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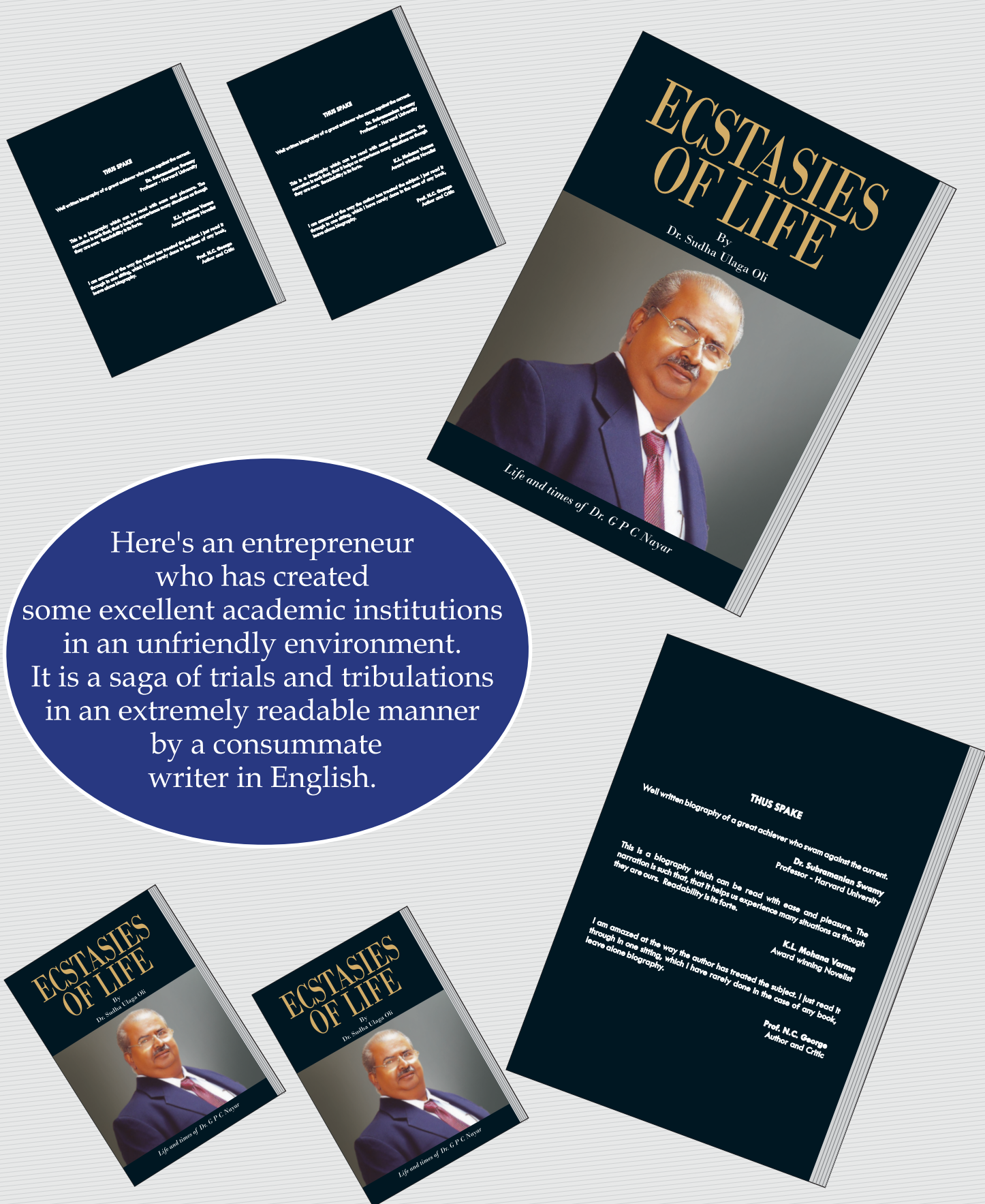
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Chairman's Overview

The year 2021 appears to be the year of transition- a bridge from the disruptions of 2020 to the brave, new post-pandemic world. As per the latest reports, around 30% of the world's population is fully vaccinated and 43% have received at least one dose. The vaccination figures in India are also making steady progress with 14% of the population fully vaccinated and 43% having received at least one dose. With the most susceptible population vaccinated, India and the world is geared to face a likely Third Wave of the pandemic, while orchestrating a safe return to normalcy.

India's relatively young population gives us hope for a resilient comeback. The educational system is cautiously re-opening with directives to all faculty and staff to be compulsorily vaccinated. Government offices and other establishments are also being directed to resume full functionality. The key to a fast recovery is the efficient vaccination of the entire population, which should be a reality by the end of the first quarter of 2022.

What does this mean for the future of the economy and for business? The pandemic has accelerated the arrival of the future. This is reflected in the huge shift in work culture brought about by the enforced work from home and distancing norms. If work can happen efficiently regardless of location, companies now need to shift their focus to hybrid models and reduce reliance on fully on-site models. This means that businesses rethink their investments in physical assets in terms of buildings and land. Instead the focus can be on building systems that can support a more fluid work culture that is not limited by time-zones and geographical distances.

Going forward we need to build on the lessons that were forced on us by the pandemic and use them to catapult us forward into a better future for all. Some trends to watch out for in the coming months are changes in the patterns of domestic and international travel, transitions in how education is delivered and consumed across the world, increasing shift to flexible and efficient digital supply chains, swings in consumer buying behavior between online and offline platforms and an omnichannel approach to consumer marketing.

Wishing all our readers a truly informative and educative experience,

Dr. G. P. C. NAYAR

Chairman, SCMS Group of Educational Institutions.

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Editorial



The current issue brings to our readers a versatile mix of articles drawn from various aspects of managerial thought and practice. We have endeavoured to showcase research that reflects the world we live in and, therefore, will be relatable and valuable to our academic and industry audiences.

The first article in this issue offers an empirical investigation into the cointegration of Indian and global stock markets (divided into developed and developing countries) over a 20-year time period. The authors provide practical inputs to investors that will help them to hedge their risks and protect their investments over the long run. Continuing this theme, we have another

article that looks at the influence of International stock markets on Indian stock markets during the peak of the Covid 19 scare.

Like never before, the pandemic brought home the importance of various state-of-the-art practices in supply chain, digital space and innovation. Theoretical and practical review of worldwide organ transplantation practices from a supply chain perspective is one of the papers included. Another study offers a view on social media use among the elderly population. This is especially relevant as the elderly population has been hit the hardest by the pandemic's enforced isolation and has turned to social media use to keep themselves connected with the outside world. Grassroots innovation regarding an alternative farming equipment developed in rural India requires more attention. The study explores its marketable strategies and possible marketing strategies for rural India.

The extent of participation of women in the workplace is a critical 21st-century issue. The new McKinsey Global Institute examines the future of women at work among six mature economies like United States, United Kingdom, Canada, France, Japan and Germany and four emerging economies like China, India, Mexico and South Africa. Understanding the importance of the study, an article that examines how companies in India and around the world have responded to regulatory calls for the inclusion of women in the top echelons of corporates worldwide is included.

Communication plays a key role everywhere and a study that assesses a company's communication style and attractiveness to investors by using readability and sentiment analysis on parts of the Annual Report is presented in this issue. An empirical analysis showing participation in the budget setting of manufacturing companies that influenced the managerial performance of managers in Iraq is presented in one of the articles. Authors have explicated the intervening role of Job Relevant Information and Job Satisfaction discreetly.

We also have a conceptual article that discusses the ramifications of bringing in Artificial Intelligence enabled innovations under IPR regulations. Finally, the issue closes with an empirical analysis of how Learning Circles influences Organizational Learning through experiential learning and employee competency.

I thank you for your continued patronage and I am confident that you will find this issue an enriching read.

Dr. Radha Thevannoor

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Cointegration of Indian Stock Market with Global Stock Markets: An Empirical Analysis Applying Vector Error Correction Model

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A b s t r a c t

Abstract: The purpose of this paper is to study the cointegration of the Indian stock market with the global stock markets, including developed countries (USA, Germany, Japan) and developing countries (Brazil, China, Indonesia) economies' stock markets over the period from January 2000 to June 2020. The extent of cointegration is determined by applying the vector error correction model (VECM), Johansen cointegration test, and Granger Causality Test. The empirical results of the study reveal the existence of cointegration between the Indian Stock Market and the US Stock market. The findings of the study indicate that investors can develop diversified portfolio strategies to hedge their risk. The results showed that Indian investors can protect their investments from financial risk by investing in developing economies like Indonesia and Brazil as they are non- cointegrated and have no long-run relationship with the Indian stock market. Similar results are obtained from Japanese and German Stock indices that show the existence of hedging opportunities for Indian investors.

Keywords: Cointegration, Vector Error Correction Model (VECM), Developed Economies, Developing Economies, Globalization, Stock Market, India

1. Introduction

Globalization has led to increasingly more interconnected international financial markets and economies with the free movement of capital as well as worldwide trade. This has enhanced the co-movement in stock price indices of global markets. The information related to economic fundamentals is transmitted from one economy to the market and thereby affects the financial markets of other economies (Wong et al., 2004; Sharma, 2011; Chand & Thenmozhi, 2013; Bhatia & Binny, 2014; Michail & Melas, 2019).

In recent times the integration of stock markets the world over has been a topic of interest among economists, academicians and researchers (Dhanaraj et al., 2013; Aggarwal & Raja, 2019; Das & Manoharan, 2019). Since the last two decades, there has been extensive growth in trade investment. The flow of external capital investment leads to the integration of international financial markets (Chen et al., 2005). In fact, diversifying the portfolio and investing in other markets has led to an increase in capital flow across borders, particularly this has happened from the developed economies to developing ones (Johansen, 1988; Zion et al., 1996; Karim et al., 2009). The increase in the flow of capital implies that across the globe, economies are integrating financially and economically. Fundamentally, the cointegrated financial markets that share long term relationships and similar trends are predisposed to generate similar returns, which restrict the benefits of international diversification and the investor's opportunity to hedge the risk. On the other hand, few other studies develop an argument against the integration of financial markets (Young, 1993; Mervyn et al., 1994).

Post liberalization, the integration of economies has become inevitable (Bekaert et al., 2002). Dhanaraj et al. (2013) studied the dynamic interdependence and interaction among the stock markets of the U.S. and six Asian markets, namely, Singapore, Hong Kong, Taiwan, South Korea, China and India. The study finds the dominance of the U.S. stock market on the selected six Asian stock markets. The association of the Indian stock market with other Asian and world stock markets has increased after the liberalization and globalization, and the international diversification opportunities can be explored by this association (Aggarwal & Raja, 2019). The study of Das and Manoharan (2019) investigated the market integration dynamics and co-movements among stock markets of three emerging economies (India, Pakistan, and Sri Lanka) in South Asia, and they found weak co-movement among these stock markets. Therefore, there is a need to understand the integration level and degree to which Indian stock markets

are associated with the other financial stock markets so as to plan strategic policy for portfolio diversification. The present paper attempts to examine the cointegration of the Indian stock market with three developed (USA, Germany, Japan) and three developing (Brazil, China, Indonesia) economies' stock markets over the period from January 2000 to June 2020. The cointegration analysis by employing the Vector Error Correction Model (VECM), the Johansen Co-integration Test, and the Granger Causality Test is used to determine the extent of cointegration among global stock markets.

The paper is structured as follows: Section 2 elaborates the literature on the cointegration of stock markets. Section 3 describes the data used and the methodology employed in the study. Further, Section 4 of the study presents the empirical results and analysis. Section 5 concludes the study with highlights on the implications of the study.

2. Review of Literature

Kenen (1976) described that financial integration is the degree to which financial markets are associated. The cointegration among the stock markets around the world has been investigated intensively by economic researchers from the past two decades; some important ones are reviewed as under. Hamao et al. (1990) studied the daily prices, intraday price, and stock returns data of the U.S., the U.K. and the Japanese markets and found significant spillover effects from the stock markets of the U.S. and the U.K. to the Japanese market. The study conducted by Chan et al. (1997) investigated the integration of 18 nations stock markets over a period of 32 years, independently and collectively in regions, in order to test for market efficiency. The study finds that only a few stock markets revealed evidence of cointegration with others. Malkamaki (1992) investigated the stock markets of Finland and Sweden and their biggest trading partners over a span of 15 years. The results found that the German and the U.K. market were leading the Scandinavian markets.

Few empirical pieces of research (Meric & Meric, 1989; Ben Zion et al., 1996; Husain & Saidi, 2000; Chen et al., 2002; Wong et al., 2004; Floros, 2005; Aktar, 2009; Srikant & Aparna, 2012) observed significant interlinkages among the developed stock market prices and the emerging economies stock prices. While few others focused on the interlinkages among the developed stock markets (Taylor & Tonks, 1989; Chen et al., 2002; Wang & Moore, 2008; Joshi et al., 2021). The cointegration among the stock markets of BRIC economies (Brazil, Russia, India, China) in the times of reforms was examined and analyzed by Aggarwal and Raja

(2019) for exploring the international diversification opportunities, and they found a long-run cointegrating association among the selected stock markets of BRIC economies. With the use of wavelet approach and a portfolio management perspective, the market integration dynamics and co-movements among stock markets of India, Pakistan, and Sri Lanka in South Asia were examined by Das and Manoharan (2019), and they found weak co-movement, which may lead to the ample arbitrage opportunities to the investors of these emerging economies. Further, for measuring the dynamic interdependence between the U.S. and six major Asian stock markets, the dominance of the U.S. stock market on these six Asian stock markets was found (Dhanaraj et al., 2013). In recent times empirical research has been conducted on regional stock markets interdependence (Ratanapakorn & Sharma, 2002; Jang & Sul, 2002; Raj & Dhal, 2008). Wong, Agarwal and Du (2004) investigated the association amongst the Indian stock markets and selected developed stock markets in the long run. They found that there is strong integration between these markets. Antoniou et al. (2007) used multivariate GARCH time-varying, conditional correlation models to study the integration between the U.S., European and the U.K. equity markets. They found that the U.K. stock market to be more associated with the European market in relation to both stock markets sectors and aggregate sectors. The literature on the cointegration of economies has also heightened the aspect of the methodology adopted. Other studies (Cappiello et al., 2006; Syllignakis & Kouretas, 2011; Horváth & Petrovski, 2013; Gjika & Horvath, 2013; Baumöhl & Lyócsa, 2014; Kundu & Sarkar, 2016 and Samadder & Bhunia, 2018) later on adopted a similar approach to study the interdependence amongst the stock markets. Though most of the studies applied weekly or daily data, there are few studies that contributed using intraday data (Egert & Kočenda, 2007, 2011; Hanousek & Kočenda, 2011). Menon et al. (2009) examined the interrelationship among the stock markets of India and China, America, Singapore and Hong Kong by applying the Engle-Granger test of cointegration over a period of ten years. The results reveal the non-existence of interdependence among the stock markets of India and America and stock markets of India and Hong Kong. On the other hand, results reveal some amount of association amongst the Indian and Shanghai stock markets, and when compared to stock markets of India and Singapore, a strong association has been observed. Khan (2011), using the Johansen test and Gregory and Hansen test, investigated the cointegration among the U.S. and 22 other developed and developing countries. The results indicated that since China, Malaysia

and Austria are not cointegrated with the U.S. market, they are highly favourable for diversification and found to be insensitive to the global index. Saha and Bhunia (2012) examined the association between the Indian and South Asian stock markets over a period of ten years by applying cointegration and Granger causality tests. They presented that both in the short run and in the long run, markets were integrated. Mohanasundaram and Karthikeyan (2015) investigated the association among stock-market indices of the USA, South Africa and India in the short and long run over a span of 10 years. The authors found a strong association between the South African stock market, the Indian and the USA markets. Samadder and Bhunia (2018) examined the association between the Indian stock market and few global stock markets from 2001 to 2016. They found low integration between the Indian and French stock markets. On the other hand, strong integration has been observed between the stock markets of India and Germany and the stock markets of India and the USA in the short run. Gulzar et al. (2019), using the cointegration test of Johansen and Juselius, the Vector Error Correction Model and the Garch-Bekk model, investigated the integration as well as the spillover effect of the global financial crisis on the financial markets in Asia over a span of 10 years. They found that in the post-crisis period, there has been a strong relationship between the U.S. and emerging stock markets. Recently, Zhou et al. (2020) examined the risk-integration and the degree of dependence between the Values-at-Risk (VaRs) estimates for the two major pharmaceutical stock markets in the world: the USA and China. Haq and Shirwani (2021) found a long-run relationship between the stock markets of China, the US and Hongkong.

The literature review indicates that the scholars have focused either purely on developed economies or regional economies. Few others have focused on the methodology adopted. The body of literature also shows that there are mixed results as far as stock market cointegration is concerned. Therefore, the present study emphasizes the cointegration of the Indian stock market with select stock markets of developed and developing economies.

3. Research Methodology

The primary objective of the study is to examine the degree of cointegration of the Indian stock market with major developed and developing stock markets. To achieve the objective, three developed (USA, Germany, Japan) and three developing (Brazil, China, Indonesia) economies have been considered on the basis of their GDP at the global level [1]. The stock indices monthly data of countries under study has

been taken from January 2000 to June 2020. E-views statistical package has been used to execute the analysis of data. The study applies ADF, Johansen cointegration, Granger causality, and VECM statistical tests.

3.1 Unit Root Test Augmented Dickey-Fuller

The purpose of the Unit Root Test is to examine the stationarity nature of the series under study. Augmented Dickey-Fuller (1979) Stationarity Test was applied to examine the nature of the series under study. The following hypothesis is developed to examine the stationarity in the series.

Null Hypothesis (H_0): Unit root exists in series

Alternate Hypothesis (H_1): Unit root does not exist in series.

The following regression equation can be employed for the Unit Root test:

$$\Delta Y_t = \phi Y_{t-1} + U_t$$

3.2 Johansen Cointegration Test

Co-integration can be termed as a characteristic that enables the collective movement of two or more variables over time and space. In the present study, the relationship of the Indian stock market has been studied with the developed and developing countries by applying Johansen's Cointegration Test in the long run. This statistical test is devised for non-stationary series. Co-integration testifies the hypotheses regarding the long-term relationship among the time series under the study.

Null Hypothesis: Co-integrating equations do not exist among variables.

Alternative Hypothesis: Co-integrating equations exist among variables.

Dickey, Jansen, & Fuller (1991) revealed that the presence of cointegration among the variables under study leads to confirm the existence of a long-run equilibrium relationship among the variables. The absence of cointegration confers the non-existence of the long-run relationship among variables. Variables can move randomly with no linkage from each other.

Johansen Cointegration Test

Trace Test

$$\lambda_{\text{Trace}} = -N \sum_{i=r+1}^n \log(1 - \hat{\lambda}_i)$$

Maximum Eigen Value Test

$$\lambda_{\text{Max}} = -N \log(1 - \hat{\lambda}_{r+1})$$

where N = number of observations

$\hat{\lambda}_{r+1}$ = Minimum estimated eigen values

3.3 Vector Error Correction Model (VECM)

Vector Error Correction Model is devised when the long-run relationship has been confirmed from the statistical results of the Johansen Cointegration test.

VECM (Developed Economies)

$$\Delta \ln BSE_t = \phi_t + \sum_{n=1}^l \alpha_{11,n} \Delta \ln BSE_{t-1} + \sum_{n=1}^l \beta_{12,n} \Delta \ln NIKKIE_{t-1} + \sum_{n=1}^l \gamma_{13,n} \Delta \ln GDAX_{t-1} + \sum_{n=1}^l \phi_{14,n} \Delta \ln NASDAQ_{t-1} + \delta_1 EC_{t-1} + \varepsilon_t$$

VECM (Developing Economies)

$$\Delta \ln BSE_t = \phi_t + \sum_{n=1}^l \alpha_{11,n} \Delta \ln BSE_{t-1} + \sum_{n=1}^l \beta_{12,n} \Delta \ln JKSE_{t-1} + \sum_{n=1}^l \gamma_{13,n} \Delta \ln BVSP_{t-1} + \sum_{n=1}^l \phi_{14,n} \Delta \ln SSE_{t-1} + \delta_1 EC_{t-1} + \varepsilon_t$$

Where,

EC = Vector Error Correction Term

The significant value of the coefficient directs that the historical value of errors plays a pivotal role in determining the present results.

4. Empirical Results and Analysis

Table 1 depicts the unit root test of stationarity, including Augmented Dickey-Fuller tests (ADF). The statistics show that the p-value of ADF statistics for both developing and developed economies lies higher than 0.05, which implies the non-existence of stationarity in the series. It means the series under study are non-stationary.

Table 1: ADF Test Statistics (Unit Root Test of Stationarity)

Country	Indices	At Zero Level		Country	Indices	At Zero Level	
		ADF Statistics	p-value			ADF Statistics	p-value
India	lnBSE	-1.9873	0.6074	India	lnBSE	-1.9873	0.6074
USA	lnNASDAQ	-2.9856	0.1363	Brazil	lnBVSP	-1.9184	0.6446
Germany	lnGDAX	-2.7949	0.1989	China	lnSSE	-1.9119	0.6480
Japan	lnNIKKE	-2.5767	0.2911	Indonesia	lnJKSE	-1.1545	0.9182

Source: Author's Own work; Exogenous: Constant; Laglength (Automatic-based on SIC; Maximum lag = 14)

Table 2 presents the statistics of the Johansen Co-integration Test of developed economies. The statistics of the Trace test leads to rejecting the Null hypothesis and signifies the presence of maximum one cointegration vector. The results show that the Trace Statistics value (105.018) is higher than the critical value (47.856) at a 5 percent significance level. A maximum Eigenvalue test was devised to investigate the accurate number of cointegration vectors. The statistics of the Maximum Eigen Value test leads to rejecting the Null Hypothesis at a 5 percent significance level for one cointegrating vector. In the Maximum Eigen Value test, computed Trace statistics value (79.532) is higher than Critical value (27.584) at a 5 percent level of significance. It implies rejecting the Null hypothesis and suggests the existence of one cointegrating vector.

The cointegration statistics of developing economies are depicted in Table 3. The Trace test, under Johansen Co-integration, rejects the Null hypothesis at a 5 percent level of significance and suggest the maximum one cointegration vector with Zero Co-integration. The test shows that the Trace Statistics value (75.827) is higher than the critical value (47.856) at a 5 percent level of significance. To examine the exact number of cointegration vectors, the Maximum Eigenvalue test was executed. The statistics of

the Maximum Eigen Value test leads to rejecting the Null Hypothesis at a 5 percent significance level for one cointegrating vector. In the Maximum Eigen Value test, computed Trace statistics value (51.781) is higher than Critical value (27.584) at a 5 percent level of significance. It implies to reject the Null hypothesis and suggest the existence of one cointegrating vector.

Vector Error Correction Model (VECM) has been performed at lag 2, which was confirmed as optimum lag for the VECM after doing the lag exclusion test. The above statistics indicate that the values of t-statistics of all stock indices under study are higher than 1.96. It means all stock indices are compromising and play a key role in correcting the error. None of the stock indices is dominating other stock indices. Vector Error Correction Model (VECM) has been performed at lag 6, which was confirmed as optimum lag for the VECM after doing the lag exclusion test. The error correction model depicts that t-statistics of stock indices of developing economies are lower than 1.96, which signifies that none of the stock indices of developing economies under the study has a significant impact on other stock indices. It shows that all the stock indices are equally dominant, so none of the stock indices are compromising series and do not contribute to correcting the error.

Table 2: Johansen Co-integration Test

Hypothesized No. of C.E. (s)	Developed Economies (USA, Germany, Japan)							
	Unrestricted Cointegration Rank Test (Trace Test)				Unrestricted Cointegration Rank Test (Eigen Value Test)			
	Eigen Value	Trace Statistics	0.05 Critical Value	p-value	Eigen Value	Trace Statistics	0.05 Critical Value	p-value
None*	0.016	105.018	47.856	0.000	0.016	79.532	27.584	0.000
At Most 1	0.003	25.486	29.797	0.145	0.003	16.516	21.132	0.196
At Most 2	0.001	8.969	15.495	0.368	0.001	6.161	14.265	0.593
At Most 3	0.001	2.808	3.841	0.094	0.001	2.808	3.841	0.094

Table 3: Johansen Co-integration Test

Hypothesized No. of C.E. (s)	Developing Economies (Brazil, China, Indonesia)							
	Unrestricted Cointegration Rank Test (Trace Test)				Unrestricted Cointegration Rank Test (Eigen Value Test)			
	Eigen Value	Trace Statistics	0.05 Critical Value	p-value	Eigen Value	Trace Statistics	0.05 Critical Value	p-value
None*	0.010	75.827	47.856	0.000*	0.010	51.781	27.584	0.000*
At Most 1	0.003	24.046	29.797	0.198	0.003	13.480	21.132	0.409
At Most 2	0.002	10.565	15.494	0.239	0.002	9.451	14.265	0.251
At Most 3	0.000	1.1145	3.841	0.291	0.000	1.115	3.841	0.291

Table 4: Vector Error Correction Model (Developed Economies)

Country	Indices	Error Correction Model		
		Co-efficient	Std. Error	t-statistic
USA	D(lnNASDAQ)	0.00038	0.0004	4.7721
Germany	D(lnGDAX)	1.4962	0.00036	7.3531
Japan	D(lnNIKKIE)	0.00056	0.0018	-1.6492
	C	4.0497		

Table 5: Vector Error Correction Model (Developing Economies)

Country	Indices	Error Correction Model		
		Co-efficient	Std. Error	t-statistic
Brazil	D(LNBVSP)	-0.00126	0.00160	-1.6636
China	D(LNSSE)	-0.00077	0.00135	-0.5738
Indonesia	D(LNJKSE)	-0.0085	0.0013	-1.6492
	C	-1.811		

The above statistics show that the bivariate causality exists between NASDAQ and BSE. The magnitude of short-term causality stands high (42.70676) from BSE to NASDAQ, whereas weak short-term causality (12.85022) exists from NASDAQ to BSE. The granger causality statistics confirm BSE as an exogenous variable and make the NASDAQ an endogenous variable. The above statistics show that the

Univariate causality exists between SSE and BSE. The magnitude of short-term causality stands high (17.633) from SSE to BSE, whereas non-significant short-term causality exists from BSE to SSE. The granger causality statistics confirm that the Indian stock market is affected by the Shanghai stock exchange, but the reverse does not hold true.

Table 6: VEC Granger Causality Test (Developed Economies)

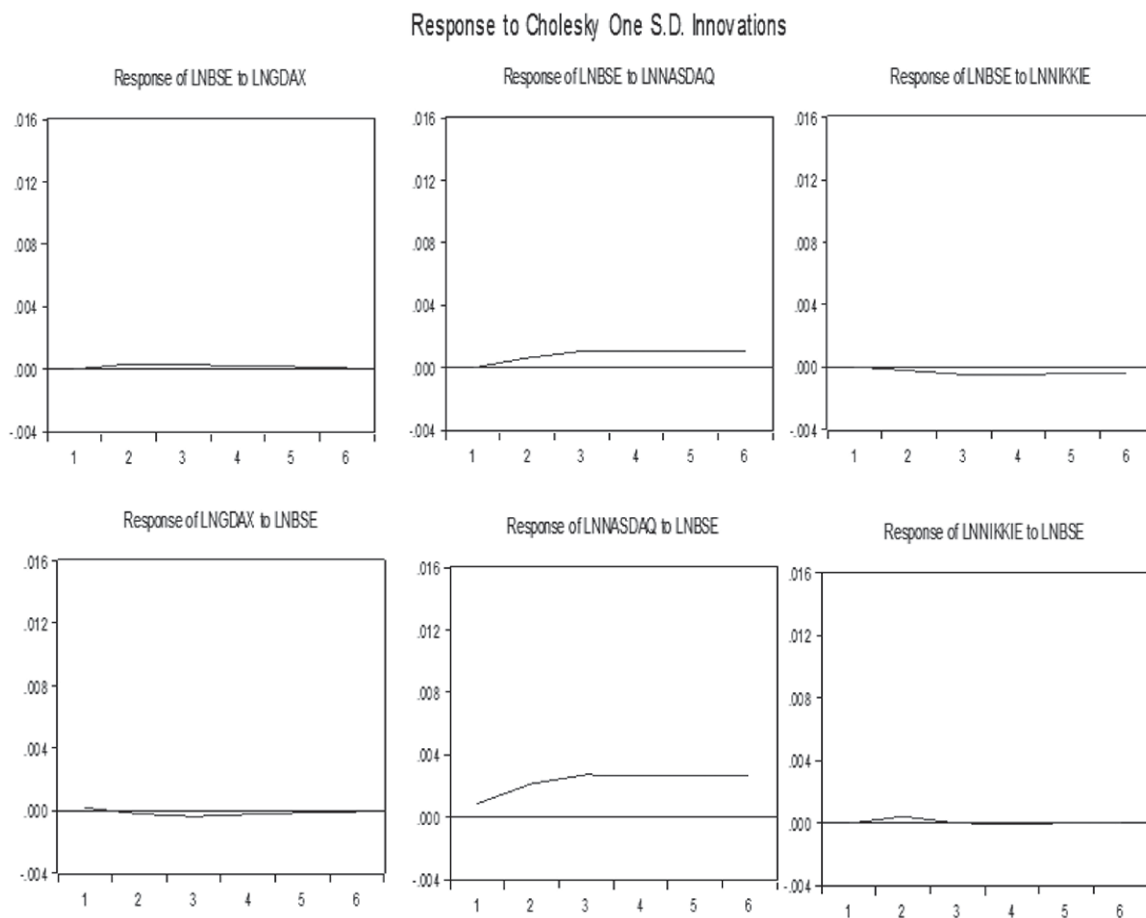
Dependent Variable	Excluded	Chi-Square	df	p-value
D(lnBSE)	D(lnNASDAQ)	12.85022	2	0.0016
	D(lnGDAX)	3.792608	2	0.1501
	D(lnNIKKIE)	3.466235	2	0.1767
D(lnNASDAQ)	D(lnBSE)	42.70676	2	0.0000
D(lnGDAX)	D(lnBSE)	6.602666	2	0.0368
D(lnNIKKIE)	D(lnBSE)	8.433468	2	0.0147

Table 7: VEC Granger Causality Test (Developing Economies)

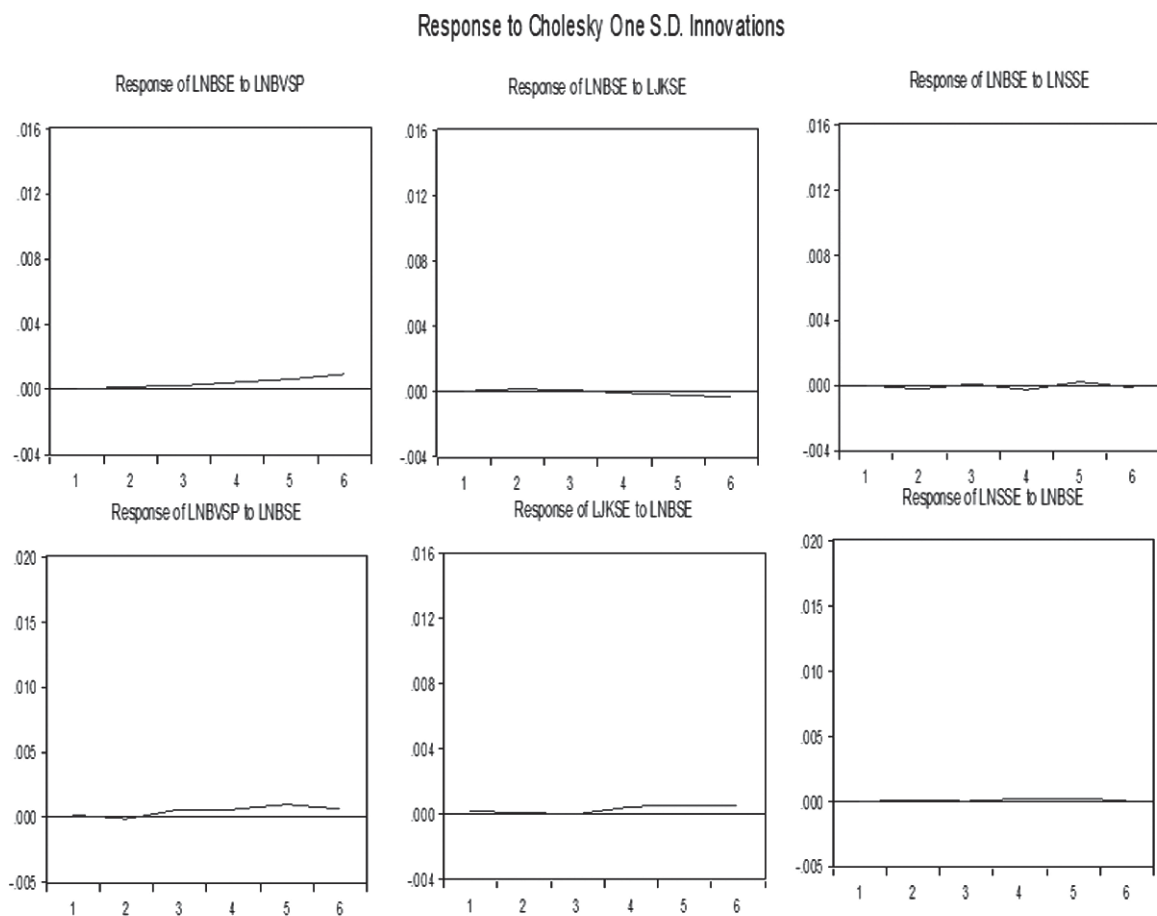
Dependent Variable	Excluded	Chi-Square	df	p-value
D(lnBSE)	D(lnBVSP)	4.503046	6	0.6089
	D(lnSSE)	17.63375	6	0.0072
	D(lnJKSE)	2.785230	6	0.8353
D(lnBVSP)	D(lnBSE)	13.58590	6	0.0346
D(lnSSE)	D(lnBSE)	1.731680	6	0.9426
D(lnJKSE)	D(lnBSE)	9.130593	6	0.1664

The below Graph 1 depicts the responsiveness of BSE to the shocks in other stock indices and the responsiveness of stock indices of developed economies to any shock in the Indian BSE. The impulse response graph portrays the non-significant sensitivity of GDAX and NIKKIE to any shock in BSE and vice versa. In case of response of BSE to any shock in NASDAQ, the impact is positive but not significantly strong and remains near to the baseline. But while considering the sensitivity of NASDAQ to any shock in BSE, the impulse is significant and remains strongly positive throughout the periods. The graph implies the bivariate relationship between BSE and NASDAQ in which BSE has a strong influence on NASDAQ.

The below impulse response Graph 2 portrays the sensitivity of BSE to the shocks in stock indices of developing economies and vice versa. The impulse response function shows the non-significant responses of stock indices of developing economies to any shock in BSE as the impulse lies at the bottom line. A similar trend has been witnessed while examining the responsiveness of the stock indices under study to any shocks in BSE. The impulse turns to the negative throughout the periods under study. It further signifies that the stock indices of developing economies do not have a significant influence on each other and remain independent at large.



Graph 1: Impulse Response: Developed Economies



The Variance Decomposition statistics depicted in Table 8 indicates that BSE is explained by 0.36% NASDAQ, whereas NASDAQ is explained by 2.630 % BSE. In the case of other markets, no developed economy explained BSE significantly, and BSE also does not play a key role in

explaining other markets. The Variance Decomposition statistics depicted in Table 9 indicates that the variance of none of the emerging economies under study is explained by BSE, and BSE also is not explained by any stock indices under study.

Table 8: Variance Decomposition (Developed Economies)

Period	Variance Decomposition			Variance Decomposition		
	lnBSE			lnNASDAQ	lnGDAX	lnNIKKIE
	lnNASDAQ	lnGDAX	lnNIKKIE	BSE	BSE	BSE
1	0.000000	0.000000	0.000000	0.314927	0.013567	0.000390
2	0.092849	0.024399	0.010600	1.156965	0.019653	0.036695
3	0.234995	0.029864	0.041912	1.922752	0.039676	0.025021
4	0.304021	0.027903	0.054666	2.267906	0.037986	0.019275
5	0.341646	0.024386	0.059966	2.472201	0.033287	0.015601
6	0.369898*	0.020725	0.061794	2.630937*	0.029293	0.013091

Table 9: Variance Decomposition (Developing Economies)

Period	Variance Decomposition of			Variance Decomposition of		
	lnBSE			lnBVSP	lnSSE	lnJKSE
	lnBVSP	lnSSE	lnJKSE	BSE	BSE	BSE
1	0.000000	0.000000	0.000000	0.008034	0.000312	0.013038
2	0.005278	0.009303	0.004330	0.006730	0.002284	0.006934
3	0.010799	0.006914	0.003917	0.044473	0.001552	0.004453
4	0.029419	0.012584	0.004539	0.064362	0.005491	0.026452
5	0.058411	0.014749	0.008901	0.112418	0.006655	0.044391
6	0.117393	0.013636	0.018715	0.117194	0.006179	0.056153

5. Conclusions and Implications

The present paper attempts to examine the cointegration of the Indian stock market with three developed and three developing economies' stock markets. The presence of a bidirectional relationship between the USA and Indian stock indices signifies the interdependence of these global stock indices. This significant interdependence limits the investment risk hedging opportunities for the investors. Investors cannot diversify their risk by investing in these two markets simultaneously. The strong influence of the Indian stock market in the bidirectional relationship between the USA and India also implies the high sensitivity of the USA stock index towards any shocks in the Indian stock index. The absence of causality among stock indices of developing economies indicates the independence of developing stock indices from each other. It implies that diversifying investment opportunities are available among emerging economies. Investors can easily diversify their investments and hedge their risk probabilities by investing simultaneously in these developing economies. The chances of reaping high profits for the investors become high while investing in these stock indices.

The present study pens down significant insights for policymakers and global investors. For investors, the study

suggests myriad opportunities to hedge against global investments and against the erosion of favourable financial conditions to reap the expected return from investment. As indicated from the results of the study, Indian investors can protect their investments from financial risk by investing in developing economies like Indonesia and Brazil as they are non- cointegrated and have no long-run relationship with the Indian stock market. Similar results are obtained from Japanese and German stock indices that show the existence of hedging opportunities for Indian investors. Investors can establish their startups and stretch their existing businesses in these markets in case the Indian market is under some financial constraints.

Further, the study suggests that investors should remain cautious against investment in the U.S. market as the Indian and U.S. markets have significant cointegration and have long-run equilibrium linkage with each other. Similar risks can emerge simultaneously in these markets. Hedging opportunities against global investment remain rare for Indian companies in the U.S. Therefore, it is positively expected that empirical results of the study would be useful for individual investors, institutional investors, investment companies, assets portfolio managers, and policymakers.

End Note [1] GDP (Millions of U.S. Dollars) 2019

Developing Economies	GDP (Millions of U.S. Dollars)	Developed Economies	GDP (Millions of U.S. Dollars)
China	143,42,903	US	214,27,700
Brazil	18,39,758	Japan	50,81,770
Indonesia	11,19,191	Germany	38,45,630
India	28,75,142		

Source – <https://datacatalog.worldbank.org/dataset/gdp-ranking>

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Women in the Board Room: A Mandate- Intent and Compliance by Companies

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A b s t r a c t

This paper discusses implementing outcomes of corporate gender diversity policies issued by regulatory policies in Indian Corporates. The policy formulators have taken the initiative to promote women's participation in the economic decision-making process by mandating a quota system for gender diversity. This article points out the lack of intent of the corporate mindsets in implementing these policies. Despite implementing a mandatory regulation applicable for all companies in India, 11 PSUs have no women on their boards. Instances of women director appointments towards the last dates to fulfil compliance, pay inequality on the board, and lower representation in leadership roles reflect unfulfilled legislative objectives. The regulatory framework is insufficient to provide its efficacy to the full as we are economically, socially and culturally male dominant. Mandatory regulation of including one woman on the corporate board might not help achieve gender diversity in Corporate India. Our study recommends that policymakers implement a stipulated percentage of women into Corporate Boards and committees.

Keywords: *Gender diversity; Corporate Governance; Women Directors; Board of Directors*

"It is impossible to think about the welfare of the world unless the condition of women is improved. It is impossible for a bird to fly on only one wing." - Swami Vivekananda

1. Introduction

In the year 1893, New Zealand became the first sovereign nation to grant women suffrage. Over the last 125 years, most countries have enacted legislation to accord women equal rights as men. However, gender equality is still a work in progress in most walks of life. Gender inequality is also best reflected in the business world. While women workforce participation has gradually increased, there still exists a considerable disparity in the responsibilities assigned and remuneration paid to women. Gender diversity is one of the most dubious topics across the globe. According to the latest report of the World Economic Forum, the estimates reveal that women would take another 118 years to earn the same as men.

Proponents of gender diversity contend that it will promote inclusiveness and a more accommodating leadership style. While the critics of enforced gender diversity suggest that if a less qualified woman is promoted and appointed in top positions, it will eventually lead to chaos in decision making and consequently reduce the firm's profitability and performance. In India, gender bias is still a significant hurdle. Cultural taboos, stereotypes and social barriers often limit the opportunities for women to home management and caregiving. Many social and regulatory frameworks have been brought into place to strengthen women's status in society and promote them to join the mainstream workforce.

In comparison with the global trends, women's participation on Indian corporate boards is meagre. The Securities and Exchange Board of India (SEBI) has adopted the quota system to address this issue. In consonance with these guidelines, SEBI has mandated the appointment of a minimum of one woman director in every listed company or company with a paid-up share capital of ₹100 crores or more or revenue of ₹300 crores or more (Balasubramanian & Mohanty, 2015). SEBI and Listing Obligations and Disclosure Requirements (LODR) regulations mandated that the Board of Directors (BOD) should have an optimal mix of executive and non-executive directors, with a minimum of 50% of non-executive directors including the one-woman director. Further to strengthen gender diversity, SEBI has mandated the appointment of a minimum of one independent woman director by April 1, 2019 as applicable for the first 500 listed companies. The remaining 1,000 listed entities should make the compliance by April 1, 2020.

The growing consensus in the corporate community exclaims gender diversity to be vital for two prerogatives.

First, that diversity bestows level pegging prospects for women to grow, excel, and, in turn, corporates can use these talented women to grow their organisation. Furthermore, the proponents of gender socialisation theory advocate that women are caring and more community-oriented because of their upbringing (Carlson, 1972; Eagly & Crowley, 1986). The second prerogative is that diversity will enhance directorial practices and accomplishment. The Bank of America executive vice president, Karen J. Curtin, also holds that more diversity is a correct mechanism for society because it enhances shareholder's value.

The literature on gender disparity divides the scholars based on mixed opinions, and a study of this kind is necessary for multiple reasons. Firstly, the selection of women for BOD is basically from the family and friends pool, without thrusting on their capabilities. No new faces are entertained into the board unless the women director belongs to the old women club. Corporates also voiced for scarcity in talent for boards because everyone desires a chief executive officer (CEO) or an experienced women director, without acknowledging that men also started afresh.

Secondly, the oscillating reputation of women in India. Society in the ancient Vedic period bestowed high status, equal footing with men and liberty with societal sanctions to the women. However, the status and respect of women diluted during the later Vedic period. During the medieval Mughal era, women's reputes declined as they had to practice purdah, Jauhar, Sati system, Devadasi, and were victims of early child marriage, dowry, and sexual harassment, imbuing them with a lingering history of sufferings and distress. At present, the status of women in India is eminent, outshining themselves by occupying chairs as President, Prime Minister, Governors, Chief Ministers, Lok Sabha speaker, Union Ministers, Finance Minister, Defense Minister and as CEOs of Multinational National Corporations. Several studies show that the inclusion of women into the boardrooms bring diverse perspectives, resulting in the improvement in the board dynamics and enhancement of collective decision-making processes (Westphal & Bednar, 2005).

Third, the Indian corporate culture is not women-friendly. In a survey conducted by Times Jobs¹ from over 2,500 working women, the results show that 70% of women admit that their workplace is not women-friendly (Ayyar, 2017). Men largely occupy the Indian workplace, recognitions are not at par, and women suffer personal and social hardships. Focusing on

¹ See <https://timesofindia.indiatimes.com/business/india-business/70-women-employees-say-their-workplace-is-not-female-friendly/articleshow/58005040.cms>

these cultural taboos, this study will unravel the perspectives of Indian corporates and discuss whether India has espoused a quota system as an intent of women empowerment, a decorative piece to the BODs or making it an ethos for corporate decision making.

The rest of the paper is arranged into the following sections. In Section 2, we discuss the overview of the extant literature. Section 3 provides a comparative analysis of gender diversity practises among various nations and firms and concludes with recommendations in the final section.

2. Overview of the Literature

Gender diversity refers to an impartial or nondiscriminatory representation of people from different genders. Corporate gender diversity is predominantly the combination of men and women in a corporate board structure that leverages for better resolution and increases firm performance. A growing body of literature emphasises executive and corporate gender heterogeneity² (Rose, 2007; Cumming et al., 2015). Several studies have empirically shown the positive impact of gender heterogeneity on firms financial performance (Campbell & Mínguez-Vera, 2008; Liu et al., 2014), factors affecting board gender composition and on firm policies (Adams & Ferreira, 2009; Kirsch, 2018), alleviation of the corporate risk-taking behaviour (Khaw et al., 2016), better governance excellence (Adams & Ferreira, 2009), healthier corporate sustainability practices (Nadeem et al., 2017), reduce corporate environmental violations (Liu, 2018), and women in the boardrooms and its association with good CSR ratings (Bear et al., 2010; McGuinness et al., 2017).

Past studies on corporate board gender diversity have been limited to the US or other developed nations. Therefore, gender diversity discussed in the existing literature is still nascent among emerging markets such as India. Among a few Indian studies, Kaur and Singh (2015) test whether the inclusion of women reduces the under-pricing of the IPO. By drawing a sample of 230 Indian companies and employing the multivariate regression model, the study's findings show the negligible influence of the existence of women directors on the under-pricing of the IPO. In other words, women directors in the corporate board during the IPO did not act as 'quality signals' regarding reducing IPO underpricing in India. Recently, Srivastava et al. (2018) used panel data of 300 firms listed in CNX Nifty from the

year 2001 through 2015 and examined the relationship between variables related to gender diversity on corporate boards with other financial characteristics of the firm, namely, return on assets and cost of equity. The overall results showed a negative association between women directors in corporate boards with the cost of equity and a positive relationship between the inclusions of women directors in the boards with the return on assets.

Sanan (2016) empirically investigated the effect of gender diversity in the corporate boards on the social and financial performance of Indian companies. Using a sample of 54 companies, their research found no significant association of gender heterogeneity in the boardrooms with that of the social and financial performance of the companies. The study advised for further investigation on various aspects of corporate governance and firm performance in India. In a study on publicly listed Indian banks, Ghosh (2017) used the information from 2003 through 2012 and probed gender heterogeneity on bank behaviour. The study showed that gender diversity improves stability but eventually lowers profitability. In a comparative study between the Indian and Chinese workplace systems, Jonge (2014) showed that in India's case, the ratio of women in the corporate board is higher in the state-controlled firms than the family business firms of Chinese counterparts. This evidence reflects the greater representativeness of political empowerment of women in India than in China. The author also found lesser women economic empowerment in India than in China based on the government's evidence appointing members to the boards in the state-owned firms. The extant literature on gender diversity and its influence on a firm's performance is mixed. Among a few studies showing the positive relationship between gender heterogeneity and its effect on firms' performance, Gul et al. (2011) used a total of 7597 US firm years. They reported a positive association between the informativeness about the stock prices and gender diversity. In another study, Campbell and Mínguez-Vera (2008) analysed the data of 68 non-financial firms. They found that the relationship between a firm's performance measured through Tobin's Q and gender diversity of the board is positive. Similarly, Carter et al. (2003) studied the association between board diversity and firms' performance on 638 fortune 1000 companies and found a positive relationship. Several other studies also found positive evidence of corporate board gender heterogeneity on firms' performance (Erhardt et al., 2003; Smith et al., 2006; Bonn, 2004).

2. We use gender diversity and gender heterogeneity interchangeably in this paper.

In contrast, Ahren and Dittmar (2012) used a sample of 248 Norwegian public limited firms and found a negative relationship between gender heterogeneity of corporate boards and firms' performance. In a similar vein, Adams and Ferreira (2009) employed 1,939 US firms and found a negative association between firms' characteristics and board characteristics. In another study of this kind, Bøhren and Strøm (2010) analysed 203 listed non-financial companies of Oslo exchange. They showed a negative association between a firm's financial performance and the proportion of women directors.

The majority of studies, as discussed, were carried out in the US and developed countries. This study reflects a lack of studies in emerging markets, including India. Thus it is imperative to examine the issue of gender diversity in emerging economies. In this paper, we attempt to extend the debate on the existing policy regulations about the quota system in the globe and compare it with the Indian context. We provide policy suggestions based on the trend analysis and extant literature available on the Indian corporate scenario.

3. Research Methodology

The study is exploratory and based on secondary data collected from various global and Indian study reports on gender diversity. The data related to the Indian corporate women directorship was cross-verified and validated with the corporate annual reports and CMIE Prowess database. The study analysed the facts revealed about women directorship in the Global Scenario and NIFTY500 companies from India. The period of study is from 2014 through 2020 for Indian public listed companies forming part of NIFTY500.

4. Current Status on Corporate Gender Diversity

4.1 Global Comparison

Many countries have introduced the quota system to increase the number of women directors in the BOD. However, such regulation is subject to scrutiny and discussed controversially. Among a few nations, the Norwegian government in the year 2003 mandated 40% of the women in the corporate board for listed companies which took full effect in 2008. Like Norway, countries, namely Italy, Germany, Belgium and France, have also implemented the quota regulation, including sanctions for non-compliance. These sanctions can be in the form of fines, warnings, deferral of directors benefits, abandonment of the elections of the boards, penalisation and suspension of the companies and their offices by the court order (European Commission, 2012; Kisch, 2017). Countries to implement the quota system without sanctions are Israel, India, Malaysia, Iceland, Netherlands, and Spain.

On the other hand, countries that have introduced some government regulations for their public sector companies are Kenya, Greece, Ireland, Denmark, Austria, Slovenia, Finland, and Poland. In some countries, the firm pledges and introduces disclosure requirements. There are soft-law legislative measures related to gender diversity (Terjesen et al., 2015). Countries such as the US, Japan and China still have not adopted the quota system to increase the number of women in BOD. As an outcome of these regulatory initiatives, there has been a significant surge in women directors worldwide (see Figure 1).

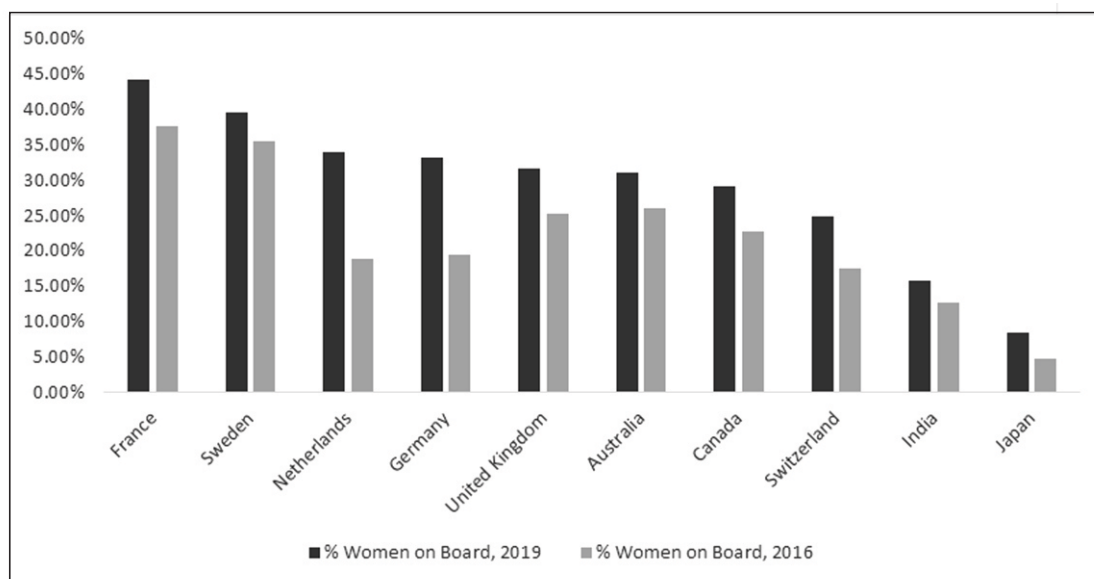
Table 1: Regulatory thresholds for companies in the boards of various countries

Country	Requirement Type	Threshold
India	Compulsory	Minimum one female director
U.A.E.	Compulsory	Minimum one female director
Malaysia	Compulsory	30%
Germany	Compulsory	30%
Netherlands	'Comply or explain'	30%
Belgium	Compulsory	33%
Italy	Compulsory	33%
Spain	'Comply or explain'	40%

Country	Requirement Type	Threshold
France	Compulsory	40%
Norway	Compulsory	40%
Denmark	'Comply or explain'	40%
Finland	'Comply or explain'	Minimum one female director
Luxembourg	'Comply or explain'	40%
Malaysia	'Comply or explain'	30%
Turkey	'Comply or explain'	25%
Pakistan	Mandate for new directors	Minimum one female director
Portugal	Mandate for new directors	33%

Source: Emelianova, O. & Milhomem, C. (2019); Women on Boards 2019 Progress Report (2019).

Figure 1: Increase in women directorship across the globe



Source: Catalyst (2019)

Diverse policies about gender diversity across the globe have prompted various scholars and policy formulators in this research domain. A report by Emelianova and Milhomem (2019) brings out the facts about firm practices worldwide. According to this report, 20% of the directors were women in 2019, and 57.3% of companies have exceeded that legal quota requirement. In directorship, women (22%) were over boarded compared to men (12%). In the year 2019, both emerging and developed economies show an increase in women directorship. The report

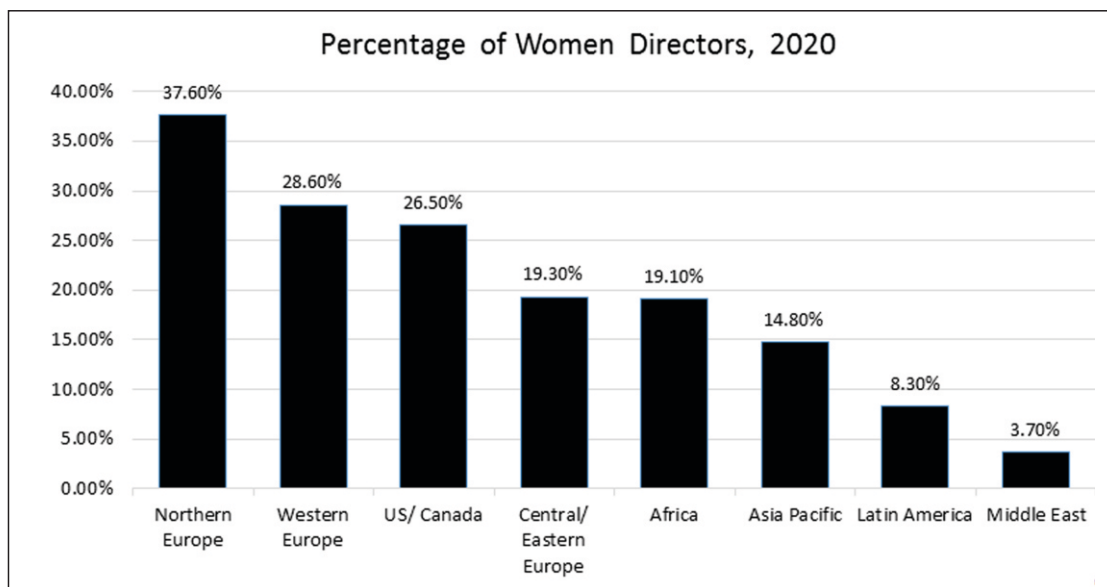
suggests a minimum of 30% to have a tipping point in the board; 36% of the boards of the developed economies have achieved the same and started reaping its benefits. Companies dealing in healthcare, financial activities, telecommunications, and utility companies show the highest representation of women members contributing to 20% to 22% as directors. Whereas companies focusing on industrial technology, basic materials, and energy shows the minimum representation contributing to 16% to 18% of women directors.

As per the Catalyst (2020), out of 2,765 MSCI ACWI Index companies, women hold 20% of directorships in the year 2019 in various companies compared to 17.8% in 2018. The report also emphasises the importance of legal mandate, showing that countries that have implemented the quota system reach a critical mass (30% of the directorship). As per the report, 71.8% of MSCI ACWI Index companies established in countries with a legal mandate of women directors had at least 30% of the BOD as women directors. Whereas companies incorporated in the countries without the legal mandate of women directors, only 20.3% of boards have reached the critical mass (30% of the directorship), and 23.0% of the boards had no women directors.

In another report by Deloitte (2018), Global's Women in the Boardroom, covering 8,648 companies across 66 countries, women reported 16.9% of seats in the board in the year 2018 compared to 15% in 2016. The report also finds that although the board diversity has just gone up by a mere 1.9% in two years, the percentage of women directors has increased by 6%. The report emphasises that the growth rate of board diversity is significantly low; at this pace, we will need approx thirty years to bring complete gender equality. Companies with a woman chair had almost more than 50% women directors on board than companies with men chairs. The women director tenure (5.5 years) is comparatively lower than that of men (8 years).

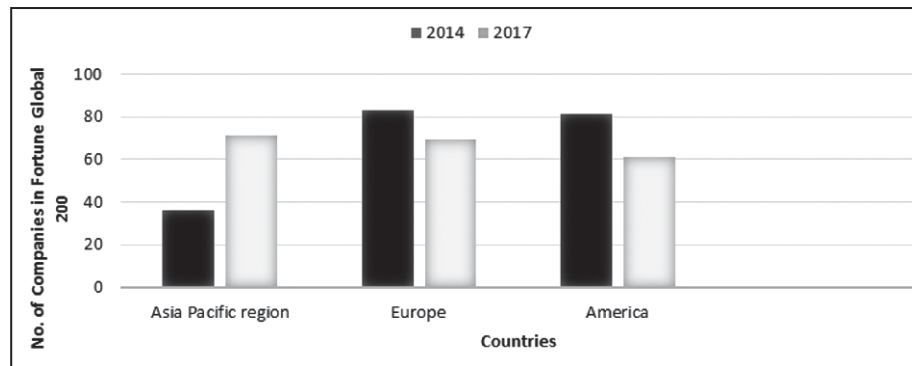
Figure 2 shows the percentage of Women Director International, 2019. The figure shows the top regions for women directors on boards is Northern Europe, Western Europe, the US and Central Europe. In contrast, the lowest is in the Middle East, followed by Latin America, Asia Pacific and Africa. The trend shows the impact of the mandate on the increase in women directorship. Data signifies that there is a positive correlation between regulatory requirements imposed and the increase in the percentage of women directors.

The Corporate Women Directors International (2020), on the Asia-Pacific region accompanying 20 economies, focused on 1,577 companies. All those companies considered in this region show that women's representation is only 15.1% of board seats and are vastly underrepresented in the boardrooms. It is clear from the report that the Asia-Pacific region still falls behind most of the other regions in the globe in appointing women to BOD. Although improvements were witnessed, wherein 74% (1,164 out of 1,573) companies now have a minimum of 1 female board director, 274 companies in this region have a critical mass in their board by having three or more woman directors on the board, which was only 179 in 2016. Asia Pacific region is ranked first in the number of women leading the business, but the number of women on board is not that significant.



Source: Corporate Women Director's International (CWDI), 2020

Figure 2: Global Comparison of Women on Boards

Figure 3: Fortune Global 200 Companies

Source: Corporate Women Directors International (2018)

Figure 3 represents the geographical spread of the Fortune Global 200 listed companies as per the report of the CWDI (2018). It shows an increase in Asia-Pacific companies from 36 (2014) to 71 (2017), a decrease in European companies from 83 (2014) to 69 (2017), and American companies from 81 (2014) to 61 (2017). Despite Europe being the initiator to implement the quota system legislation related to gender diversity, the decrease in its corporate representation in Fortune Global 200 listed companies indicates the impact of women participation not contributing to the company's growth.

Based on this report, further comparison reveals that nations with legislative quotas systems have reached 33% women participation in BOD compared to 17.1% for countries not having a quota system. Considering top companies with more women directors, 16 companies (from the top 20 list) are from nations adopting the quota system. Hence, we can justify that getting women on board using legislative power has a positive impact on increasing women directors.

Table 2: Comparison of various key metrics between S&P 500 USA and Nifty 500 India

Key Metrics	S&P 500 USA	NIFTY 500 India
Ratio of females on corporate boards	28%	16.9%
No female director on board	0%	3%
Board with only just one female director	5%	53%
Minimum two or more female directors on the board	95%	34%
Minimum three or more female directors on the board	39%	10%
Average number of females per board	2.8	1.03
Ratio of females in audit committee	26%	16%
Remuneration committee	15%	18%
Nominating / Governance Committee	28%	16%
Independent Board Chairs	4%	0.7%

Source: Institutional Investors Advisory Services (2020) and Women Participation on Key Committees, Spencer (2020)

Table 2 show that India is still lagging behind the global scenario in all aspects of gender diversity. Therefore, women representation is necessary for the corporate boards. An increase in the participation of women in the corporate boards and policies related to these issues would promote the status of women in society and empower them. The mandatory rules set by the regulators such as SEBI and the Companies Act, 2013 reflect the country's commitment towards an egalitarian society. However, further empirical investigation is required to evaluate the contribution of women on the board to firms' performance in India.

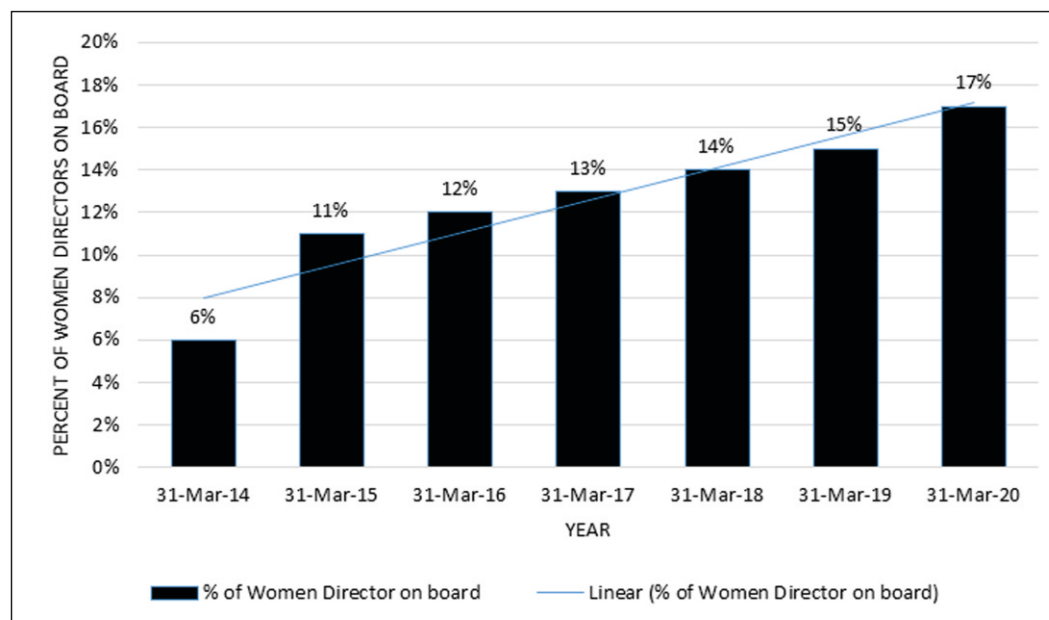
4.2 Indian Scenario

Women in India have proved themselves better in almost all sectors, including deciding for family or an organisation. However, when the discussion is about directorship, the percentage of women as independent directors is very minimal in Indian companies. As per the Institutional Investor Advisory Services (IIAS) 2020, the regulator's enforcement of the quota system has led to an increase of women representation from 5% as of March 31, 2012 to 17% as of March 31, 2020 for NIFTY 500³ Companies.

Figure 4 represents the growth in the percentage of women directors in the corporate boards from the year 2014 through the year 2020. However, there is a growth of women directors because of the mandatory inclusion of at least one woman in the regulator's corporate board. The increase in women director representation on the BOD also throws light on various other flaws in the legislation. For instance, the Managing Director of the Prime database, Mr Pranav Haldea, mentioned that at the time of compliance with the one-woman director norm in 2014, many companies had fulfilled this requirement in the final week. The report on Women on Board in India by the Federation of Indian Chambers of Commerce and Industry (FICCI) 2020, figures out that 49 women were hired on March 31, 2015 as this was the last date to fulfil the legal mandate requirement imposed by the Companies Act, 2013. Therefore, the quality and efficiency of such women directors appointed to the board and their independence is an important aspect to look into the issue (Verma & Basu, 2019)

Second, this surge can also be due to the inclusion of woman members in the corporate board absorbed directly by the family members of the business to meet the requirement

Figure 4: Historical trend of gender diversity on boards



Source: IIAS Research Report, 2020.

³ NIFTY 500 companies include the stocks of 96% of the total market capitalization and about 93% of the total turnover on the National Stock Exchange as on 31st March 2020. Available at: http://www.nseindia.com/products/content/equities/indices/nifty_500.htm

coming from the enforced mandatory norm implemented by the regulator. Therefore, women appointed through the family lobby has no impact on the organisation's problem-solving capabilities or innovation (Bhattacharyya, 2019). Sandberg and Thomas (2018) hold that several companies commitment towards gender heterogeneity is appreciable. However, this commitment has not converted into eloquent development.

With objectives of better governance practices and to prevent the method of inducing a family woman member in BOD for compliance purposes by corporates, SEBI, in one of its board meetings, decided to implement a minimum of one independent women director, which will be applicable for the top 500 listed companies from April 1, 2019 or before. According to Prime Database Group, 42 of the top NIFTY 500 companies responded by appointing an independent woman director only in the last week of March, 2019. Fifty-one companies failed to induct an independent women director as directed by SEBI (Srivastava, 2019), and 39 women directors were appointed on March 31, 2019. The mandatory SEBI regulation leads to 93% of the NIFTY 500 companies appointing at least one independent women director on board by March 31, 2020. However, measuring the impact of the increment of the women in the BOD is challenging. One woman member on board may also face the challenge of tokenism.

As per the report from IIAS 2020, despite the increase in the number of women in BOD, the representation of women in board leadership is very minimal. Only 4% of the NIFTY 500 companies have women as Chairperson as of March 31, 2020. Even in BOD participation, men exceed women by five times. The number of women holding directorship is just 590 as compared to 3,205 by men. In addition to this disparity, the remuneration paid to the women directors is 60% lower than men directors.

Further, the number of shares allotted to women is also 52% less as compared to men directors. 50% of the independent director's payment is less than ₹ 1 lakh. The women directors in India lag the male directors in most of the key parameters such as tenure, remuneration and leadership role. Boards inducted young women without much corporate experience. Women attaining to a board position through executive function is very minimal. The disparity between women director and male director hints how the boards pursue and value their presence.

Appointing women directors on the last day, biases in pay and minimal leadership roles reflect the corporate strategy of meeting compliances and showcase their sensitivity

towards gender equality but ignorance in providing equal opportunity to women for showcasing their performance, capability and efficacy in top management positions. Many companies in India are mystifying the process by complying with the law on the facade but restraining any visible change in the board decision making (Aguilera et al., 2021). The move made by SEBI to increase gender diversity in the top organisations seems to have become more of a compulsion than a positive effort. Thirteen companies of the Nifty 500 have not inducted any women directors, of which 11 companies are Public Sector Undertaking (PSUs). This data indicates how gender bias has crept deep inside the corporate corridors and acknowledges it is not as stringent as is prevailing in other parts of the globe.

Overall, it seems that appointing women on boards for corporates is more about fulfilling a mandate. Such compliance with legislation may not meet the higher objective of gender equality in Corporate Governance. Mr J.N. Gupta, the Managing Director of Stakeholders Empowerment Services, pointed out that such policy needs a cultural and perspective change and will take time to yield results. Ideally, corporate governance to achieve a sustainable work environment can be legislated and require adequate monitoring mechanisms to ensure laws are followed in their true spirit. If companies cannot witness the benefits of gender diversity, the regulators must formulate the appropriate policy to stimulate the companies in the long run.

5. Concluding Remarks and Recommendations

The current paper discusses women participation in the corporate boards and existing regulations associated with the quota system in India. Regulators such as SEBI, and Companies Act, 2013 implemented the mandatory appointment of at least one woman candidate to the corporate boards. Despite these mandates, the article argues that India's reluctance to appoint the women director is defeating the whole purpose of the mandate to have a diverse view and better decision-making in the board.

Our findings are that the adoption of the quota system in India is a good start, as it helped India increase its gender diversity on Boards. However, it is just a first step. The relationship between board characteristics and firm performance varies by country because of the different regulatory and governance structures, economic climate and culture, and size of capital markets. Hence, the regulatory framework alone is insufficient to provide its efficacy to the full as we are still economically, socially and culturally male dominant. Women crossing all the barriers to acquire requisite qualifications and experience for being a part of the corporate

boards are less. This policy is not stringent enough to make corporates realise the urgency of acting and letting the diversity momentum grow, and making corporates believe that embracing diversity is no longer a feminist notion. Nevertheless, it is an essential corporate plan needed for efficiencies and effectiveness, and the policy is elusive.

A plethora of literature available globally finds a direct link between women inclusion in the board and firms performance. The association between the corporate board and firm performance attributes depends on country-specific characteristics such as corporate governance decision-making and regulations, culture and economic environment, capital markets size, etc. However, the available studies investigating the effect of gender diversity on Indian corporate boards' decision making and firms' performance is nominal because of the recent implementation of the mandatory norm by the regulators. Therefore, the impact of women on the corporate board and their capabilities is a developing area of research in the Indian context. Furthermore, by pushing for gender diversity, the policy formulators have taken the initiative to promote women participation in the economic decision-making process. Nevertheless, mandatory regulation of including at least one woman on the corporate board might not help achieve gender diversity in corporate India. Extending the research will be helpful for the policymakers in taking a decision on the quota system and implementing a stipulated percentage of the proportion of women into various boards and committees.

Gender diversity must not be a regulatory or compliance exercise – it necessitates a change in the mindsets of the corporate body. To obtain the profits of gender diversity, companies need to hold the statutory commitment and work towards the culmination of discriminatory practices to achieve a sustainable and better work culture.

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The Impact of Budget Participation on Managerial Performance: Evidence from Manufacturing Firms of Iraq

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Abstract

The purpose of this paper is to examine the impact of budget participation on managerial performance in the context of corporate firms of Iraq. To examine this relationship, the study has employed the LSM path model where budget participation influences managerial performance via two mediating variables – job relevant information and job satisfaction. Data was collected through a survey questionnaire from 302 managers, engineers and departmental managers of eleven manufacturing firms of Iraq. The findings of the study indicate that the direct influence of budget participation on managerial performance is positive and significant. Likewise, the observed results in the present path analysis suggest that the influence of the two mediating variables (job relevant information and job satisfaction) is significant. Finally, the results reveal that there is no influence on indirect effect between the mediating variables and managerial performance.

Keywords: *Budget Participation, Managerial Performance, Job Relevant Information, Job Satisfaction, Path Model, Manufacturing Firms of Iraq*

1. Introduction

Efficient planning, budgeting and accountability are the crux to achieve the goal of sustainable development in this changing environment (Gleadle, 2011). A significant portion of accounting literature on budgeting emphasises the relevance of participation of middle and lower-level managers in the budget setting (Hofstede, 1968; Milani, 1975; Nouri & Parker, 1998; Noor & Othman, 2012; Kewo, 2014). Management participation in the budget process may provide benefits to the organisation in two ways. First, the process of participation reduces information asymmetry in the organisation, which helps top management to know more about the specialised knowledge of the managers at the operational level. Second, the process of participation may increase the commitment of lower-level managers to carry out the budget plan and reach the target (Welsch et al., 1988). Participation is very useful in planning and goal setting in a highly uncertain environment, helpful in motivating subordinates when there is task uncertainty and further suitable for coordinating interdependence when there is task interdependence (Shields & Shields, 1998). It is also claimed that participation can be used as the main solution to the dysfunctional effects of budgeting (Argyris, 1953).

Given the significance of budget participation, the influence of budget participation (BP) on managerial performance (MP) is an extensively investigated issue in the history of managerial accounting literature (Hofstede, 1967; Milani, 1975; Nouri & Parker, 1998; Leach-lopez et al., 2008, 2009; Noor & Othman, 2012; Kewo, 2014; Sim & Utami, 2018; Berdicchia & Masino, 2019; Ahn et al., 2018), although, the evidence before and until the early 1950s, the literature of management accounting had essentially well-thought-out budgeting as an accounting technique only. In 1952, Argyris (1953) conducted an exploratory field study on budgeting practices and identified some undesirable social-psychological events related to budgeting that caused dysfunctional behaviour like bias, reduced effort, and poor communication and claimed that participation in goal setting could be the best clarification to the budgeting's dysfunctional effects (Argyris, 1953). A plethora of empirical studies signposts that budget participation has a positive impact on managerial performance (Milani, 1975; Kenis, 1979; Merchant, 1984; Brownell & McInnes 1986; Dunk, 1989; Shields & Shields, 1998; Derfuss, 2009).

However, the empirical evidence relating to the association between budget participation and managerial performance is not clear. While some researchers have found significant positive association (Kenis, 1979; Merchant, 1984; Brownell, 1986; Brownell & McInnes, 1986; Shields & Shields, 1998; Leach-Lopez et al., 2009; Derfuss, 2009), other findings advocate that the relationship is positive but insignificant (Milani, 1975; Brownell & Hirst, 1986; Dunk, 1989). In contrast, the findings of Stedry (1960), Bryan and Locke (1967) and Cherrington and Cherrington (1973) indicate that the relationship is negative.

Another debatable issue relating to the association between (BP) and (MP) is the stimulus of other moderating variables. Some intervening variables that have been investigated by earlier researchers are information and environmental volatility (Kren, 1992), budget emphasis and information asymmetry (Dunk, 1993), budget adequacy and organisational commitment (Nouri & Parker, 1998; Leach-Lopez et al., 2009). Following Leach-Lopez et al. (2009), some researchers have tried to address different aspects of the Iraqi manufacturing companies in recent times. For instance, Alhashimi et al. (2017) have addressed the accounting methods followed by Iraqi manufacturing firms to measure and disclose the environmental aspects. Ali and Shakir (2017) have tried to measure the impact of conservative accounting principles on the transparency of accounting information disclosure in the manufacturing sector of Iraq. Hussein (2021) has empirically examined the role of cost accounting standards settings on the managerial performance of manufacturing companies of Iraq. Hazzaa and Hussein (2021) contributed to the accounting literature by showing the role of job satisfaction on business performance.

Nevertheless, this paper has tried to empirically investigate the relationship between (BP) and (MP) via two intervening variables – job-related information (JRI) and job satisfaction (JS) in the context of corporate firms in Iraq. It is evident from the extant literature that (BP) leads to high (JRI), which, in turn, increases (MP) directly and indirectly (JS). This paper is a modest attempt to revalidate this relationship employing the LSM (Leach-Lopez et al., 2009) path model in the context of industrial firms in Iraq due to the absence of any empirical evidence relating to this issue and the importance of the industrial sector in general for the development of the economy of Iraq.

The remaining of the present paper has been systematised as follows:

Section 2 presents the Theory and Development of Hypotheses. Section 3 describes the data and methodology adopted in this study. While Section 4 describes the empirical results, concluding remarks are presented in Section 5.

2. Theory and Development of Hypotheses

The influence of budget participation on performance directly or indirectly via mediating factors has been extensively investigated by researchers from different angles. But our interest in this paper is to introduce the empirical testing of the LSM path model in the background of corporate firms in Iraq. Hence, only relevant literature associated with the variables included in the LSM path model is briefly discussed here. In the LSM path model, (BP) is the explanatory variable, (MP) is the dependent variable, the relationship was explained through, and mediating variables are (JRI) and job satisfaction (JS). The LSM path model is shown in Figure 1.

2.1 Path A: Budget participation (BP) and Managerial Performance (MP)

Numerous studies have promoted that (BP) positively influences (MP). But this positive association is not always significant. For instance, while Shields and Shields (1998), Nouri and Parker (1998), Leach-Lopez et al. (2009) and Derfuss (2009), Sim and Utami (2018), Berdicchia and Masino (2019), Ahn et al. (2018), Ozer and Yilmaz (2011), Odia (2013), Mazzioni et al. (2014), Hussein et al. (2016), Zainuddin and Isa (2019), Lunardi et al. (2020) have observed this relationship is significantly positive, others (Milani, 1975; Brownell & Hirst, 1986; Dunk, 1989) have found such positive association to being weak or insignificant. On the other hand, Bryan and Locke (1967) and Cherrington and Cherrington (1973) have observed a negative association between (BP) and (MP). Theoretically,

budget participation increases the motivation of the employees to fulfil the goals and consequently leads to better managerial performance. Based on this proposition, it is hypothesised that:

H₁: Budget participation and managerial performance are positively associated.

2.2 Path B: Budget Participation (BP) and Job Satisfaction (JS)

Generally, budget participation helps employees to understand the budget goal, motivates them to meet the target and subsequently increases the degree of (JS) (Brownell & Hirst, 1986; Nouri & Parker, 1998; Lau & Tan, 2003). Leach-Lopez et al. (2009) and Lau & Tan (2003) results confirmed a significant path coefficient between (BP) and (JS). Thus, the study proposes the second hypothesis as:

H₂: The relationship between budget participation and job satisfaction is positive.

2.3 Path C: Job Satisfaction (JS) and Managerial Performance (MP)

Various scholars of managerial accounting have concluded that employees with low job satisfaction are more likely to change their jobs to another where they feel that they are more satisfied (Hulin, Roznowski, & Hachiya, 1985; Kohler & Mathieu, 1993). Herzberg et al. (1957) established an empirical reasoning between managerial performance and job satisfaction where the employees are developing certain work behaviours based on the level of their job satisfaction. While employees with higher job satisfaction will devote their time, inspiration and determination to complete their job and achieve the work targets, the dissatisfied employees will always have different behaviour towards completing their job or achieving their job's targets. On the other side, Brayfield and Crockett (1955) found that there is no considerable association between job satisfaction and job dissatisfaction on managerial performance. It is thus relevant

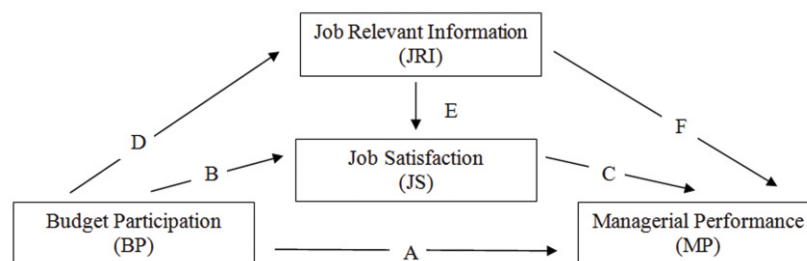


Figure 1: LSM path model

[Source: Leach-Lopez et al., 2009]

to hypothesise that the level of job satisfaction significantly affects the level of managerial performance.

H₃: Job satisfaction positively influences managerial performance.

2.4 Path D: Budget Participation (BP) and Job Relevant Information (JRI)

Earlier researchers (Merchant, 1984; Chenhall & Brownell, 1988; Kren, 1992; Magner et al., 1996; Leach-Lopez et al., 2009) have found a positive association between (BP) and (JRI). The rationale behind this positive association is that (BP) enables information exchanging between the managers and the employees, which clarifies the budget target to be fulfilled. Thus, departmental managers will have a higher degree of involvement in determining and also evaluating budget goals. Kren (1992) and Leach-Lopez et al. (2009) have found that the association between BP and JRI is significant and also positive in a path model considering JRI as an intervening variable. Hence, based on the extant literature, it is hypothesised that:

H₄: Budget participation (BP) has a significant and positive impact on job-relevant information (JRI).

2.5 Path E: Job-Relevant Information (JRI) and Job Satisfaction (JS)

Theoretically, increased job-relevant information (JRI) diminishes role ambiguity and then increases (JS). Empirically this proposition is supported by Chenhall and Brownell (1988). Likewise, Lau and Tan (2003) and Leach-Lopez et al. (2009) have established a significant positive association between job-relevant information (JRI) and job satisfaction (JS). Thus, the fifth hypothesis of this study is:

H₅: Job-relevant information (JRI) is positively associated with job satisfaction (JS).

2.6 Path F: Job-Relevant Information (JRI) and Managerial Performance (MP)

Regarding the association between (JRI) and (MP), Hanifah (2013) has argued that job-relevant information (JRI) has a positive effect on managerial performance (MP). JRI is the level of awareness of the subordinates to do their job in the right way that leads to a higher level of managerial performance. This positive relationship has been empirically supported by Kren (1992) and Leach-Lopez et al. (2009). Furthermore, Zacher et al. (2010) devoted the relationship between high-complexity jobs and managerial performance (MP). In the same vein of research, Kozlowski and Hults (1986) and Man and Lam (2003) have found similar results of this relationship where complex goals

motivate the employees to use their skills and knowledge to achieve firms' goals. Fitoussi et al. (2009) found that managers usually perform better when they have a clear understanding of their responsibilities; for instance, managers will have a strong reason to make their commitments higher and dedicate their time, effort and resources towards achieving the firms' goals. Espedido and Searle (2018) found a direct significant and positive association between goal difficulty (GD) and creativity (MP). It is also evident from the management accounting literature that overload information on the managers can adversely affect their performance (Chong, 1996). Thus, the last hypothesis of the study is:

H₆: The impact of job-relevant information (JRI) on managerial performance (MP) is positive.

3. Data and Methodology

3.1 Data and Sample

This study is based on primary data collected through a pre-administered questionnaire from the employees of eleven manufacturing firms in Iraq. These companies are selected based on many factors, viz. production capacity and consistency, number of employees, and contribution to the local Iraqi market. The selected companies all together represent 55% of the total companies listed in the Iraqi stock exchange¹. It is also imperative to note that many other companies have stopped production in recent times due to uncontrolled factors. However, the sample companies are continuing operations till date. The sample of the present study is very relevant for the economy of Iraq as this sector is the second-highest sector in respect of the contribution to the GDP of Iraq². The focus of the study came to advocate the importance of income generation variety with the high risk of depending on dominating income sources like the oil sector in Iraq. Primary data were collected using a random sampling technique from eleven Iraqi companies, namely, Light Industrial Company, Alhilal Industrial Company, Iraqi Company for Manufacturing Cartons, Modern Painting Company, Modern Sewing Company, Iraqi Company for Carpet and Furniture, Iraqi National Company for Manufacturing Chemical and Plastic Materials, Pepsi Baghdad Company, Garment Company, Iron and Bicycle Company, and Iraqi Company for Manufacturing and Exporting Dates. Total 302 (out of 350) forms were retrieved and considered for the analysis. The rest of the forms (omitted) were not completed, wrongly filled out, or left blank. Questionnaire facts are shown in Table 1.

1. isc.gov.iq

2. <https://globaledge.msu.edu/countries/iraq/memo>

Table 1: Description of Sample

	Company name	Total number of employees	Distributed forms	Forms received and analysed	Percentage
1	Light industrial company	336	35	28	80
2	Alhilal industrial company	203	45	41	91
3	Iraqi company for manufacturing cartons	102	35	32	43
4	Modern painting company	147	35	18	91
5	Modern sewing company	45	30	26	78
6	Iraqi company for carpet and furniture	55	25	19	76
7	Iraqi national company for manufacturing chemical and plastic materials	189	35	33	94
8	Pepsi Baghdad company	1325	40	36	90
9	Garment company	49	15	14	93
10	Iron and bicycle company	143	30	23	77
11	Iraqi company for manufacturing and exporting dates	363	40	31	78
	Total	2908	350	302	86

Note: Data were collected from the Human Resource Departments of the respective companies in September 2019

3.2 The study variables' measurement

For measuring the study variables, the study has used a pre-administered questionnaire, for example, to measure budget participation (BP), the study has used a measure developed by Milani (1975) and subsequently used by (Brownell, 1983; Chenhall & Brownell, 1988; Mia, 1989; Tsui, 2001; Lau & Tan, 2003; and Mahjoub & Halioui, 2012), the scale is a seven-point Likert-type scale where 1 is strongly disagree and 7 is strongly agree. The level of job-relevant information (JRI) was measured with a five-point scale developed by Kren (1992) and used by (Lau & Tan, 2003; and Leach-López et al., 2009) in budgeting research. The level of job satisfaction (JS) variable was measured through the short-form of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss et al., 1967). This tool is widely used in managerial accounting research (Harrison 1992, 1993; Lau & Tan, 2003). To measure managerial performance (MP), the study has employed an eight-dimension scale by measuring (planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing). This scale was developed by Mahoney et al. (1963) and is widely used by researchers to measure budget participation (BP) (e.g. Brownell & McInnes, 1986; Frucot & Shearon, 1991; Tsui, 2001).

3.3 Model

For measuring the influence of budget participation (BP) on managerial performance (MP) the present study has employed the LSM path model, where (BP) is the sole independent variable, (MP) is the only dependent variable

and job-relevant information (JRI) and job satisfaction (JS) are two intervening variables. In the present context, the path model is more suitable than the multiple regression model as the latter does not capture the association between an independent variable and a dependent variable in the existence of one or more intervening variables (Luft & Shields, 2003; Leach-Lopez et al., 2009).

Path model has been used to examine the impact of budget participation (BP) on managerial performance (MP) via two intervening variables – job relevant information (JRI) and job satisfaction (JS). The following model is based on a set of simultaneous equations to measure the path coefficients:

$$MP_i = b_1 BP_i + b_2 JRI_i + b_3 JS_i + e_i \quad (1)$$

$$JS_i = \beta_1 BP_i + \beta_2 JRI_i + \varepsilon_i \quad (2)$$

$$JRI_i = \gamma_2 BP_i + v_i \quad (3)$$

Where: MP is managerial performance; BP is budget participation; JRI is job-relevant information and JS is job satisfaction. The study model has been used mainly to test the hypotheses corresponds to the theoretical model shown in Figure 1. Path coefficients (both direct and indirect effects) are estimated following the procedure adopted by Nouri and Parker (1998).

4. Empirical Results

Table 2 shows the correlation matrix for the study variables that have been used in the proposed path model. A cursory look into the table reveals that the observed correlation coefficients are significant at a 5% level. The highest

correlation is found between BP and JS (0.503), followed by JRI and JS (0.457). On the other hand, the observed lowest correlation coefficient (0.333) between JRI and MP is also significant at the 5% level. The regression results of the path analysis, along with the associated hypotheses, are shown in Table 3. The standardised beta is used to show the path coefficient values; these values are measured by regressing the response variable on the appropriate antecedent variable(s). Table 3 reveals that all standardised path coefficients are significant. The standardised coefficient of path A (BP and MP) is 0.223, and the result is significant at the 1% level. Likewise, the coefficients of paths B and D are 0.391 and 0.348, respectively. Likewise, the observed coefficients of path E (0.321) and path F (0.139) are found to be significant at 1% and 5% levels, respectively. Thus, the results of path coefficients advocate in favour of accepting our hypotheses. The observed path coefficients of Table 3 are shown in Figure 2, which indicates that budget participation, directly and indirectly, affects managerial performance.

The summarised results of the path analysis are shown in Table 4. Path analysis provides detailed information relating to the relationship between BP (independent variable) and MP (response variable), decomposing the total relationship into direct and indirect effects via JRI and JS (mediating variables). The table shows that the total relationship (observed correlation) between BP and MP measured by zero-order correlation is (0.399), and the coefficient is significant at a 5% level. The decomposition of total effects into (both direct and indirect) indicates that the coefficient of a direct link between BP and MP is 0.223 (significant at 1% level). On the other hand, the indirect effects of BP on MP (0.028) consist of three paths involving two mediating variables (JRI and JS). While path (1) depicts the indirect effect solely via JRI, the other two paths reveal this relationship through JS. It is observed from the analysis of the indirect effect that the path from JRI to MP via JS is the most dominating indirect path (results are not reported here).

It is also worth noting that there is a spurious effect (0.112) in the observed association between (BP) and (MP), and the spurious effect between BP and MP is found to be 0.148. But a cursory look into the table reveals zero spurious effect between (BP & JRI), (BP & JS), (JRI & JS), and (JS & MP). In the path model, the total effect is the summation of direct,

indirect, and spurious effects, where the total effect is the total zero-order correlation between two variables. While the direct effect is the path coefficient between two variables, the indirect effect is the multiplication of the path coefficients through mediating variable(s). For instance, in the case of the association between JRI and MP in the present context, the total correlation is 0.333. The observed path coefficient is 0.139, which is the direct effect. The indirect effect through the mediating variable JS is 0.082 (0.321×0.254). The total direct and indirect effect of JRI and MP is 0.221, and the residual is the spurious effect (0.112). The results of the study clearly indicate that the direct effect is considerably higher than the indirect effect, i.e. using the mediating variables. The spurious effect indicates the existence of latent variable(s) that influences the association between the exogenous and endogenous variables. However, in the present study, only a small portion of the relationship between BP and MP is found to be spurious.

In the present context, the spurious effect reflects the impact of budget participation (BP), which is a common antecedent of job satisfaction (JS), job-related information (JRI), and managerial performance (MP). Indeed, as argued by Baron and Kenny (1986), a third variable acts as mediating variable between dependent and independent variable when three conditions are satisfied: first, the association between both (independent and mediating) variables was found significant; second, it is also found that the mediating variable is significantly related to the dependent variable; and third, the association between the independent variable and dependent variable declines after controlling for interceding variable. The outcome of the present study, however, violates the third condition, like the observed coefficient between BP and MP (i.e. controlling other factors) is found to be (0.223). Further, the significant relationship between BP and MP does not support the impact of full mediation that takes place when the observed association between both (dependent and independent) variables is insignificant after controlling the mediating variables (Baron & Kenny, 1986). Although, in most social psychology research, the researchers have observed only partial mediation rather than full mediation (Nouri & Parker, 1998), the observed correlation between BP and MP after controlling mediating variables (JS and JRI) puts a question mark on the true influence of the two mediating variables in the process of enhancing the influence of BP on MP. The observed spurious effects between JRI & MP and BP & MP also empirically support this view.

Table 2: Matrix of inter-correlations

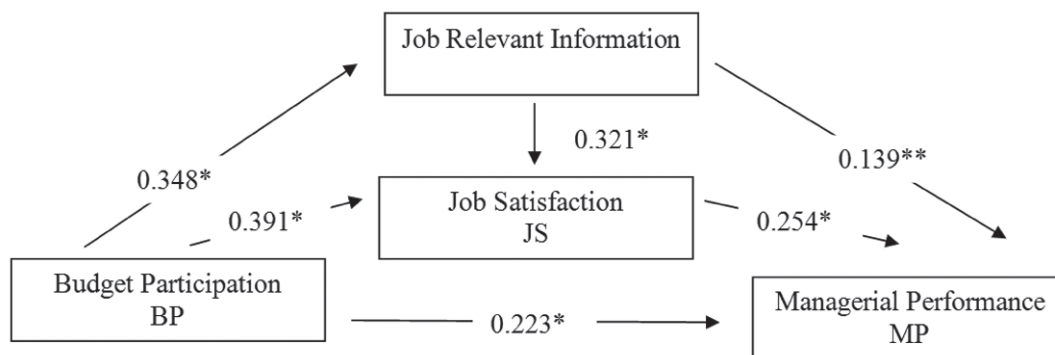
Variables	BP	JRI	JS	MP
BP	1.000			
JRI	0.348**	1.000		
JS	0.503**	0.457**	1.000	
MP	0.399**	0.333**	0.430**	1.000

Notes: ** indicates significant at 5% level by two-tailed test; n=302

Table 3: Results of path analysis

Dependent variable	Independent variable	Associated hypothesis	Path coefficient	t-statistic	P-value	R ²
JRI	BP	H ₄	0.348	6.423	0.000	0.121
JS	BP	H ₂	0.391	7.814	0.000	0.344
	JRI	H ₅	0.321	6.411	0.000	
MP	JS	H ₃	0.254	4.083	0.000	0.245
	JRI	H ₆	0.139	2.428	0.016	
	BP	H ₁	0.223	3.776	0.000	

Notes: n = 171; for each run of the regression model F-statistic is significant at 1% level



Note: * and ** indicate significant at 1% and 5% level respectively

Figure 2: Path coefficients (values of path coefficients are taken from Table 3)**Table 4: Decomposition of the observed correlation**

Combination of variables	Observed correlation	Direct effect	Indirect effect	Spurious effect
BP/JRI	0.348	0.348	-	-
BP/JS	0.503	0.391	0.112	-
JRI/JS	0.457	0.321	-	-
JS/MP	0.43	0.254	-	-
JRI/MP	0.333	0.139	0.082	0.112
BP/MP	0.399	0.223	0.028	0.148

Notes: Observed correlation= direct effect+ indirect effect+ spurious effect.

Indirect effect of BP on MP has been calculated as ((D×F)+(B×C)+(D×E×C)), where D, F, B, C and E are the paths as shown in Figure 1, and the respective path coefficients are taken from Figure 2.

5. Concluding Remarks

Management accounting researchers have strived over a long time to understand the association between BP and MP. But the extant literature indicates that this relationship is very complex due to the intervention of many factors. The present study is a modest attempt to examine the association between BP and MP via two mediating variables (i.e. JRI and JS) in the context of corporate firms in Iraq. We have employed the LSM model to examine the association on a sample of 302 employees collected from all the 11 industrial firms of Iraq.

The findings of the present study point to that BP has a significantly positive influence on JRI, JS, and MP. Similarly, the observed values of other path coefficients were also found to be significant and positive, which supports our hypotheses. The decomposition of total effects into both (direct and indirect effect) indicates that the coefficient of a direct link between BP and MP is significantly associated with the minimal quantum of spurious effect (0.146) in the observed relationship. Regarding the indirect impact of BP on MP via two mediating variables, the study finds the path from BP to JS is the most dominating indirect path. Which indicate the mediating variables (JS and JRI) are strengthening the direct relationship between BP and MP. Furthermore, the results also show spurious effect with path A (BP and MP) and path F (JRI and MP). However, the rest of the paths in this study have no spurious effect.

The outcome of the present study, thus, supports the relationship between BP and MP in the existing literature across counties (Nouri & Parker, 1998; Leach-Lopez et al., 2009; Berdicchia & Masino, 2019; Hussein et al., 2016; Zainuddin & Isa, 2019; Lunardi et al., 2020). Similarly, the observed positive relationship between BP and JS corroborates the outcomes of earlier researchers in both developed and developing countries (Brownell & Hirst, 1986; Nouri & Parker, 1998; Lau & Tan, 2003; Leach-Lopez et al., 2009). Likewise, the result of the study relating to the relationship between JS and MP also corresponds with the result found by Hulin, Roznowski, and Hachiya (1985) and Kohler and Mathieu (1993). Also, the result of BP and JRI confirms the finding of Kren (1992), Magner et al. (1996), and Leach-Lopez et al. (2009). On the other hand, the observed association between JRI and JS in the present study is in line with the findings of Chenhall and Brownell (1988), Lau and Tan (2003) and Leach-Lopez et al. (2009). Finally, the finding of JRI and MP in the present context confirms the outcomes of earlier researchers in a different

context (Zacher et al., 2010; Kozlowski & Hults, 1986; Man & Lam, 2003).

The outcome of the present study violates one of the three conditions required to act as mediating variables between dependent and independent variables as argued by Baron and Kenny (1986) since the observed coefficient between BP and MP (i.e. controlling other factors) is found to be comparatively high. Likewise, the significant relationship between BP and MP does not support the impact of full mediation. Although, in most social psychology research, the researchers have observed only partial mediation rather than full mediation (Nouri & Parker, 1998), the observed results in the present path analysis suggest that the influence of two mediating variables (JRI and JS) is significant in explaining the association between BP and MP of corporate firms of Iraq.

The present study is a modest attempt to examine empirically the theoretical association between budget participation and managerial performance through mediating variables in the context of Iraq, where empirical evidence is scanty. The findings of the study have several practical implications for the firms working in Iraq in particular and in the Middle East in general, like the involvement of managers of different levels in the process of budget preparation for enhancing the managerial performance, which in turn, may lead to an improvement in the financial performance of firms; the role of job-related information and job satisfaction of employees in augmenting the managerial ability of the employees of the organisation. However, the study is limited to 302 observations collected from 11 manufacturing firms in Iraq. Although these firms are leading listed firms in Iraq, considering the small sample size of the study, future studies may be undertaken considering larger sample sizes from several Middle East countries to investigate the relevance of budget participation in the managerial performance of firms. The cross-country comparison may provide better insight into the impact of budget participation on managerial performance.

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Review of Organ Donation and Transplantation: A Healthcare Supply Chain Management Perspective

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A b s t r a c t

Organ donation is one of the most valuable gifts a person could give to another person in need. Hence, any technique developed to increase the use of donated organs should be properly used in order to prevent the wastage of organs due to transplant rejections and the organ reaching the concerned person only after the cold ischemic time. Organ donation, sharing and transplantation have been in practice since the first transplant of a kidney that took place in the year 1954. Many changes in the technology, allocation and policies have occurred in this field of organ transplantation in order to improve in terms of the quality given to the patients as well as the efficiency involved from the perspective of the organizations. The authors attempt to consolidate the organ donations and transplantations that has happened in the past decade in the international and national arena available from International Registry on Organ Donation and Transplantation (IRODaT), and review studies on supply chain management of organ transplantation. The methodology of classifying perspectives is initially identified from the existing literature and done for separate typologies like donations, organs, countries, methods, solution, approach etc.

Keywords: *Organ Donation, Healthcare, Transplantation, Supply Chain Management*

1. Introduction

Organ transplantation is a surgical operation where a failing or damaged organ in the body is replaced with a new one. This study concentrates on kidney transplant stakeholders. End-Stage Renal Disease (ESRD) is a stage wherein the person's kidney deteriorates from its normal intended function. One of the solutions for this problem is to replace the non-functioning kidney with a real functioning one. The best possible permanent treatment available as of now is Kidney Transplantation or Renal Transplantation. In India, the number of people in End-Stage and requiring a kidney is on average about 100,000 every year, of which only 3500 to 4000 people get kidney transplants (Modi & Jha, 2011). Therefore the gap between the demand and supply is keeping on increasing. Interestingly, only less than 2% of the donations are from cadaveric donors, and the remaining are from live donors, mostly the first or second relatives (Abellan, 2006). This great need for organs makes organ donations the most valuable gift. But unfortunately, the harvested organs are sometimes wasted because of the organs reaching the concerned person only after Cold Ischemia Time or because of the kidney being rejected due to severe mismatch after transplantation. Therefore, any technique developed to increase the use of donated organs should be properly used, preventing the wastage of organs. This requires the development of an optimal recipient selection system that will aid in the process of selecting the best matching recipient for the donated organ in a very short duration of time. As and when a donor organ becomes available, all the matching and potential recipients from the pool of registered recipients are identified by querying, and the best fit recipient is selected by evaluation technique. Literature is available which supports improving the efficiency of transplants.

Organ supply chain management cannot be treated in the same way as other supply chains, which can be dealt with by treating them as separate subsystems of a larger system. Hence this proves that the organ supply chain needs to be understood in such a way that the decomposition of the problem into different subproblems would provide better solutions. There are classifications of literature depending on various criteria. An attempt to identify the trends and patterns learned from a few case studies was also carried out, though not an exhaustive one. Except for a few papers that provided an advantage in the rise of technologies, many other papers are not discussed here in terms of technology issues. But the focus of this paper is mainly from a managerial perspective.

The databases for inventory and supply chain management of organ transplantation include Web of Science, Pubmed, Academic Search Premier, Elsevier and Science Direct. The references cited in the obtained journals were again reviewed for further publications. The overall supply chain is classified into two broader categories, namely I) Organ Donation and the supply chain management perspectives at present, and II) Solution Methods for providing solutions in the area of health care supply chain management. Under Organ Donation, there are subtopics on the typology of donation, organs, countries and organizations, stakeholders and problems. And under the solution methods, the subtopics include the typology of approaches, solution method, echelon in transplantation and hierarchical level.

The literature has been structured under different perspectives, which makes it easier for researchers to look for a set of journal papers that are specific to their needs. A reader wanting to study about the characteristics of centralization must not look at the classification of the type of organ transplant. Similarly, classification based on hierarchical level may not be useful for a researcher looking for liver transplantation problems in specific.

The following are the taxonomy fields:

I Organ Donation

- a) Typology of Donation (Section 2)
- b) Typology of Organs (Section 3)
- c) Typology of Stakeholders (Section 4)
- d) Typology of Problem (Section 5)

II Solution Methods

- e) Typology of Approach (Section 6)
- f) Solution Method (Section 7)
- g) Typology of Optimization (Section 8)
- h) Hierarchical Level (Section 9)

2. Typology of Donation

The types of donations are majorly divided into live and dead donations. As the name suggests, live donations are made by live donors, and the method of donation may be altruistic or based on the countries, and the policies and the laws involved also vary from one to another. The dead donations also include cardiac dead or brain dead donors, and the procedures involved to get the consent and the declaration of the death also vary from country to country. In this section, the organ donations that have been taken place in different countries

around the world reported in IRODaT (International Registry in Organ Donation and Transplantation) and freely available for public access have been collected with respect to different categories of donation as well as in combinations and represented as graphs for the years 2008 - 2015. IRODaT is a community involving a large network of health experts involved in donation and transplantation activities around the world. The data obtained is reliable as it is obtained from the members of the National Transplant Organizations and Ministries of Health and is also transparent and verified by experts and official reporters. Figure 1 represents the living organ donations of the countries which have been doing well for the period from 2002 to 2016. The United States has the highest with an average of 6390.75 donations for the period under study compared to Cyprus, which has only 26.75 donations, but when considering their respective populations, they have an average of 21.15 pmp and 42.68 pmp, respectively. The values in pmp (per million population) is more appropriate than just the number of donations, and hence the statistics considered here are values in pmp (International Registry in Organ Donation and Transplantation (IRODaT), 2019).

Cyprus has the highest average number of donations with 42.68 pmp, distinctly separate from other countries as visible in the figure, but in 2016 it reduced to 14.13 pmp. South Korea has an average of 30.49 pmp for the period, and it also had an increasing trend from 21.16 pmp in 2002 to 43.09 pmp in 2016. The trend is similar to that of the Netherlands, which had 12.4 pmp in 2002 and 33.94 pmp in 2013. Iran and the USA have constant donations for the period with an average of 22.28 pmp and 21.15 pmp, respectively. The UK, which was having only 6.3 pmp in terms of living donations, has improved and attained about 17.8 pmp donations.

The deceased organ donations in different countries are shown in Figure 2. From the figure, it is quite clear that Spain has set an example for other countries in terms of deceased donations, having an average of 35.33 pmp for the period of 2002 to 2016. Croatia, which had 9.3 pmp donations in 2002 has reached 38.6 pmp donations in the year 2016. Malta also had registered 34 pmp donations in 2013. The USA, as usual, have constant deceased organ donations with an average of 25.51 pmp (IRODaT, 2019).

The donations through cardiac death are shown in Figure 3. Latvia leads others with 6.23 pmp average donations, followed by the Netherlands with 5.76 pmp donations on average. The United Kingdom, which had only 0.9 pmp donations initially, has realized the potential of harvesting through cardiac death donors and also mastered it and has increased to 9.23 pmp donations in 2016. It has certainly become an example for every other country to follow.

The kidney donations from the living donors and deceased donors are shown in Figures 4 and 5, respectively. The trends are similar to that of the living and deceased organ donations explained earlier except for South Korea, where more donations are in living organs but is not reflected in kidney donation meaning that most may be liver donations.

The addition of living and deceased donations, combining same for kidney donations and also combining living, deceased and cardiac death donations of countries are shown in Figures 6, 7 and 8, respectively. Comparing the graphs, we can see that when the combination is considered, the USA slowly creeps up to second, as seen in Figure 7, which was not visible when considered individually. Similarly, when we look at Figure 8, we can understand that the UK, which had only 20.3 pmp donations even when combining living, deceased and cardiac death donations, rose to 47.11 pmp donations in 2013. The reason for the increase is the number of donations contributed from cardiac death donors.

From these, we can understand the need for designing an integrated system where donations from living, deceased and cardiac death, if combined and utilized effectively and efficiently, will certainly increase the donor pool. The model of organ sharing operating with respect to each method of donation at the same time which have set an example for other countries to follow are identified and shown as graphs separately for live, brain dead, cadaveric donors for kidney and also combinations of the donations. The model of organ sharing operating with respect to the type of donation (Deceased or Live Donations) which have been performing well in terms of donations and at the same time setting an example for other countries to follow are explained one by one below (IRODaT, 2019).

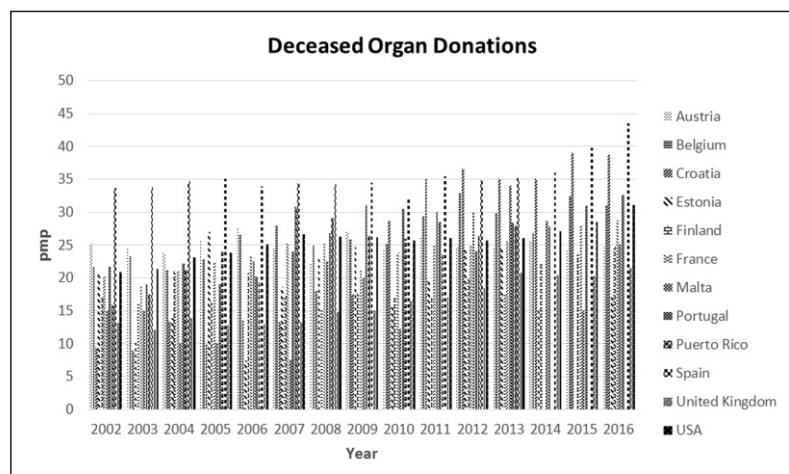


Figure 1: Living Organ Donations

(Source: www.irodat.org)

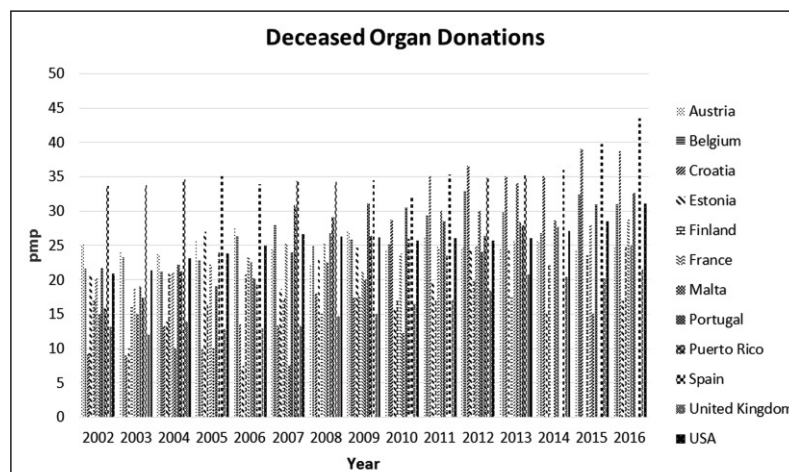


Figure 2: Deceased Organ Donations

(Source: www.irodat.org)

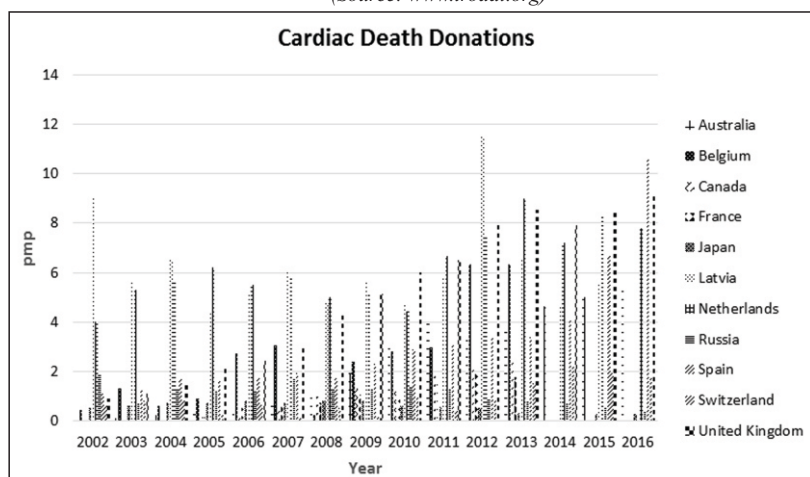


Figure 3: Cardiac Death Donations

(Source: www.irodat.org)

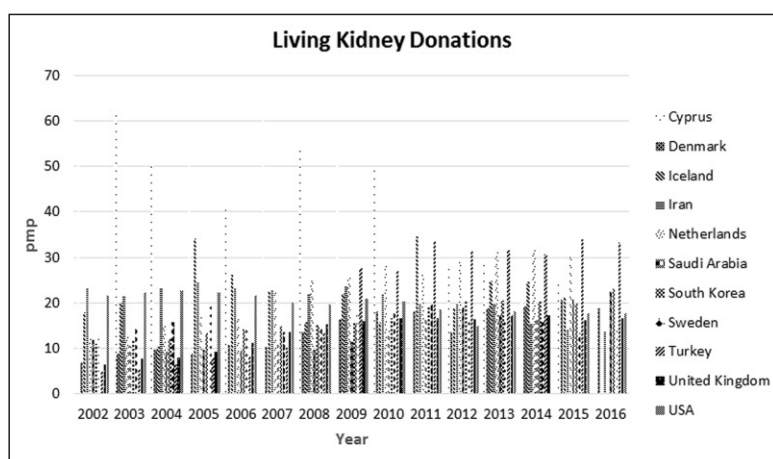


Figure 4: Living Kidney Donations

(Source: www.irodat.org)

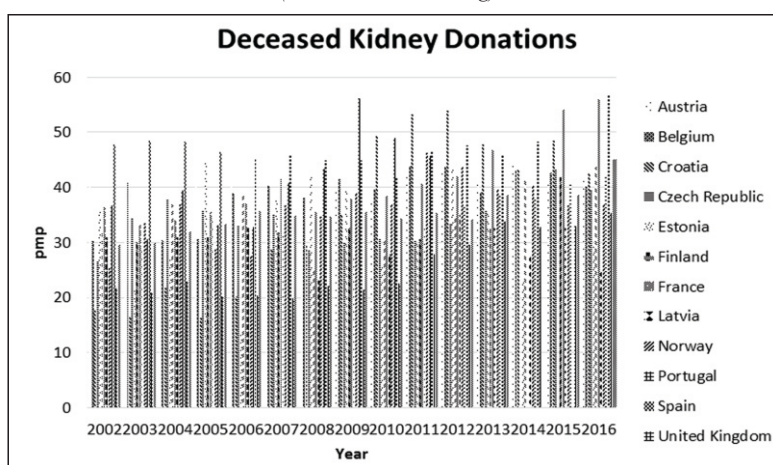


Figure 5: Deceased Kidney Donations

(Source: www.irodat.org)

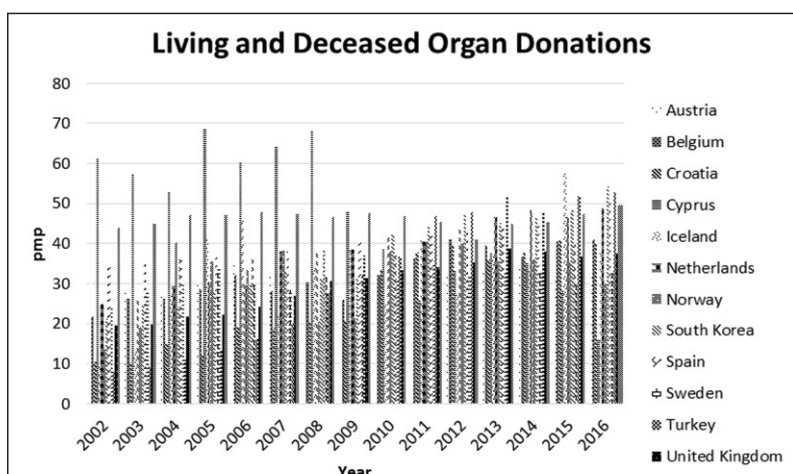


Figure 6: Living and Deceased Organ Donations

(Source: www.irodat.org)

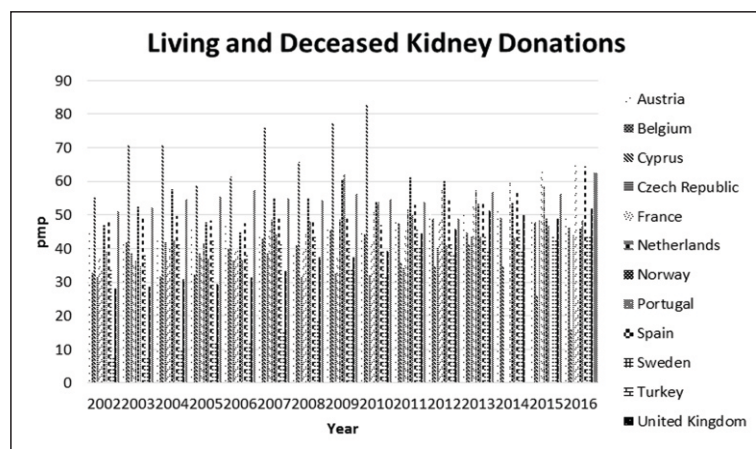


Figure 7: Living Kidney Donations

(Source: www.irodat.org)

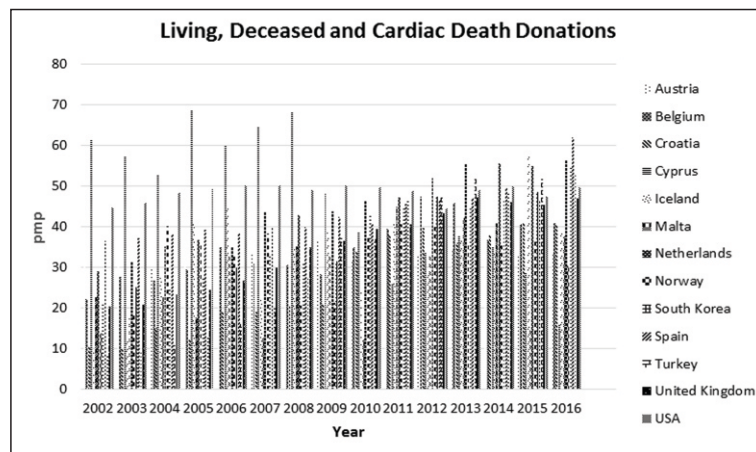


Figure 8: Living, Deceased and Cardiac Death Donations

(Source: www.irodat.org)

3. Typology of Organs

An organ is a mass of specialized cells or tissues which perform a particular function in the human body. The heart is an example of an organ. The functions of each organ is different, and depending on its vitality, the failing of the organ needs to be repaired or replaced by another functioning system from outside; otherwise, it may result in the fatality of the person. The transplantation of organs is done by sourcing it either from dead or live donors. The organs that can be transplanted, according to the UNOS website, are kidneys, heart, lungs, liver, small bowel and pancreas. We have reviewed kidney (Segev et al., 2005), lung (Botha & Phil, 2009; Raemdonck et al., 2009) and liver-related papers (Cook et al., 1990; Stahl et al., 2005;

Teng & Kong, 2010) to an extent. The tissues that can be transplanted vary from eyes, heart valves, bone, skin and tendons. A number of studies have been for liver and kidney. This study concentrates more on kidney transplantation as it is one of the organs which can be transplanted from both live (one kidney) as well as dead donors (both kidneys), and in the case of dead donors, two organs can be shared.

4. Typology of Stakeholders

The stakeholders involved in the transplantation are right from the donors who are the source from which the supply chain initiates for the transplantation to happen, the recipients who are the ultimate consumers and in addition to the recipients, the end also includes the dependents of the

recipients (Richter, 1989). In addition to the donors and recipients, the other stakeholders include the nephrologists, urologists, physicians, neurologists, staff nurses and also the persons outside the medical field like the organ transplant coordinators, the legal officers (like in some countries like India, the authorization committee), the convener and the police officials in case of the legal issues for dead donors of accidents and non-governmental organizations (NGOs) all working for the equality of the allocation of organs (Baran, 2006). Though the designation of stakeholders differs from organization to organization, the major classifications include the donors, recipients, the government, and the medicos.

5. Typology of Problem

The supply chain management, in general, consists of two types of problems, namely inbound and outbound problems. Inbound problems consist of inventory and collection planning, whereas the outbound problem consists of supply, distribution and scheduling related problems. In organ transplantations, there are problems in the mobilization of the donors to donate in the form of awareness campaigns, and removing the barriers in terms of culture, religion and beliefs, as well as the fear surrounding the medical issues for donation as well as successful transplantation (Gregory & Glen, 2009). Once the supply is available, the next step in distributing the organ to the concerned recipient balancing efficiency and equity and increasing the donor pools all come under the outbound problems (Cook et al., 1990). The inbound problem deals with the location and allocation of organs for successful transplantation. All the activities in co-ordination and networking of the transplant centres in receiving and transplantation with the concerned centres need to be efficient and effective in the organization of events.

6. Types of Approach

Deterministic and stochastic approaches are the two types of approaches in which the papers have been classified, but in most cases, the papers are unclear/ irrelevant depending on the type of problem. For example, based on the type of problem, forecasting is a stochastic approach (Zenios, 2000), while benchmarking (Pritsker et al., 1995) may be coming under a deterministic approach. Leaving aside these papers, those which have different approaches alone are considered for classification. Most of the papers involving simulation methods are classified under the stochastic approach because of the probabilistic values involved for different arrival, transplant patterns as well as the important characteristics of each recipient and donor. The number of

papers on stochastic approaches recently happens to be more because of the trend in attaining reality. This trend is likely to increase in the future even further towards the stochastic settings.

7. Solution Method

Based on the solution method, it is broadly classified as qualitative and quantitative models and is briefed as sample literature in this section. The solution method of qualitative and quantitative approaches is classified on the basis of subjective and objective ways of obtaining the solution for the problem of organ transplantation.

7.1. Qualitative and Quantitative Methods

The methods that have been adopted by organizations as well as studies by individuals for allocating the organs for transplantation, both qualitatively and quantitatively for different organs, are given here.

7.1.1. Qualitative Methods

The factors involved in deciding on allocation has been in debate for many years as it may lead to segregation into some group as most disadvantaged. There needs to be a system to balance both efficiency and equity in allocating the organs to recipients. The scarcity of donor organs continue to limit organ transplantation, resulting in longer waiting times and sometimes even mortality of the patients on the waitlist (Gregory & Glen, 2009). Botha and Phil (2009) and Raemdonck et al. (2009), in their works, stated that improvements in the selection, assessment and management of the potential donor base are the main sources necessary to increase the use of donor organs. Pritsker et al. (1995) studied the problem of allocating the organ with the recipient lists created based on the patient's medical status and the Organ Procurement Organization (OPO) location. Points are assigned for the patient's medical status, waiting time and blood type compatibility with that of the donor. Finally, the first candidate subset ranked highest by the allocation policy is offered with the recovered organ.

Starzl et al. (1987) studied multi-criteria decision making in selecting the best recipient from the available alternatives depending on the important factors using a multifactorial system for allocation of the cadaveric kidneys. Extensive research on the development of intelligent systems was developed for the allocation of the organ to the recipients by Aldea et al. (2001). After years of studying the organ transplant system and knowing the working of the system and its nuances, an innovative methodology in Multi-Criteria Decision Analysis (MCDA) which specially deals with complex multi-criteria decision analysis was developed by

them. They have managed to deal with different criteria, different scales and also missing data. The developed methodology emphasizes that there is never a need to convert this heterogeneous data into a unified scale. It is based on the similarities that are inherent in the nature of clustering techniques in comparing the alternatives and their interrelationships.

7.1.2. Quantitative Methods

Quantitative methods were also studied by many authors for waitlisting the patients as well as allocation of organs based on algorithms developed with the identified important criteria. Poli et al. (2009) have implemented the cadaver kidney allocation algorithm in the North Italy transplant program based on univariate and multivariate analysis of a number of immunological, clinical, social and administrative factors that impacted the transplant outcome. Xue et al. (2001) have used the stepwise autoregressive method and exponential smoothing method to assist in planning for the End-Stage Renal Disease (ESRD) program in the United States, for forecasting the increase in trend of patients' numbers and their medical costs for the year 2010. Abellan et al. (2006) have studied Spanish renal transplant waiting list patients using Queuing theory. They have considered that the customers of this queue are end-stage renal disease patients waiting for a kidney transplant. Optimization has been used for the allocation of organs. Righter (1989) used a stochastic sequential assignment problem to structure the allocation policies. The organ allocation process was also studied by David and Yechaeli (1985), and a similar kind of stochastic sequential assignment was formulated by them. Zenios et al. (2000) analyzed the dynamic allocation of kidneys to the clients on the waiting list. The quantitative methods and qualitative methods that have been developed by countries and organizations have the sole purpose of implementing the smooth functioning of their allocation process. As discussed in a previous section, some of the well-established models are explained in the next section.

8. Typology of Optimisation

In case of optimization problems, the solution may be obtained with the help of exact method or heuristic method. The optimal location and reconfiguration of the transplant centres and the organ procurement organization, as well as the transplant centres which must be catered by each organ procurement organization for the region, are all considered as an optimization problem. Similarly, the matching problem between the recipient and donors falls under the

category of the optimization problem. There have been papers on the simulation of the characteristics of the donor and recipient, and the obtained data based on the history is tried to optimize for matching, and this is classified under the heuristics approach. Though it provides the solution for the created scenarios and cases, it doesn't ensure an optimal solution. Papers using linear programming, integer linear programming, mixed-integer linear programming and those containing mathematical formulation are assumed to be exact procedures unless they are solved using some of the heuristic or meta-heuristic solution procedures. Multi-objective optimization consists of those problems which try to solve or optimize under multiple objectives (Maria & Domenico, 2006). In some papers, the problem is split into two phases, and one part is solved using exact, and other parts using the heuristic method, and such papers appear in both the classes (Zenios et al., 2000).

8.1. Echelons in Optimizing Transplantation

The hierarchy is basically of three types, namely the individual hospital level, the regional level [Organ Procurement Organization (OPO)], and the supply chain level. Many of the papers deal only with the hospital level individually, as in the case of a single centre study, while some papers have dealt with the regional level of organization of regions to cater with the different hospitals to coordinate and network with others for efficient and effective transplantation. Some papers try to study a combination of the levels. Even the comparison of centralized with the decentralized kind of set up and the better-performing among them is also classified under the regional level. The supply chain level is one that considers the whole supply chain from the donor to the recipient to be handled with co-ordination and networking in a single stretch and in the same paper.

9. Hierarchical Level Decision Making

The hierarchical level usually consists of strategic, tactical and operational levels in the supply chain and the same is classified into location, allocation, matching and prediction of the organ transplantation network for optimal functioning, co-ordination and networking of the transplant centres. From the literature, it is found that a better way of solving the problem is to hierarchically decide on the issues from donation to transplantation. Based on this hierarchical order, the literature has been classified as Location, Allocation, Matching and Prediction. The classes are explained one below the other with the related papers in each category as well as in combination as their work suggests.

9.1. Location - Facility Location of Organ Procurement Organizations (OPO)

The facility location of Organ Procurement Organizations (OPOs) has been done for optimal reconfiguration and also in allocation in certain studies. Some of the works are explained in brief in this section.

The common healthcare service facility location models are mainly covering model, p-center model and the p-median model (Drezner & Hamecher, 2002). Chu & Chu (2000) studied the objective of supply and demand matching of hospital beds in Hong Kong. The location set covering the model needs to cover all demand points, the number of required facilities is often too large and may exceed the actual capacity, and also, there is no distinction between the demand points. The maximum covering model is applied to emergency ambulance and fire services (Church & Revelle, 1974).

In relation to organ transplantation facility location, Kong et al. (2002) initially worked on the location of transplant centres, striking a balance between efficiency and equity. In the organ transplantation process in the USA, the entire state is divided into different transplant regions for effective co-

ordination and networking. They used a set partitioning algorithm for the regional configuration of the transplant centres in the United States. Stahl et al. (2005) extended the study with a detailed analysis to identify the optimal configuration of transplant regions in the USA, considering OPO as both procuring as well as distributing units to its associated transplant centres.

Maria & Domenico (2006) have worked on the problem of the location of OPO, relaxing the 'local primacy' rule by disconnecting the procurement part and the distribution part of the OPO's in Italy. In India, the transplant centres are not networked, and there are very few Organ Procurement and Distribution Organizations (OPDOs) to coordinate the transplantation procedures within the state. Hence, this study intends to network the Transplant Centres at the state level and then deem "n" number of transplant centres as OPO's in-order to facilitate co-ordination of transplantation activities and to ensure the best fit allocation of an organ to the recipient. The OPDO location considering the procurement and distribution depending on the demand of the waitlist from the recipient perspective and population density and donations from the donor perspective, for weights are modelled as a P-Median problem. The list of the papers is shown in Table 1 below.

Table 1: Location of Hospitals and Organ Procurement Organizations

Author	Title	Objective	Methodology	Results
Chu and Chu (2000)	A modelling framework for hospital location and service allocation	Plan for supply and demand matching of hospital beds in Hong Kong	HLSAP model a mathematical model for planning issues	Evaluating and predicting and Decision Support System.
Teng and Kong (2010)	An Efficient Approximation for Refining Organ Geographic Distribution in the U.S. Liver Transplantation and Allocation System	Geographic balance between supply and demand and decay of liver quality	Deterministic sequential matching model	Modification of geographic configuration of liver allocation system.
Kong et al. (2002)	Organ transplantation regions: the need for optimization	To study the optimal configuration of transplant regions in USA	Set partitioning algorithm for the optimal configuration of the OPO	The condition of local primacy is maintained.
Stahl et al. (2005)	A Methodological Framework for Optimally Reorganizing Liver Transplant Regions	A methodologic framework for determining optimal configurations of regions maximizing transplant allocation efficiency and geographic parity	An integer program to maximize a weighted combination of intraregional transplants and geographic parity	11 regions as constraint increases 17 transplants/year while unconstrained gives 18/year.

9.2. Allocation of Organs Based on Matching Donors and Recipients

The models for allocation are categorized once the organ becomes available; the allocation is based on the order in which the sharing system is devised in their network. It varies from country to country and organization to organization.

9.2.1. Point system for recipients of the organs

Baran (2006) studied the deceased donor donation followed in organizations around the world, particularly in the USA, Europe, Australia and New Zealand. The point system followed by the countries was also studied by her, and the table showing the points for various factors like Blood group, HLA, Age, sensitization and waiting time is given below. Some problems are shared by all jurisdictions for similar solutions, and for others, it is unique and must be dealt regionally or nationally thereby trying to strike a balance between efficiency and equity. A concerted effort is

being made by the countries for improving the existing systems to ensure the best possible outcomes. Each country and organization has their own policies and systems for the allocation of the organs. Depending on the cultural, geographical, political characteristics and also the characteristics of the recipients (patients) and donors, there is no specific and optimal method for allocation, and each organization adapt some of the principles from other countries in order to execute the allocation policies of their own. The allocation policies that have been systematically prepared by organizations have been briefed below in Table 2. And it cannot be assured of optimality as it is subjective and cannot be used as such by any organization for the same reason.

There are also a few qualitative studies done for allocation of liver (Cook, 1990) and point-based systems for allocation of other organs (Pritsker, 1995; Starzl et al., 1987). The following Table 3 deals with a sample of studies related to the works of the allocated organ being matched on to the recipient.

Table 2. Allocation Rules Followed in Different Organizations of Different Countries.

Organization	ALLOCATION RULES					
	Blood group	HLA (Human Leukocyte Antigen)	Age-Recipient	Age-Donor	Sensitization	Waiting time
UNOS (United Network for Organ Sharing)	O → O B → B	Only DR (Mismatches)	<35 yrs. donor given to <18 yrs recipient	Old and low quality donor for more waited recipient	All organization give some degree of priority to patients with high PRA at varying levels	Calculated either from the time of wait listing or from the first dialysis based on the organization. Not that much importance for standard donor, however when there is a tie breaker then the patient waiting longer will be given preference over the others.
UKT (UK Transplant)	O → O or B	DR > A or B	<50 yrs donor given to <18 yrs recipient	Older donor to Older recipient		
AUS (Transplantation Society of Australia and New Zealand)	O → O B → B	DR > A or B	<18 yrs recipient given bonus points for dialysis from < 15 yrs	Older donor to Older recipient		
ET (Eurotransplant)	O → O/ B (0 HLA) O → O (1 HLA)	All equally weighted	<16 yrs recipient get additional waiting time points on dialysis	>65 yrs donor given to recipient of same age group	Acceptable mismatch HLA for PRA > 85%	
Efg (Etablissement Francis des Giraffes)	ABO identical preferred over ABO compatible	DR>B>A	If donor and recipient < 16 yrs even though national else regional	Older donor to Older recipient	Patients with compatible blood group and even minimal matching are given based on priority	
ONT (Organization National de Transplants)	-	-	Priority for <15 yrs recipient	Older donor to older recipient		
ST (Scandiarttransplant)	O → O B → B	All equally weighted	<40 yrs donor given to < 16 yrs recipient	Older donor to older recipient		

Table 3: Allocation of Organs for the Recipients

Author	Title	Objective	Methodology	Result
Cook (1990)	Equitable allocation of livers for orthotopic transplantation an application of the AHP	A rating system allocation of cadaver livers for orthotopic transplantation	AHP method consisting of criteria for efficiency and equity	Selection of patients by stratifying based on size and blood.
Alan and Pritsker (1995)	Organ transplantation allocation policy analysis	Organ allocation problem creating patient list based on the patient's medical status, and the location of OPO's	Two fuzzy logic models for improving the then point system in UK.	Allocation of Points based on a patient's medical status, waiting time and blood type compatibility.
Baran (2006)	Deceased Donor Kidney Allocation in the US, Europe, Australia, and New Zealand	Review deceased donor kidney allocation algorithms in USA, Europe, Australia and New Zealand	Point system for Blood group, HLA mismatch, Medical urgency etc.	A concerted effort is being made for improving their existing systems.
Starzl et al. (1987)	A Multifactorial System for Equitable Selection of Cadaver Kidney Recipients	Develop a multifactorial system for cadaveric allocation	Awarding points to recipients for factors like waiting time, antigen match etc	First Multifactorial System for cadaver kidney allocation.

9.3. Matching of Recipient with Donor

As soon as an organ becomes available, the next step in the decision process is identifying the right recipient who matches with the donor and that too it must be completed within a very short period of time (in hours). In between procurement and transplantation, there are a lot of activities in terms of the exchange of information and co-ordination of

all the activities. There are in-depth studies done on analysis by simulating data on donation and waitlist of patients (Stefanos et al., 2000) and also studies on allocation for live donors (Gentry et al., 2005; Saidman et al., 2006; Roth et al., 2005). The literature involving studies and techniques for matching of recipients with donors is given in Table 4 below.

Table 4: Matching of Recipient with Donor

Author	Title	Objective	Methodology	Result
Stefanos et al. (2000)	Dynamic Allocation of Kidneys to Candidates on the Transplant Waiting List	Tri-criteria objective of quality of life, likelihood of transplantation and waiting time difference	Development of a dynamic index policy for allocation of resources	Simulated data yielded maximum quality adjusted life year and minimize waiting time
Gentry et al. (2005)	Expanding Kidney Paired Donation Through Participation by Compatible Pairs	To increase the number of paired donation and transplantation	Simulation to analyze the paired donation by allowing compatible pairs	The participation of compatible pairs doubled the match rate
Saidman et al. (2006)	Increasing the Opportunity of Live Kidney Donation by Matching for Two- and Three-Way Exchanges	To expand the opportunity for paired live donor kidney transplantation	Computerized matching algorithms to analyze simulated data from OPTN/SRTR database	Number increases from 8 pairs to 11 pairs and robust
Roth et al. (2005)	Utilizing List Exchange and Nondirected Donation through 'Chain' Paired Kidney Donations	To increase the number of transplants	Integrating List Exchange and Nondirected donation with KPD	Increase in the transplant of O group patients

9.4 Prediction Model for Graft Survival Post-transplant

The survival of the graft is an important aspect to be considered in the decision making process as the advancement of medicine and technology of capturing the history of data in the success of the transplant and its follow up post-transplant. As there is only limited work on the data on post-transplant data in our country, it can be done by prediction techniques. A lot of work has been done on the prediction of graft survival, and a few have been explained in this section.

In order to use the available kidneys without wastage, there is a need to increase the survival of the graft after transplantation. And hence prediction of graft post survival is necessary for making the decision of transplantation. A study by Rao et al. (2014) predicted the outcome of kidney and liver transplant patients using two classifiers in their predictive model as a decision support system. From the literature, it is evident that Artificial Neural Network (ANN) (Brier et al., 2003) is used for prediction of delayed graft function after two years and also as separation of ten periods instead of continuous-time for prediction. Similarly, Bayesian Belief Network (BBN) (Topuz et al., 2018) was developed for the data and also a simple fuzzy logic model as a decision making aid (Perris & Labib, 2004) for the medical professional also was developed to compare the prediction accuracy with each other. The literature in detail is given below in the form of Table 5.

10. Conclusion

Organ donation is one of the best donations that a person can give to someone. Therefore, there is a need to consider the organs as national resources. The organs are wasted due to two reasons. One is due to the rejection of the organ due to immune response or organs received after Cold Ischemia Time (CIT). There is also a compounded rise in the gap between the demand and supply, and hence utilization of these scarce resources becomes inevitable. In this paper, the various perspectives of classifying the literature on organ transplantation was carried out systematically, and the trend of growth from the distribution to analyzing the future scope for each classification is carefully carried out. The trend in organ donations of live, dead and cardiac donors of certain countries providing an increasing trend is initially analyzed using the IRODaT source. The typifying of the literature is important for analyzing and addressing the problem of concern separately. Accordingly, the type of donors was classified as live and dead donors, and the type of organs was classified as kidney, liver, lungs, heart, bowels and pancreas. The type of stakeholders was also classified under the head of donors, recipients, medicos, managerial and government and non-government organizations. The research contribution at different stages was classified as ontology, epistemology, dynamics and technology. The type of problem was classified as inbound and outbound problems, and the type of approach was classified under deterministic and stochastic approach.

Table 5: Prediction of Organ Graft Survival Post-transplant

Author	Title	Objective	Methodology	Result
Rao et al. (2014)	Predictive Modeling for Organ Transplantation Outcomes.	To predict the outcome of kidney-liver dual transplant patients.	Predictive analytics based clinical decision support systems	Two classifiers to predict the outcomes of kidney-liver dual transplant patients.
Brier et al. (2003)	Prediction of delayed renal allograft function using an artificial neural network	To predict the occurrence of Delayed Graft Function and compare with logistic regression	Covariate Analysis by ANN and Logistic regression using data from Jewish hospital	Logistic regression and ANN had accuracy of 63 and 64%, sensitivity 36.5 and 63.5% and specific 90.7 and 64.8% respectively
Topuz et al. (2018)	Predicting graft survival among kidney transplant recipients: A Bayesian decision support model	Novel methodological solution to the prediction problem	Comprehensive framework of feature selection from huge database combining several machine learning approaches	Obtained predictor sets outperformed other alternative predictor sets comprehensively
Perris and Labib (2004)	Transplant patient waiting lists using fuzzy logic	Prioritization of kidney transplant recipients	Two fuzzy logic models for improving the then point system in UK	Fuzzy logic with existing system also includes the humanistic criteria

The solution methods were classified broadly under qualitative and quantitative methods. The classification as individual hospital level, the regional level, and the supply chain level helps in the organ procurement as well as distribution of organs. Finally, the literature was identified on the different levels in which the decision has to be made, and an optimal way of doing it could be to decide in a hierarchical manner on location, followed by allocation, matching and prediction. This aids in the decision making phase of the stakeholders for successful organ transplantation.

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Determining the Factors Influencing Social Media Usage among Elderly

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A b s t r a c t

Ageing is an inevitable process. According to data from World Population Prospects: the 2019 Revision, by 2050, one in six people in the world will be over age 65 (16%), up from one in 11 in 2019 (9%). Over the recent years, there has been a considerable growth in the numbers of active internet users as well as social media users. The percentage of elderly (above 60 years) who are social media users is on the increase. One of the factors that drive the quality of life of the elderly is the use of social media to get connected with others and as time pass. This study aims at understanding the factors that influence the usage and addiction of social media by elderly people. The factors identified from the literature for this study are relationship maintenance, hedonic motivation, social influence, passing time and information seeking. A sample of 260 people above the age of 60 is taken for the study, and the data collection is done using a structured questionnaire. The results of the study show that all the factors are found to have a significant influence on usage, and usage, in turn, has a significant influence on addiction. Social influence is found to be the major determinant of usage.

Keywords: *Social media, usage by elderly, hedonic motivation, relationship maintenance, passing time, social influence, information seeking, addiction*

1. Introduction

An inevitable process of life is ageing. A considerable amount of the world's population is ageing. The UN report on World Population Prospects 2019 states that in India, the projected increase of the ageing population is from 8% to 20% in 2050. Hence a considerable number of researchers is now focussing on the area of ageing and, to be very specific, on healthy ageing. According to a WHO report (2015), healthy ageing is defined as "the process of developing and maintaining the functional ability that enables well-being in older age." Healthy ageing is found to have a strong impact on quality of life.

Social media has become an integral part of the daily life of a majority of people worldwide. Every year the percentage growth of active users of social media is increasing, and from the previous year, there has been a 13% growth in active social media users by the start of 2021. The use of smartphones has also increased considerably, which leads to the use of social media through these phones. Accordingly, the usage of social media by the elderly also has increased. There are many factors that lead to the use of social media by the elderly.

Information System researchers have always taken an interest in studying the usage of different systems by proposing different models with suitable factors. Some of the commonly used models are the Technology Acceptance Model (TAM) (Davis, 1989), Innovation Diffusion Theory (IDT) (Rogers, 1995), Uses and Gratification Theory (UGT) (Katz et al., 1973), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), UTAUT 2 (Venkatesh et al., 2012) etc. There are many factors identified by these models in determining the usage of different information systems. One major area of research in recent times is social media, as this has emerged to be an inevitable part of the daily life of people.

This study aims to understand the usage of social media by the elderly and whether this usage leads to addiction. The different factors suitable to the context are identified from the models- UTAUT2 and UGT. For this study, the factors identified to affect social media usage are hedonic motivation, social influence, relationship maintenance, passing time, information seeking. Further, the study explores if this usage leads to addiction to social media.

The objectives of the study are as follows:

1. To identify the major factors influencing the usage of social media by the elderly.

2. To frame a model that leads to usage and thereby addiction to social media by the elderly.

2. Literature Review

2.1 Social Media

The definition of social media, according to Merriam Webster dictionary, is "forms of electronic communication (such as websites for social networking and microblogging) through which users create online communities to share information, ideas, personal messages, and other content (such as videos)". Social media is a wide umbrella with many other sub-areas under it as per the definition above. As per Digital 2021 reports, the number of social network users in India at the start of 2021 (January) is 448 million and has a 21% increase between 2020 and 2021. Around 32.3% of the population in India are social media users. Among the most used social media, Facebook remains the top, followed by YouTube. WhatsApp is termed as a messaging service and in recent times have been included in the wide umbrella of social media. India is termed as the biggest market for WhatsApp and has around 390 million monthly active users. In India, there is not much competition for WhatsApp, and hence a large number of people turn to it for messaging services. The usage of social media has been studied by many researchers, and each social media has its own unique factors that lead to the usage of the same.

Social Media has become an integral part of everyday life irrespective of age. Many studies confirm that social media has become a daily routine of the elderly. As age increases, the limitation to mobility and the urge for social relationships draws the elderly to social media. There are many factors identified by researchers that pull the elderly to such media.

2.2 Hedonic Motivation

Hedonic motivation is defined as the fun or pleasure derived from using technology (Venkatesh et al., 2012). Hedonic motivation plays a vital role in determining the usage of information systems (Thong et al., 2006; van der Heijden, 2004). Sledgianowski and Kulviwat (2009) have found that the hedonic component-perceived playfulness to be a strong predictor in the use of online social networks. According to them, social networking sites are considered to have a more hedonic perception than the utilitarian purpose. Chen (2014), in his study on exploring influences on Facebook continuous usage, states that when the perceived enjoyment is high, users are willing to continuously use Facebook. The different apps, games, posts, etc. that are there on social networking sites attract people to use these sites. Microblogging and video streaming are other features that ignite the enjoyment of

using social media. The elderly find these as a source of enjoyment as these are at their fingertips at home, and they needn't move out.

2.3 Social Influence

Social Influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003). In the technology adoption context, peer pressure is shown to be a determinant of subjective norm/social influence. The effect of social influence is significant in the study of acceptance of social networking sites. Hsu and Wu (2011) states that one of the factors that determine the user's continuance intention of Facebook is social influence. In the case of the elderly, one of the major factors that influence social media usage is the influence of their peers or people around them. These people are usually introduced to social media by either their family or friends. Hence social influence, as suggested by Venkatesh et al. (2012), is a major influencer in the usage of technology and, in particular, social media.

2.4 Relationship Maintenance

According to Dindia and Canary (1993), relationship maintenance involves processes that not only sustain the relationship but also ensure relationship satisfaction. Relational maintenance is a dynamic process that requires persistent communication between partners (Dindia, 2003). Computer-mediated communication appears to be valuable to maintain relationships developed face-to-face (Rabby & Walther, 2003). Social networking sites offer advantages over traditional means of maintaining relationships (Wright et al., 2008). Users post updates that help their friends stay informed on their lives. For the elderly, one of the main purposes is to remain connected with their family and friends, and hence, they resort to the online medium, which is more easy and cheap also. Many of these people might be at home and want to communicate with their far-away family members, grandchildren etc. Social media is one platform that provides them with a connection with any person they want to, and thus relationship maintenance is taken as one factor to study the use of social media in this study.

2.5 Passing Time

According to Papacharissi and Rubin (2000), one of the factors identified for using the internet is passing the time along with some other factors like information seeking, entertainment, utility etc. Quan-Haase and Young (2010), in their study, states that the use of social media is to obtain gratifications by the factors- passing time, sociability and

social information. To be more specific, different studies have stated that the use of Facebook is for keeping up with friends, passing the time, self-promotion etc. After retirement, or as age increases, the elderly are restricted to their home and surroundings, and hence finding options to pass time comes in. Social media with the various offerings thus attracts them, be it with games, apps or any other videos, posts etc.

2.6 Information Seeking

The early use of social media was intended as online communication media. But over the years, it has become a platform for discussions, posting of happenings and even as a news platform. According to Wilson (1999), information-seeking behaviour arises from the need for information. Active information-seeking behaviour on social media involves affective commitment, continuance commitment and normative commitment (Chen et al., 2014). In recent times, real-time information is shared through social media, and hence many people turn to these for gathering information on various topics and even recent happenings. Since many of the discussions and videos are posted on these social media platforms, elderly people find it easy to search and get information as and when they need it. Hence this factor may play a role in the usage of social media by the elderly.

2.7 Habit and Addiction

Habit is defined as the extent to which people tend to perform behaviours automatically because of learning (Limayemet al., 2007). Habit is found to be a significant predictor of intention to use technology (Venkatesh et al., 2012). Social media can be thought of to be a habit or addiction when individuals exhibit a compulsion to use social media to excess (Griffiths, 2000). The different features, the games, the entertainment etc., leads to usage of social media by the elderly, and in turn, they develop a likeliness to spend more time in these. This gradually develops an addiction, and they feel a blankness at times when they cannot access such sites. Some researchers argue that frequent social media usage need not necessarily lead to addiction (Griffiths, 2010).

All the above factors identified are found to have a major role in predicting the usage of social media and also to confirm if this leads to a habit of getting used to this, which in turn becomes an addiction. The theoretical framework proposed here is based on these factors and on the earlier models discussed above.

In accordance with the factors identified above, the following hypotheses are proposed.

H1: Hedonic Motivation has a significant influence on the usage of social media by the elderly.

H2: Social Influence has a significant influence on the usage of social media by the elderly.

H3: Relationship Maintenance has a significant influence on the usage of social media by the elderly.

H4: Passing time has a significant influence on the usage of social media by the elderly.

H5: Information seeking has a significant influence on the usage of social media by the elderly.

H6: Usage of social media has a significant influence on the addiction to social media by the elderly.

The proposed model is as given in Figure 1.

3. Methodology

A survey by means of a questionnaire was undertaken to meet the aim of the research. The population is defined as elderly people: people over the age of 60 in the state of Kerala. The sampling method chosen here is a non-probability sampling method- convenience sampling. The

sample size was fixed at 300, and both online and offline method was chosen for data collection. The analysis is done by means of Structural Equation Modelling (SEM). Warp PLS is used for this purpose. The rest of the analysis is done by using SPSS. The questionnaire was designed in two parts- the first part to understand the demographics and the second part to measure the variables. Hedonic Motivation, Social Influence and Usage was measured using the scale by Venkatesh et al. (2012). Relationship Maintenance, Passing Time and Information Seeking was measured with a scale from the Uses and Gratification Theory (Katz et al., 1973). Addiction was measured by scales adapted from Venkatesh et al. (2012) and Sahin (2018).

4. Data Analysis

At the end of data cleaning, 234 usable questionnaires were used for the analysis. The analysis is divided into two parts- the first part deals with descriptive statistics, and the second part gives inferential statistics.

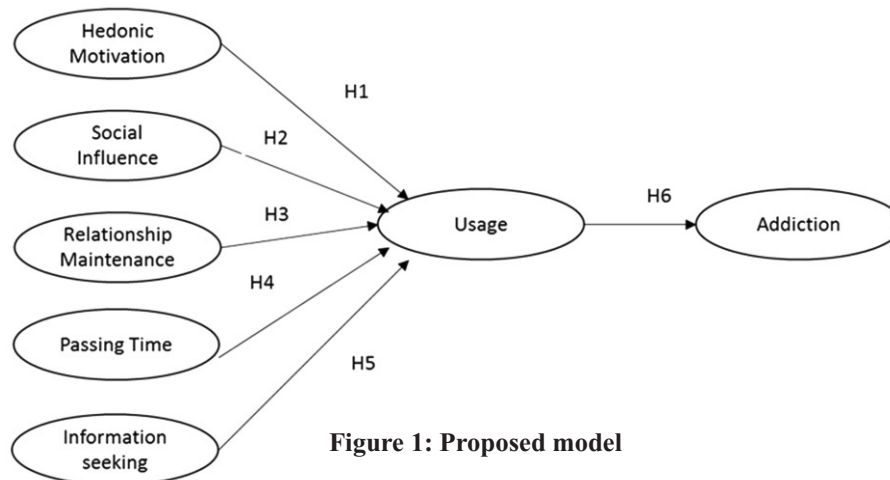


Figure 1: Proposed model

Table 1: Descriptive Statistics

Gender		Present Employment Status	
Male	34%	Employed	18%
Female	66%	Not employed	82%
Age		Previous Employment	
60-69	71%	Bank	20%
70-79	25%	Govt service	30%
80-89	3%	Housewife	10%
90-99	1%	Private employment	35%
		Self-employed	5%

Further from the data, 97% of the respondents said that they own a smartphone, while 3% said that they don't. Out of the 97% of people who use a smartphone, the whole 100% responded that they access social media through their phones.

The most used social media are Facebook, WhatsApp, and YouTube. A small percentage (5%) of people said they use TikTok. TikTok is a recent addition to social media, which is used as a video sharing platform.

Figure 2 represents the percentage of the respondents on their active time spent on social media

4.1 Inferential Statistics

4.1.1 Reliability and Validity

The reliability is tested and validated by Cronbach's Alpha. Table 2 shows mean, standard deviation, Cronbach's alpha values and the average variances extracted (AVE) calculated for the variables of the study. All the values are above the accepted value (0.7), as suggested by Nunnally (1978). Hence the reliability is established.

Further, to establish discriminant validity, the correlations among the latent variables and the square roots of AVEs are calculated and given in Table 3.

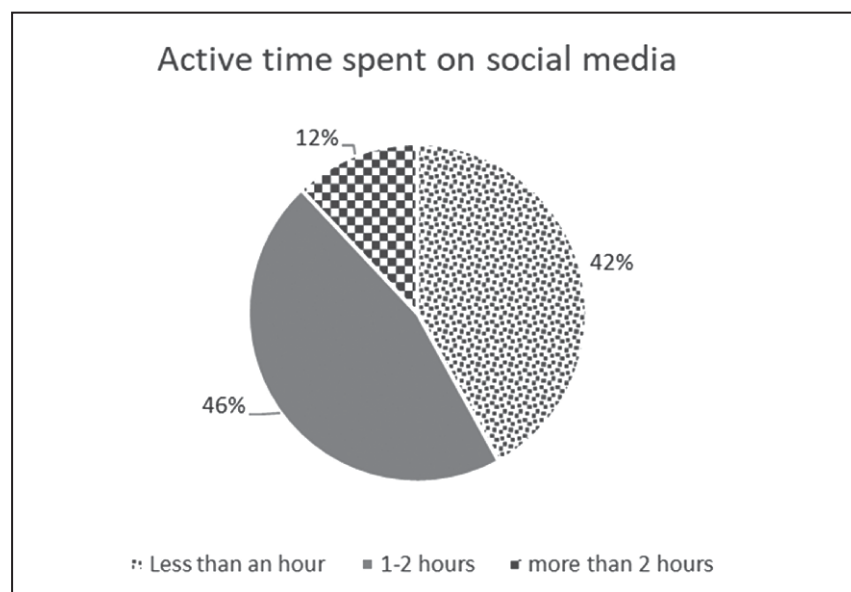


Figure 2: Active time spent on social media

Table 2: Descriptive Statistics and Reliability

Variables	Mean	Std.Dev	Cronbach's Alpha	AVE
Hedonic Motivation	3.59	0.603	0.845	0.765
Social Influence	3.3	0.898	0.922	0.866
Relationship Maintenance	3.3	0.493	0.777	0.534
Passing Time	3.09	0.766	0.903	0.776
Information Gathering	3.71	0.772	0.827	0.744
Usage	3.4	0.636	0.814	0.644
Addiction	3.24	0.765	0.839	0.556

Table 3: Discriminant Validity

Variables	Hedonic Motivation	Social Influence	Relationship Maintenance	Passing Time	Information Gathering	Usage	Addiction
Hedonic Motivation	0.875						
Social Influence	0.345	0.931					
Relationship Maintenance	0.388	0.526	0.731				
Passing Time	0.594	0.609	0.393	0.881			
Information Gathering	0.206	0.432	0.394	0.393	0.863		
Usage	0.445	0.617	0.546	0.738	0.373	0.803	
Addiction	0.544	0.653	0.276	0.547	0.427	0.683	0.746

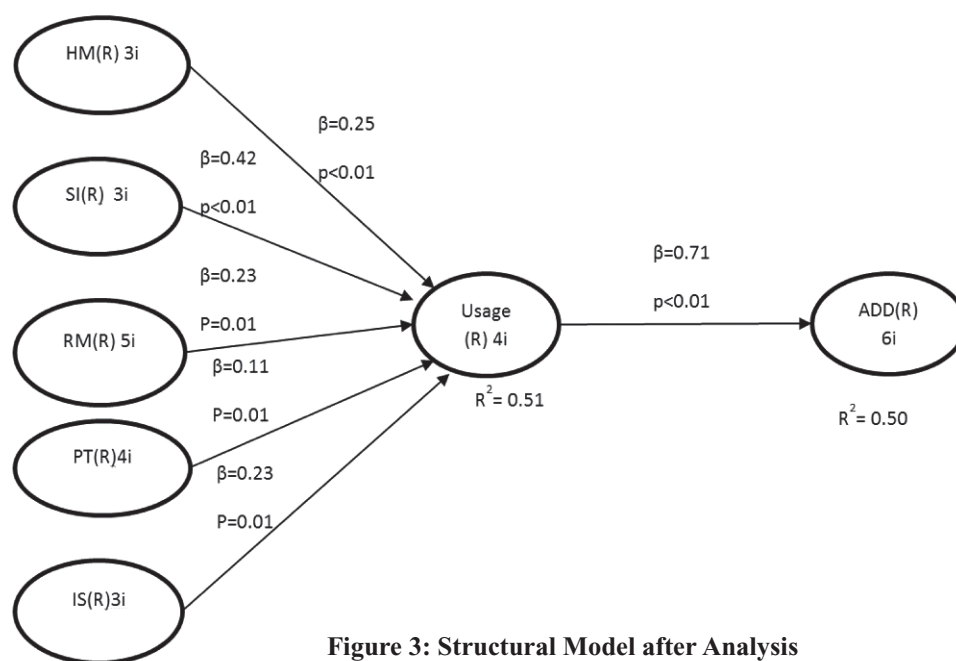
It can be seen that all the values are less than the square root of AVE, and hence we establish discriminant validity.

4.2 Evaluation of Structural Model

Warp PLS was used to test the model. The hypothesised model was tested to check the relationships and the model fit. WarpPLS is a software with a graphical user interface for variance-based and factor-based structural equation modelling (SEM) using the partial least squares and factor-based methods. Warp PLS uses the variance-based SEM and is generally used when the assumption to normality is

questioned and when the sample size is small. The model tested is given in Figure 3.

It can be seen from Figure 3 all the hypotheses (H1 to H6) are found to be accepted since all the p-values are found to be less than 0.05. Further comparing the beta values, it can be seen that the highest significant factor in predicting usage is the social influence ($B=0.42$), followed by hedonic motivation ($B=0.25$), relationship maintenance and information seeking ($B=0.23$) and passing the time ($B=0.11$). Further usage has a significant influence on addiction ($P<0.01$, $B=0.71$).

**Figure 3: Structural Model after Analysis**

It is also found that the R-square value for usage is 0.51, which means that 51% variation in usage is explained by the factors- hedonic motivation, social influence, relationship maintenance, passing time and information seeking. The R-square value for addiction is 0.50, i.e. 50% variation in addiction is explained by the factors. It can be interpreted that the model has good explanatory power with these factors. The model fit indices generated are as given below.

Average path coefficient (APC)=0.270, $P=0.002$

Average R-squared (ARS)=0.508, $P<0.001$

Average adjusted R-squared (AARS)=0.462, $P<0.001$

Average block VIF (AVIF)=1.949, acceptable if ≤ 5 , ideally ≤ 3.3

Average full collinearity VIF (AFVIF)=2.377, acceptable if ≤ 5 , ideally ≤ 3.3

Tenenhaus GoF (GoF)=0.596, small ≥ 0.1 , medium ≥ 0.25 , large ≥ 0.36

Sympson's paradox ratio (SPR)=0.833, acceptable if ≥ 0.7 ,

ideally = 1

R-squared contribution ratio (RSCR)=0.999, acceptable if ≥ 0.9 , ideally = 1

Statistical suppression ratio (SSR)=1.000, acceptable if ≥ 0.7

Nonlinear bivariate causality direction ratio (NLBCDR)=1.000, acceptable if ≥ 0.7

All the fit indices fall in the acceptable level, and hence we can say that the model has a good fit. The proposed model in this study had six hypotheses, and it is clear from the results that all the hypotheses are accepted. This shows that all the factors identified above and the relationships hold good. The model fit indices also very clearly mention the good fit. Hence in the case of the usage of social media by the elderly, these factors are prominent.

Further, a t-test was done to understand the significant difference of gender in these factors and the usage and addiction. Table 4 shows the results of the t-test.

Table 4: t-test for Gender Difference in the Factors

Factors	t	sig-value
Hedonic motivation	-1.802	0.08
Social Influence	-2.725	0.009
Relationship Maintenance	-2.531	0.012
Passing time	0.686	0.493
Information seeking	3.07	0.004
Addiction	1.618	0.107
Usage	-1.706	0.089

It can be seen that there is a significant difference for gender in social influence, relationship maintenance and information seeking. On exploring the mean values, it was seen that for social influence and relationship maintenance, the mean value for females is more than that of males, which means that for females, these factors are more important than the others. But for information seeking, the

mean score for males is larger than that of females. Hence males use social media for information seeking than females.

To understand the significant difference for the age groups considered for the study (four age groups: 60-69, 70-79, 80-89, 90-99), Anova was done. Table 5 shows the results of Anova.

Table 5: Anova Results for Age Group Difference in the Factors

Factors	F	sig-value
Hedonic motivation	4.515	0.004
Social Influence	8.009	0.000
Relationship Maintenance	3.09	0.028
Passing time	1.015	0.387
Information seeking	27.72	0.000
Addiction	3.266	0.022
Usage	5.669	0.001

It can be seen that except for passing time, there is a significant difference for the age groups in the variables considered for the study. The age groups considered here is a bit skewed as the majority of the respondents were from the age group 60-69.

5. Discussion

The quality of life of elderly people depends on many factors. One of the main factors which have made a drastic impact on the life of the elderly is the use of social media. The advent of smartphones and the access of many apps through this have made the life of elderly people more entertaining. This study has aimed at identifying the major factors that lead to the usage of social media and thereby to explore if this usage leads to addiction. 97% of the respondents said that they own a smartphone and all of them access social media through these phones. Facebook and WhatsApp are the most used social media, followed by YouTube. The new entry to the umbrella of social media-TikTok is also seen to be on the good list of usage among the elderly. It is found that the elderly use social media mainly to share pictures and videos. Many of them view YouTube for small videos and understanding things.

SEM using WarpPLS was used to test the proposed structural model. The results of the study show that all the factors- hedonic motivation, social influence, passing time, information seeking, and relationship maintenance has a significant influence on the usage of social media. It is found that social influence is the major predictor influencing the usage among all these factors. This can be very true as the majority of these people, after their retirement, have started to use these social media by the influence of either their close family or friends or colleagues etc. Social influence

has been found to be a major factor in the case of the elderly in using different technologies in many studies. Chogahara et al. (1998), in their study, have stated that social influence had a major role in the physical activity of the elderly. Peek et al. (2014) have found that social influence is one factor that determines the acceptance of technology in ageing. Further, hedonic motivation is the next important factor. The study is in tune with the other researches which have found that people use social media for enjoyment and entertainment (Thong et al., 2006; van der Heijden, 2004). The usage of social media is found to be very prominent in leading to addiction. The model is found to be of good fit.

According to a Pew Internet report (2019), around 43% of the elderly aged above 65% now use Facebook, and many of the other social media has now become a communication tool for them. After spending long years in their profession, or for the children, as age increases, the use of social media has become a tool to overcome loneliness as well as getting connected with the world around for the elders.

6. Implications of the Study

The study has taken different significant factors from literature and proposed a model for the usage and addiction of social media by the elderly. The use of social media differs with different age groups as there is a shift in the focus and nature of uses. This study focuses on the factors that are relevant for people aged above sixty years and has found that the major factor that drives the usage is social influence. The influence of family and friends leads to the usage of social media by them. Since the majority of these people have either retired from work or staying at home, enjoyment and relaxation thus gained is also one reason they are drawn towards social media. This study adds to the literature as a

model for the usage of social media by the elderly. The different social media, including the social networking sites, can thus focus on segmenting their customer base based on age and provide such features. These people might not be interested in the same apps or games as the youngsters, and hence certain additions can be focussed on such needs.

7. Conclusion

The study has tried to frame a model in determining the major factors that lead to the usage of social media. The factors identified are hedonic motivation, social influence, relationship maintenance, passing time and information seeking. It was found that social influence is the major factor determining the usage, followed by hedonic motivation. i.e., the enjoyment in using social media. Further, it was also seen that the usage of social media has led to addiction among the elderly. The results of the study also show that females use social media more for relationship maintenance and because of social influence than males, while males use it more for information seeking.

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Exploring Marketing Insights for Grassroots Innovation: The Case of Bullet Santi

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A b s t r a c t

This study was undertaken to support the grassroots innovation alternate for farming, Bullet Santi, by exploring its marketing needs in a specific market. A qualitative field research using interview & observation methods was undertaken in four villages of Ahmedabad-rural to understand the potential target market, demographics and behavioural intent, major issues and needs, new product perception, pricing gaps, communication and distribution requirements for generating insights for the grassroots innovator for the marketing of Bullet Santi. Besides providing insights to the product innovator, support institutions and policymakers, our research will enable an improved understanding of the determinants of successful commercialisation of grassroots innovation and help researchers to examine new avenues for future research in grassroots innovation by linking it to the marketing domain.

Keywords: *Bullet Santi, Grassroots Innovation, Grassroots Innovator, Marketing Needs, Commercialisation*

1. Introduction

Hardship and poverty affect human life indifferently, which gives birth to the accidental innovator. The desperate wish to fulfil the basic needs of people in the lowest socio-economic group gives rise to grassroots innovation. It may refer to the innovations by individual innovators who often pursue innovative efforts to solve localised problems and generally work outside the sphere of formal organisations like business firms (Bhaduri & Kumar, 2009). It may also be defined as innovation by civil society and not by business organisations or government (Tang et al., 2011). It provides solutions that differ from mainstream and routing innovation (Monaghan, 2009). There are numerous innovations continuously made at the grassroots level across the world. India might not be the only country. India's rural demography spreads across six lakh villages consisting of millions of households and people. They have a severe need for low priced utility products for different purposes to solve their difficulties. Learning across various aspects over time and vision that converts into real-life projects is the main characteristic of grassroots innovation. Grassroots innovation may also involve novel ways of doing something like refrigeration without the usage of electricity and made of clay (Abrar & Nair, 2011).

Grassroots innovation gradually contributes to the global market in the form of niche products and is then adopted by the mainstream. This can happen when a large organisation owns or supports the commercialisation of these projects (Hess, 2013).

1.1 Brief Literature Review on Grassroots Innovators

Few researchers define grassroots innovators as 'innovative network of activists' who are located locally and helped by people of common interest (Church, 2005), while few also call them as 'innovators who come from origin' or 'individual actors coming from rural communities' (Agarwal, 1983; Butkeviciene, 2009). Usually, these grassroots innovators are people who did not get any formal education and don't have theoretical knowledge of science and technology etc. (Rao, 2006). Despite the fact, they possess knowledge and skills that come from traditional resources or are indigenous (Onwuegbuzie, 2010). This knowledge is applied by these grassroots innovators to solve their problems. The innovation capability of grassroots innovators can create many benefits to an individual and community in the resource-constrained environment (Singh et al., 2020). Other than their limited knowledge due to lack of formal education, grassroots innovators may also lack in

few skills like capabilities to execute new projects, commercialising their project, making their project functional, optimising their project solutions, etc. They may also lack the skill of scaling up their project. Also, there are a lot of constraints in grassroots innovation like sources of finance, the dependence on locally available raw material, lack of infrastructure, etc. Large populations, poverty in the country, low cost of establishing a company and good opportunities in the social enterprise ecosystem is motivating these grassroots innovators to develop and scale up the projects (Rawat et al., 2019). However, lack of funds and knowledge is becoming a hurdle for their growth. Hence, creating proper funds through small grants, subsidies, co-funding, insurance facilities, etc., can boost such innovations (Hoppe et al., 2015). Innovating in scarcity is the difference between multinationals and grassroots innovations that prevails in developing countries. This ability to innovate under such critical circumstances is, in that perspective, an essential requirement at the bottom of the pyramid (Krämer & Belz, 2008), and therefore it has the potential of scaling up. It can be scaled up for the local market first and then in other national and international markets (Srinivas & Sutz, 2008). Scaling up of these innovations can also help in increasing employability and earning opportunities of that country's citizens (Dutz, 2007).

The scaling-up process also involves integrating grassroots innovations which can help to get information about consumers, their needs and how to use the product. Hence, employing market research for the same is essential. In such kinds of work like research, a proper communication channel to promote their project is also a challenge for these innovators (Creech, 2014). The innovators need the handholding of people, institutes or organisations that can do it for them and help them scale up their project. There should be intermediaries to support such kinds of grassroots innovations and innovators in terms of legal, local, market, policy and social context.

Most of the grassroots innovators are need-based innovators, and they do not have the intention of becoming entrepreneurs. Innovators are born because of the need, and hence, at times, they are not motivated enough to commercialise their projects (Kumar et al., 2013). Hence, to motivate such innovators and to commercialise their projects, different networks, organisations, people, communities, academic researchers must connect with them and support them in all means. These products are developed keeping in mind issues of the target audience like adoptability, availability, and affordability.

2. Justification of the Study

India is the first country in the world to have set up a committed office under the Department of Science of Technology, Government of India, to search, reward and value-add individual grassroots innovators. The Indian government patronised grassroots innovators and movements like the Honey Bee Network, SRISTI (Society for Research and Initiative for Sustainable Technologies and Institutions), and NIF (National Innovation Foundation) dedicated to grassroots innovations in the country (Ferreiro et al., 2021). Prof. Anil Gupta, who is the founder of Honey Bee Network, NIF, Grassroots Innovation Augmentation Network (GIAN), and SRISTI and whose objective is to support and boost global and local grassroots innovation introduced to the product studied. Widely known and discussed, grassroots innovations solve many challenges of the people at the bottom of the pyramid, but the innovators lack the skills to commercialise it to be benefited. They also lack financial resources to promote their products. GIAN, NIF, SRISTI, and Honey Bee Network incubate these products, document, and commercialise. Developing innovative marketing strategies for these products required in-depth study of the target audience, differentiation, consumer behaviour, and suitable channel of distribution. As per Anil Gupta in the interview given to Balachandran (2018), grassroots innovators must be given entrepreneurial support for taking their idea to the economic and social market. In his words, "Not all grassroots innovators make good entrepreneurs."

Again, looking at the research contributions in grassroots innovation and social entrepreneurship, innovativeness has been identified as a critical factor, but an analysis of the marketing staples like four Ps (product, price, promotion & advertising, and physical distribution) and segmentation, targeting, and positioning (STP) have not been explored completely (Short et al., 2009).

This study was undertaken to support the social entrepreneur's grassroots innovation by exploring its marketing needs in a specific market. It also links the marketing domain with the grassroots innovation field, where research questions can be formulated for future interdisciplinary research.

3. Research Objectives

The study was undertaken with the objective to generate marketing insights for the formulation of the marketing strategy of the grassroots innovation product, Bullet Santi in Ahmedabad-rural by exploring the following items:

1. Target audience
2. Demographics, Behavioural intent
3. Significant issues in farming (Needs)
4. New product perception, including functional and emotional
5. Pricing strategy
6. Marketing communication needs
7. The requirement of a channel of distribution

A detailed discussion was undertaken with a team of marketing experts, including an ex-Indian Institute of Management, Ahmedabad (IIM-A) faculty. During the discussion, the following research objectives were formulated:

1. To study the marketing impact on the commercialisation strategy for Bullet Santi in the rural areas of Ahmedabad.
2. To investigate the marketing staples applicable in the study.

During the discussion, it was also agreed that demographics-based targeting like age, gender and income might not be adequate. It was also important to assess the farmers' behavioural intent and affinity to understand their marketing needs. Broadly, the STP and the four Ps were used to design the template and discussion guide for the field research.

4. Methodology

One of the significant issues with grassroots innovation identified in the literature review was the scaling up of business/enterprise due to a lack of resources and knowledge. In the case of a grassroots innovation product like Bullet Santi, the innovator and the team wanted to develop marketing strategies (marketing plan) to scale up the business. It was essential to understand farmers' perceptions of Bullet Santi to formulate marketing strategies for the product. It was also important to understand their needs for farming-related products, farmer's demographical and economic backgrounds. Therefore, qualitative field research mainly using the interview method for the study as the respondents were farmers, and in-depth interviews would help uncover rich and deep insights into the product. Also, it was believed that the interviewer's presence would give the respondents additional comfort while answering the questions in the local language. Observations were also made during the interaction. For the introductory level, a telephonic interview was also conducted with the product innovator of Bullet Santi at the preliminary level. The study was conducted in two stages:

Stage 1: Initially, a telephonic interview with the product innovator and published sources in research was undertaken to understand the innovator's background, the origin of the grassroots innovation, and other relevant details about the product.

Stage 2: In-depth interviews were carried out with 30 farmers from four villages of Ahmedabad district, Gujarat, to understand the market needs for the product. Thirty farmers from these villages were chosen based on judgemental sampling. The rationale behind the number of interviews was based on almost similar background and geographic location of the respondents (Baker & Edwards, 2012) besides the recommendations of the marketing expert from IIM-A. Again, the interviews were conducted till we reached theoretical saturation or 'redundancy' (Srivastava et al., 2021; Creswell, 2014). The laddering technique was used for interviewing the farmers for understanding them better. It is particularly useful in developing an understanding of how consumers translate the attributes of products into meaningful associations concerning self-defining attitudes and values (Reynolds & Gutman, 1988). The interview questions were formulated in the local language, i.e., Gujarati, to ease interaction with the respondents.

The observation method was also used throughout the interaction. The unit of observation included the target market for Bullet Santi, major issues in farming, new product perception, functional and emotional benefits, pricing, communication, and distribution.

5. Findings and Analysis

From the review of literature, it is found that grassroots innovations lack appropriate research, especially in the case of scaling them up and developing marketing plans of the same though it solves local environmental issues of people (Seyfang & Smith, 2007). These innovations majorly lack resources; despite this fact, innovators develop new products that are cost-effective to the market for which it is developed in this industrialised society. This is the beauty of grassroots innovation in terms of difference with multinationals.

The preliminary findings were generated using published sources and telephonic interview with the innovator, Mr. Mansukh Bhai Jagani.

5.1 Phase 1 (The Genesis of the Grassroots Innovation: Bullet Santi)

Many farmers in India suffer from resources available, knowledge of technology, and other modern farming skills.

They are usually uneducated and, therefore, have little knowledge about the government schemes for their welfare. They do not even get paid as per the yield due to ignorance and lack of skills, and hence, the financial condition is critical. Most of the time, shortage of resources gives rise to remarkable grassroots innovation. One such innovation was created by Mr. Jagani, the developer of Bullet Santi. He belonged to a small village of Amreli district of Gujarat state in India. Born as a poor farmer, he could not even complete primary education as he had to support his family. It is said that many people are born with some talent, and so was Mr. Jagani, who, with his challenging conditions, gave the world a unique product that was patented and won many national and international awards. In his words:

"I always had a passion for being an innovator and for developing things that did not exist."

He tried other occupations too, but that did not interest him much. His inclinations, passion, and inquisitiveness to develop something new made him start a workshop related to innovative farm products that reduce farmer's efforts and generates more yield cost-effectively. He quoted:

"I was not sure whether to continue with agriculture or start my workshop. Finally, I decided to start a workshop on my own. I also continued with farming."

Bullet Santi was a product developed by Mr. Jagani that was a combination of the front part of motorcycle Bullet, and ploughing equipment attached behind; therefore, the name given was Bullet Santi. This patent won the award in not only India but in the US too. According to him:

"The farmers have greatly benefited from Bullet Santi. It has helped them to improve productivity as they did not have to bother about the labour cost or bullocks to plough their land."

The device received great appreciation from Africa and other countries as it can plough one-acre land in only two litres of diesel in less than thirty minutes. The cost of a tractor is more than Rs. 4 lakhs while Bullet Santi costs Rs. 1.65 lakhs indicating cost-effectiveness, reduced work, effort, and more benefit. This success boosted his confidence, and he launched his workshop. In his words:

"My workshop is performing well. The Grassroots Innovation Augmentation Network and the National Innovation Foundation recently assisted me with a grant for workshop expansion and purchased more equipment. However, the need for skilled labour remains a concern for my business."

He has developed several such farm devices to benefit farmers and ease their work effort. He not only got appreciation from foreign countries but also got a chance to visit South Africa. In his words:

"I enjoyed my first trip abroad. I observed that the style of agriculture was a bit obsolete in African countries. There is a lot that African countries can adapt and learn from our work. There is immense scope for improvement. The people there were delighted to know that farmers from India had come to interact with them."

He also received the award from former President Dr. APJ Abdul Kalam. In his words:

"The most cherished moment of my life was receiving an award from President Dr. APJ Abdul Kalam."

Authors (A): Do you regret not completing your education?

Mr. Jagani (MJ): "I do not worry about it much. However, sometimes I feel if I had learned English, I would have been able to connect and communicate with many people."

A: What are your lessons for other innovators?

MJ: "Do not focus on incremental innovations; develop something completely new on your own."

A: Any future work or plans?

MJ: "I am working on a machine that can help draw water easily from deep wells. There are more than a few ideas on which I am working now. It is too early to comment on them."

Mr. Jagani is a good exemplar of a grassroots innovator who, despite social challenges against all odds, created a low-cost alternative for farming that benefited the farmer community in his region. His contribution as an individual innovator, addressing localised problems, no formal education or theoretical knowledge, and novel ways of innovation, especially for rural communities, is consistent with the literature review.

5.2 Phase 2 (Findings from the Field Interviews and Observations)

The findings generated through the interviews and observations were summarised into seven categories, namely target market, demographics and behavioural intent, major issues and needs, new product perception, perceived benefits (functional and emotional), pricing strategy, and communication and distribution insights for *Bullet Santi*.

5.2.1 Target Market for *Bullet Santi*:

Thirty farmers interviewed from four villages near Sanand, Ahmedabad belonged to one or the other segments as below:

- Farmers who could not afford tractors and equipment (as an alternative to tractors)
- Rich farmers who had their own land (those looking for labour substitute)
- Poor farmers who had taken land against rent or had little land (those looking for cost-benefit)

All the above segments had different needs but were found to be suitable target groups for *Bullet Santi*.

Table 1: Key Segments (Target Market)

Segment	Characteristics	Needs
Middle-level Farmers	Had own land	Needed alternative to expensive tractors and equipment
Rich Farmers	Had own land of large size	They required replacement for daily wagers and agricultural labourers and workers
Poor Farmers	Little land or leased land	Desperate need for low-cost farming gadgets and equipment, couldn't afford tractors

Source: Compiled by the Authors

1. Innovator has been awarded National Award from NIF's First National Competition for Grassroots Innovations and Traditional Knowledge in 2001.

5.2.2 Demographics, Behavioural intent of farmers

The age group of the farmers was between 35 to 55 years, and the majority of them were males who were associated with farming on a reasonably large scale. Their income from farming ranged between 1 to 8 lakhs per annum and had other different sources of income as well. Many of them were less educated, while their sons were well educated, with some qualified as engineers and other professionals. In most of the cases, the sons were not interested in farming.

Almost all the farmers were observed to have a simple lifestyle, and they were found to be extremely hospitable and kind-hearted. Despite their simple living, traditional values and straightforward approach, they were open to trying new things or new innovative farming methods. All the farmers were found to exhibit strong inner job values of keeping up with the tradition, being independent and enjoying their work. The table below categorises the key statistics from demographics and the behavioural intent observed:

5.2.3 Major Issues and Needs

During the interviews with the farmers, the following insights were generated through discussion to identify the specific needs of the farmers:

- The foundation for agricultural development depended on the changes in the cropping pattern and in the levels of productivity of various crops. Also, soil and its type affected crop productivity.
- According to the farmers, a very important and crucial input for agricultural production was the irrigation method used.

- In India, cattle-like bullocks or tractors are used for ploughing and as other agricultural implements. Tractors are sold through agencies as the channel of distribution. Due to high prices that small and medium level farmers cannot afford, their time, energy, and efforts are increased.
- Non-traditional agriculture means that were either cheaper or multifunctional, or both were welcomed by the farmers. All farmers felt that the irrigation system, fertilisers, ploughing techniques, etc., needed new technologies and means.
- As per most of the farmers, the majority of development, research, and action plans were focusing on the rich and large farmers having land to cultivate, and the target was to increase the crop or output, etc. Most of them felt that their small farmers' plight was ignored, i.e., the small farmers needed new technology or innovation to sustain their livelihood.

5.2.4 Bullet Santi Perception (New Product)

The following features of *Bullet Santi* were explained to the farmers before recording their perceptions:

- The product was smaller and cheaper than a tractor but more powerful than bullocks used for ploughing farms.
- It was fuel-efficient as two acres of farmland could be ploughed by only one litre of diesel.
- It was easy to use and handle, including assembling and dismantling the device from the motorcycle.

Table 2: Key Demographics

Age :	35 to 55 years
Gender :	Males
Income :	Rs. 1 to 8 lakh per annum
Education :	Matriculation and below

Source: Compiled by the Authors

Table 3: Behavioural Intent

Code	Interpretation
Simple lifestyle, traditional and hospitable	Cultural and sociable
Straightforward and kind-hearted	Honest and good-natured
Open and curious about trying new things	Venturesome
Independent and enjoyed work	Free and strong inner job values

Source: Compiled by the Authors

- The device could also undertake other farm operations like sowing seeds, spraying, inter-culturing, etc., including ploughing.
- The product could be used for orchards and crop plantations as it would prevent soil compaction due to being lightweight.
- 8 to 12 acres of land was possible to be ploughed in 8 hours depending on the type of soil.
- The rear-wheel spacing could be adjusted depending on crop spacing.

Functions of *Bullet Santi* explained:

It was explained to the farmers that *Bullet Santi* was a modified Bullet with attachments for ploughing, cross cultivation, sprayer and other similar functions.

The farmers from the four villages, namely Khoraj², Chandrasan³, Yashodanagar⁴ and Govindpura⁵, were of the following perceptions for *Bullet Santi*:

- The farmers felt that *Bullet Santi* could perform additional functions by providing attachments. They liked the idea of the product, inquired, and suggested a

wider variety of attachments that can perform functions like seed cum fertiliser drill, rice harvester, reaper (farm machine that cuts grain), and sugarcane cutter and grasscutter (see Exhibit 1).

- Farmers believed that the type of land would create difficulty in farm activities using *Bullet Santi*. Therefore, they believe that tractor's work cannot be replaced. Nevertheless, they also feel that for some farmers (labours, workers, and wagers), the product would have huge potential. They also mentioned that products should be demonstrated for better understanding and for creating awareness.
- Most of them were curious and appreciative of the innovation, while some expected few modifications in the grassroots innovative alternative like it should have larger wheels and should preferably be hydraulic and automatic.

5.2.5 Perceived Benefits of *Bullet Santi*

Based on the interactions with the farmers through pamphlets including photos and video of *Bullet Santi*, they perceived several benefits, which were categorised into functional and emotional benefits as below:

Table 4: New Product Perceptions and their Interpretation

Perceptions of <i>Bullet Santi</i>	Interpretation of Response
Can perform additional functions with attachments	Versatile, Multi-utility gadget
May not substitute for a tractor as land is sticky	Not very clear with the functions and benefits, product demonstration and objection handling required
Can replace daily wagers and agricultural workers	For some farmers, it could be a substitute for problems related to farm labourers
Has smaller wheels compared to a tractor, and it is not hydraulic and automatic	It was smaller and technologically inferior to a tractor but much better than traditional means of farming
Can be used as a harvester for inter-cultivation, spraying insecticides, fertilising, etc.	It could perform all necessary functions related to farming

Source: Compiled by the Authors

2 Khoraj is a village panchayat located in the Ahmadabad district of Gujarat state, India

3 Chandrasan is a village panchayat located in the Mahesana district of Gujarat state, India

4 Yashodanagar is a village panchayat located in the Mahesana district of Gujarat state, India

5 Govindpura is a village panchayat located in the Mahesana district of Gujarat state, India

Table 5: Perceived Benefits (Functional & Emotional)

Functional Benefits	Emotional Benefits
It could save water	It would make one feel special and royal-like
It could reduce cost and labour related problems	It would create comfort and make one feel relaxed
It could be cost-effective and would require low maintenance	It would reduce stress and anxiety
It was a multipurpose device and versatile	It would generate a sense of pride in the owner for using an ethnic (Gujarati innovator) innovative product
It was compact and easy to use	It could make one feel more masculine
Could be used in spraying insecticides and sowing seeds	It would make neighbours jealous

Source: Compiled by the Authors

5.2.6 Pricing Strategy

The traditional competitor tractors range started from Rs. 4.0 lakhs, where few small sizes were also available at around Rs. 2.5 lakhs which was very expensive for the common farmer. The equipment was also priced separately.

Bullet Santi was commercially priced in the range of Rs.1.25 to Rs.1.65 lakhs which also included all four-farming equipment by the innovator (Singh & Mehta, 2018). While inquiring about what price farmers were ready to pay for the features of *Bullet Santi*, it was revealed that farmers were ready to pay anything between Rs.1.8 to Rs.2.0 lakhs.

5.2.7 Communication and Distribution

As per the farmers, all tractor manufacturing and marketing companies communicated their products through the use of traditional media like place advertising, hoardings, pamphlets, local newspapers and radio. Based on their requirements, a local marketing campaign and demonstration program in the villages was highly recommended. Most of the farmers expected product demonstration of *Bullet Santi* in their villages and farms to understand the features, usage and feasibility of the product to them.

The farmers also expected ready availability of the product for demonstration and sales, assembly, and service support just like the tractor and mini tractor companies in the area.

6. Discussions

The findings from the case (Stage 1) of *Bullet Santi* also adds to extant literature where grassroots innovations lacked appropriate research, especially in the case of scaling them up and developing marketing plans of the same though it solved local environmental issues of people (Seyfang & Smith, 2007).

The findings from Stage 2 can be summarised as follows:

The observations were consistent with the literature where target audience issues related to adaptability, availability, and affordability applied to such low-cost innovative products and grassroots innovations. The findings would contribute to the literature by generating insights on the behavioural intent of farmers for grassroots innovations like *Bullet Santi*. The same shall be useful in assessing the marketing needs of customers of grassroots innovations. The findings are also consistent with the literature review, which proves that the Indian rural population has a serious need for low-priced utility products for different purposes to solve their difficulties. The insights generated towards the perceptions of *Bullet Santi* could add value to the extant literature in the study of perceptions for new products and grassroots innovations. They could be used by practitioners and academicians for the formulation and study of the marketing strategy for grassroots innovations. The findings also contribute to the marketing literature where perceived benefits, i.e., both functional and emotional, can be used for developing the marketing strategy, especially the positioning of a grassroots innovation. They also generate useful insights for the grassroots innovator in the pricing strategy, communication, and distribution strategy for the launch of the low-cost innovation.

The following recommendations based on the field research can be proposed to the innovator for formulating the marketing strategy of *Bullet Santi*:

- The target market should essentially constitute farmers who cannot afford tractors and who are looking for cost-effective labour substitutes. Cost-effective ploughing methods involving fewer efforts were a major need of farmers. Although branded tractors with multiple farming options were desirable, they were

found to be costly. The demographics and the behavioural intent findings could be used by the innovator to arrive at the target market and positioning of *Bullet Santi* during commercialisation. The type of irrigation, soil and cropping pattern were major issues to be considered by the innovator. It was also found that farmers were in desperate need of a low-cost alternative for farming and to sustain their livelihood.

- *Bullet Santi* was perceived as a unique product that was cost-effective, easy to assemble and use, capable of multiple farming, and saving water. It was also perceived as a product that gave immense pride to the user and made him feel like a royal. Most of the farmers were highly appreciative of *Bullet Santi* as a farming option, but some expected a few modifications in the device as well. The modifications were suggested to the innovator.
- The farmers were willing to pay between Rs. 1.8 to Rs. 2.0 lakhs for *Bullet Santi* and offers good profit to the innovator. *Bullet Santi* may be positioned as the best cost provider during the launch in the future.
- The communication and the personal selling strategy for *Bullet Santi* must be localised by using regional language and demonstration. The findings related to new product perceptions, perceived benefits, and behavioural intent can be integrated into the communication strategy of *Bullet Santi* during the launch in the future. It may also be used for personal selling efforts during the demonstration and objection handling process.
- The product should be demonstrated, promoted and showcased in agriculture markets, agriculture events like *Krushi Unnati Mela*⁶ and *Agri Asia*⁷ (Singh & Mehta, 2018).
- The distribution strategy should involve local partners located close to the farmers and capable of assembly, sales and service. Additionally, a tie-up with some local manufacturers in the nearby location of the target segment was suggested to easily cope up with the demand and availability of the product in the market. The manufacturing and assembly should have proximity to the target market area.

6. Krishi Unnati Mela is a three-day event launched by Prime Minister Narendra Modi

7. Agri Asia showcases the continuous upgradation of technology and interrelated development in Agriculture Industry.

7. Managerial Implications

Current findings add up to the existing body of theoretical literature besides making a useful contribution, as seen in the introduction section earlier. Grassroots innovations have a lot of potential to satisfy the need of people, especially at the bottom of the pyramid at an affordable price in developing countries. As the products are developed by innovators of similar environments and economic conditions, usually the products have ease of use, they are pocket friendly and meet the need. Therefore, these products have acceptability in the market. It becomes easy for the marketer to communicate the product in the market, educating customers and developing value propositions to those customers. Usually, the product distribution (accessibility) is easy in the same market; for example, the product (*Bullet Santi*) is developed in the Saurashtra region of Gujarat state of India. It becomes easy for farmers of that region to buy the product, but while interacting with farmers of Ahmedabad district of the same state, farmers were not even aware of the product. Though when communicated, they showed great interest in buying the product. It is very important to create good and impactful awareness about these innovations to the rural market for which mainly the products are developed. If the innovations are really good and affordable, rural customers are likely to spread positive word of mouth for the product. It is important to spread knowledge about the existence of such products in the market. From the theoretical analysis, it is found that there is a large number of grassroots innovations across the world that have remained confined to the local market. Support is necessary to scale up such innovation so that people from other markets (both nationally and internationally) can derive the benefits of these grassroots innovations.

8. Conclusion

There is a strong need to develop grassroots knowledge and an innovation-led approach to poverty alleviation by identifying, acknowledging, and supporting creative individuals like Mr. Jagani through government initiatives and other organisations. The efforts of organisations like GIAN, NIF, and SRISTI are commendable, and more such initiatives for funding and research should be encouraged by policymakers and research institutions. Our research would hopefully contribute to generating marketing insights for the successful commercialisation of *Bullet Santi* in Ahmedabad-rural, and the findings will enable an improved understanding of the determinants of successful commercialisation of grassroots innovation.

Education institutes should take up such projects and help innovators with research regarding their innovation. With

findings like our research, they can either position themselves appropriately or, with the intervention of some marketer, formulate a marketing plan for scaling up the project. If they do not have support in formulating it, they can take the help of expert faculty or students of business schools or management institutes. An effective marketing plan with the help of appropriate research insight will help innovators and their supporters to communicate their products properly. Even corporates, multinationals and industrialists can provide a huge helping hand to these innovators by not only providing funds but by producing and promoting these products and giving profit sharing to the innovators. With the knowledge and resource advantage of the companies and competitive advantage of the product, such grassroots innovation can bring laurels to the country in the global market. Such grassroots innovations also help in strengthening a country's economy.

8.1 Future Directions

The study would be useful to researchers for examining new avenues for future research in grassroots innovation and social entrepreneurship by linking it to the marketing domain, i.e., multidisciplinary approach. A future agenda for us as researchers will be to understand how marketing impacts the success of grassroots innovators and social enterprises for future theoretical and empirical efforts. Hopefully, the findings of our study will also assist the country's policymakers in developing strategies that will provide an impetus to innovations and social entrepreneurship.

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Appendix

Exhibit 1: Multi-functional Bullet Santi



Photographs courtesy: National Innovation Foundation

Impact of International Stock Market Indices on the Indian Stock Market Indices during the COVID 19 Pandemic

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A b s t r a c t

This paper helps to understand the possible relationship between selected International stock market indices and Indian stock market indices during the COVID 19 pandemic. To study the relationship between international stock market indices and Indian stock market indices, regression analysis is used. For Granger Causality test Japan, China, Hong Kong, India, Germany, France, UK, and US stock markets are selected. The selection of the stock market indices was made based on the opening time of the stock market according to Indian Standard Time. The study is conducted during the COVID 19 situation using daily data from March 2020 to May 2020 relating to the prices of the selected International stock market indices. The outcome of the study concludes that the Indian stock market indices, mainly NIFTY are having bidirectional causality with NYSE, NASDAQ, FTSE, DAX and CAC40. The study further concludes that both NIFTY 50 and SENSEX do not have any impact on the ASIAN indices: Nikkei, Hang Seng and SSE Composite.

Keywords: Indian Stock Market, International stock market indices, Granger Causality, Stock indices linkage

1. Introduction

Due to the rise of globalization across the world, all the countries are now exposed to a common connection link, be it financially, economically, or through trade. It has been observed that no country can separate or delineate itself by forming a closed economy. Therefore, if one country is exposed to any differentiative circumstances and gets impacted by it, then the countries linked with the affected one; are also going to converge into those circumstances. As stock markets are considered as the true reflector of a country's economy; therefore if any ramifications or reverberation occurs in the stock market, eventually it is going to show repercussions in the economy also (Masoud, 2013).

Many studies have been consummated to manifest the interconnection between the various stock markets around the world. Again, it has been observed that at various times these stock markets got impacted by various reasons, and the year 2020 showed such an occurrence, where the stock markets across the globe got impacted by the COVID 19 pandemic. As the outbreak center of this disease was WUHAN city (China), some research has happened on the impact of COVID 19 on the Chinese stock market (He et al., 2020). Not only the Asian stock markets but the European markets also get impacted by the outbreak of coronavirus in the European countries. The study showed how the coronavirus had impacted various industries listed on the London Stock Exchange (Griffith et al., 2020). The Indian stock market is no exception; we have noticed a sharp fall in the share prices of the companies listed in NIFTY 50 and the SENSEX during this pandemic situation. In the first quarter of 2020, BSE SENSEX gave a -28% return on the indices price. Through this study, an effort has been made to understand the price movement of Indian stock market indices with the International stock market indices. Few studies have been done to understand the relationship between the Indian stock market with the selected Asian stock market and the US stock market (Ahmad et al., 2005). The result of the study ensures that during this COVID 19 pandemic situation, there is a significant impact of International stock market indices on NIFTY 50 and SENSEX. There are many studies regarding linkage or interdependency between different equity markets, but there are no studies that have been done during the COVID 19 pandemic situation to understand the impact of all the selected stock market indices on each other.

2. Literature Review

The measurement of interdependencies between the Chinese stock indices and seven other international stock indices can be observed and analyzed by using the T-test and Mann-Whitney tests (He et al., 2020). A stock market tells about the company, i.e., how well a company is doing or how well the company is expected to do in the future. But the pandemic caused a massive change in the stock markets and had a great impact on the stock markets as well (Griffith et al., 2020). Again, if we talk about it from the Indian stock market point of view, it can be observed that the Indian stock market tends to be more volatile during the lockdown period, and even the returns were also exhibiting non-normality during the pandemic time (Chaudhary et al., 2020). Again it can also be observed that the lockdown period has increased the unemployment rate, the stock prices have also seen a decrement (Sunder, 2020). Covid-19 has hit the industry sector, and as a result of this, the stock market also got impacted due to the pandemic. Even it can be observed that the pandemic negatively impacted the Shanghai Stock Exchange (He et al., 2020). Although there is no well-established cointegration between the Indian stock market and other stock markets, there can be a short term as well as long term association between the Indian stock market and other stock markets (Choudhary & Singhal, 2020).

It is to be believed that developing economies get influenced by the developed economies from all perspectives; but if we consider the economy of India and Japan, then it can be seen that despite being a developed economy, Japan's economy gets influenced by the Indian economy which is a developing economy (Khanum, 2019). On the other hand, with the help of the analysis of the correlation between various stock markets, the investors can identify and understand the interdependencies between the various stock markets and predict the movement of the stock market to decision making (Kumar, 2019). There is a significant role of time-varying correlation among stock markets in the decision making for the instances portfolio evaluation, investment allocation, rebalancing as well as determining the risk and taking the corrective measures during the period of the financial crisis. If a very high correlation exists between the financial markets then it can be implied that there are few diversification opportunities available for the potential as well as existing investors (Seth & Panda, 2019). The volatilities across different equity markets can be used by the investors and the policymakers to forecast the volatilities of emerging stock markets as well as to formulate the appropriate strategies to enable financial stability (Dutta, 2018).

The impact of foreign institutional investors on the Indian stock market is of utmost importance, and they play a significant role in the development from the perspective of the Indian stock market (Kedia, 2017). The indices of the Indian stock market are impacted by various global issues, and therefore investors need to understand the correlation between the Indian stock market and the international stock market to analyze the position of the Indian stock market (Chougala, 2016). Again if we consider country-specific, then it can be observed that among the SAARC countries, the Indian stock market is positively related to the stock markets of Pakistan and Sri Lanka to some extent (Tripathi & Seth, 2016). For instance, it can be said that even the price change of an object can impact the stock market, such as price fluctuation of crude oil in the international market impacted the Indian stock market (Ghosh & Kanjilal, 2016). Along with the correlation between the Indian stock market and the International stock market, if the matter of efficiency rises, then it can be said that the Indian stock exchange has an efficient mechanism in application due to the proper governance system such as SEBI, from the perspective of globalization and growth factors (Srivastava, 2016). Again from the perspective of a specific industry, it can be claimed that the relationship between the crude oil price in the international market and the Indian stock market has been impacted by the extremely volatile crude oil price and due to the subprime financial crisis (Ghosh & Kanjilal, 2016).

Again it has been observed that there are fundamental premises which can be evident that there is a well-proven and established cointegration between the Indian stock market and other stock markets (Sanyal et al., 2015). On the other hand, from the relationship between South Africa, the USA, and the Indian stock market indices, it can be observed that the stock market indices are non-stationary, and they appear to be stationary only after the first differencing. Therefore it can be said that these stock market indices can offer the possibilities of investment diversification from the international investors as there is no strong evidence of correlation in the long run (Das & Uddin, 2013). It can also be observed that a substantial integration exists between Indian and International financial markets, and there is a perfect price correlation between the Indian and global stock markets (Srikanth & Aparna, 2012). As per the study, there is a positive correlation between the Sensex and other indices in both the short term and long term. The markets can show various circumstances with time; therefore, although there is a positive correlation between

the indices, the investors can diversify risk and gain returns by investing the stocks, especially in the Asia- Pacific region only for a certain period (Sen, 2011).

Again it can also be observed that there is a strong correlation between the Indian stock market and Shanghai stock market and a strong interdependency; whereas if the cointegration test is taken to be into consideration, then it can be noticed that there is no strong interdependency and long term relationship between the Indian and American stock markets as well as Indian and Hong-Kong stock markets (Menon et al., 2009). Even the various local as well as international factors and possible forces such as economic forces can impact the inter-market relationship between the Indian stock market and other international stock markets (Mishra, 2007). The reaction of the market due to the global stimulus and any event occurrence in the global scenario, whether it can be country-specific, can also be observed (Mukherjee, 2007). It can also be depicted that the Indian stock market is influenced by the other stock markets due to the liberalization of 1991 that successfully opened the stock market outside the world (Wong et al., 2005).

If the risk factor is examined from the country-specific point of view, then it can be seen that in the case of investing in India, the exposure to the currency risk is quite less as compared to that of the US and Japanese markets (Ahmad et al., 2005). If the stock returns can be observed from the country perspective, then it can be observed that the factors which cause changes in the stocks are not caused only by the local phenomenon; rather, these factors can appear due to the various events in the international markets. As Covid-19 and lockdown had appeared as one of the most challenging factors in the entire economic world, the stock markets also got highly impacted by this pandemic situation. Although pandemic is an important factor in impacting the stock market, there can be several reasons and factors for which a stock market can get affected (Campbell & Hamao, 1992).

Although this study is based on the interrelationship between Indian stock market indices and international stock market indices, the main essence of this study is analyzing the relationship which got impacted during the COVID 19 pandemic situation to a great extent. The studies which had been conducted earlier mainly focus on integration and correlation between the Indian stock market and the International stock market from a general overview, but this study is trying to focus on all these above-stated aspects for a specific circumstance, i.e., the pandemic situation.

2.1 Objectives

The main objectives of the study are as follows:

1. To examine whether the Indian Stock Market is influenced by the International Stock Market during the COVID 19 pandemic situation;
2. To examine whether the Indian Stock Market has any influence on the International Stock Market during the COVID 19 pandemic situation;
3. To find out the interdependency among the various stock market indices.

2.2 Hypotheses:

HA1: There is a significant impact of International Stock Market Indices on NIFTY 50

HA2: There is a significant impact of International Stock Market Indices on SENSEX

HA3: The performance of International Stock Indices does cause the performance of NIFTY 50 and SENSEX

HA4: The performance of NIFTY 50 and SENSEX does cause the performance of International Stock Indices

3. Methodology

3.1 Data Collection

The list of stock markets indices taken for the study consists of Indian stock market indices and seven other International stock market indices, based on the opening time (IST) of the exchange of that particular country. The name of the country and their respective stock indices are mentioned in Table 1:

NIFTY 50 and the SENSEX index has been considered from the Indian stock market.

The daily closing value of the selected indices is considered over four months starting from March 2020 to May 2020 as the lockdown in India was started in March and the Unlock Phase 1 started from 1st June, 2020. The data relating to the selected International stock market indices was collected from Investing.Com (2020) and the data for NIFTY & SENSEX was collected from the National Stock Exchange of India Ltd. & Bombay Stock Exchange (www.bseindia.com). All the exchange data are expressed in terms of local currencies to avoid the fluctuation of the exchange rates.

4. Analysis & Findings

To examine the stated hypotheses, many different methods are being adopted.

Daily average return and daily average standard deviation is calculated for the selected ten stock market indices. For the calculation of the daily return and daily risk the following formula is used:

$$R_t = (P_t / P_{t-1}) - 1$$

$$\sigma = \sqrt{[\sum (R_i - R)^2 / (n-1)]}$$

$$\text{Variance} = \sigma^2$$

$$\text{Annualized Return: } (1 + R_t)^{252} - 1$$

$$\text{Annualized Risk: } \sigma * \sqrt{(252)}$$

Table 1: List of Selected Stock Indices and their Opening Time

Stock Indices	Country	Opening Time (IST)
NIKKEI	JAPAN	05:30 AM
HANG SENG	HONG KONG	06:45 AM
SSE COMPOSITE	CHINA	07:00 AM
NIFTY & SENSEX	INDIA	09:00 AM
CAC 40	FRANCE	12:30 PM
DAX	GERMANY	12:30 PM
FTSE	UK	01:30 PM
NYSE & NASDAQ	USA	07:00 PM

Source: Compiled by Author

Table 2: Annualized Risk & Return

Description	NIKKEI	HANG SENG	SSE COMP	NIFTY	SENSEX	CAC 40	DAX	FTSE	NYSE	NASDAQ
Average Daily Return	0.08%	-0.20%	-0.06%	-0.20%	-0.21%	-0.15%	0.02%	-0.10%	-0.06%	0.19%
Annualized Return	21.02%	-39.99%	-14.14%	-38.88%	-41.62%	-31.76%	4.93%	-23.16%	-13.85%	60.80%
Average Daily SD	2.63%	2.16%	1.22%	3.68%	3.77%	3.37%	3.38%	3.07%	3.88%	3.75%
Annualized SD	41.78%	34.23%	19.44%	58.38%	59.82%	53.52%	53.67%	48.66%	61.60%	59.59%
Variance	17.45%	11.72%	3.78%	34.08%	35.78%	28.65%	28.81%	23.67%	37.85%	35.51%

Source: Compiled by Author

4.1 Regression:

To find the strength of the association among the stock indices, a correlation method is used. Although the correlation study only provide the information regarding the degree of the association between two or more variables it will not provide information regarding the linkage between the stock indices (Singh, 2011).

4.1.1 Testing of first hypothesis:

NIFTY 50 is taken as dependent variable and rest of the other selected International Stock Market Indices as Independent variables.

Dependent Variable: NIFTY 50

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.934 ^a	.873	.852	306.94696	.873	42.123	8	49	.000

a. Predictors: (Constant), NASDAQ, Hangseng, Nikkei, SSE, CAC_40, NYSE, FTSE, DAX

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	31749180.219	8	3968647.527	42.123	.000 ^b
	Residual	4616605.318	49	94216.435		
	Total	36365785.537	57			

a. Dependent Variable: Nifty

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	-4655.385	2164.654		-2.151	.036
Nikkei	-.010	.112	-.016	-.093	.926
Hangseng	-.179	.154	-.229	-1.165	.250
SSE	4.763	1.500	.500	3.175	.003
CAC_40	-.519	.885	-.223	-.587	.560
DAX	.576	.393	.611	1.466	.149
FTSE	-.280	.717	-.135	-.391	.697
NYSE	.875	.227	.936	3.859	.000
NASDAQ	-.799	.279	-.699	-2.861	.006

a. Dependent Variable: Nifty

F(8, 49) = 42.123, p = 0.000

That means Null hypothesis got rejected and alternative hypothesis is accepted Adjusted R square is 0.852. That means 85.2% variance in NIFTY 50 can be explained by the other international stock market indices.

4.1.2 Testing of second hypothesis

SENSEX is taken as dependent variable and rest of the other selected International Stock Market Indices as Independent variables.

Dependent Variable: SENSEX

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.932 ^a	.869	.847	1063.56604	.869	40.534	8	49	.000

a. Predictors: (Constant), NASDAQ, Hangseng, Nikkei, SSE, CAC_40, NYSE, FTSE, DAX

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	366805081.053	8	45850635.132	40.534	.000 ^b
	Residual	55427463.179	49	1131172.718		
	Total	422232544.232	57			

a. Dependent Variable: Sensex

b. Predictors: (Constant), NASDAQ, Hangseng, Nikkei, SSE, CAC_40, NYSE, FTSE, DAX

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	-15778.416	7500.489		.2104
	Nikkei	-.014	.388	-.006	.972
	Hangseng	-.572	.533	-.215	.289
	SSE	15.820	5.197	.488	.004
	CAC_40	-.695	3.065	-.088	.822
	DAX	1.586	1.361	.494	.249
	FTSE	-1.204	2.485	-.170	.630
	NYSE	2.869	.786	.900	.001
	NASDAQ	-2.536	.968	-.651	.012

a. Dependent Variable: Sensex

F (8, 49) = 40.534, p = 0.000

That means Null hypothesis is rejected and alternative hypothesis is accepted

Adjusted R square is 0.847. That means 84.7% variance in SENSEX can be explained by the Other International Stock Market Indices.

4.2 Unit Root Test:

HA5: Stock Indices do not have a Unit Root i.e. Data is stationary

To understand the data is stationary or non-stationary, unit root test has to be conducted. Augmented Dickey-Fuller (ADF) test is used to determine the unit root property of the data series.

$$\Delta Y_t = \gamma_0 + \gamma_1 Y_{t-1} + \beta_i \sum Y_{t-1} + \varepsilon_t$$

Where, Δ = First difference operator

γ_0, γ_1 and β_i = coefficients to be estimated

Y_t = Non-stationary time series

ε_t = Error term at time t

Table 5: Augmented Dickey-Fuller test results

Stock Indices	First Difference (Intercept and trend)	Prob*	Hypothesis Result
CAC40	-7.896502	0.0000	Ho Rejected
NIFTY 50	-9.503044	0.0000	Ho Rejected
DAX	-7.820577	0.0000	Ho Rejected
HANGSENG	-8.772728	0.0000	Ho Rejected
SSE COMPOSITE	-8.373330	0.0000	Ho Rejected
NYSE	-11.31744	0.0000	Ho Rejected
SENSEX	-9.395960	0.0000	Ho Rejected
NIKKEI	-6.623934	0.0000	Ho Rejected
NASDAQ	-13.89063	0.0000	Ho Rejected
FTSE	-7.924064	0.0000	Ho Rejected

Test critical Values: 1% level -4.115684
 5% level -3.485218
 10% level -3.170793

As the p values are less than 0.05 in the above table, all null hypothesis gets rejected, means all data are stationary. As the variables are stationary, regression result cannot be spurious.

4.3 Granger Causality Test:

Granger Causality test is conducted to analyze the direction and significance of Causality between

- NIFTY 50 with International Stock Market Indices
- SENSEX with International Stock Market Indices
- International Stock Indices with each other (Except NIFTY 50 & SENSEX)

It helps to understand whether X (t) cause Y (t), according to the Granger Causality Test. Concerning the same series:

$$Y_t = a_0 + a_1 Y_{t-1} + a_2 Y_{t-2} + \dots + a_p Y_{t-p}$$

The Granger causality tests for pairwise are as follows:

$$Y_t = a_0 + a_1 Y_{t-1} + a_2 Y_{t-2} + \dots + a_p Y_{t-p} + b_1 X_{t-1} + \dots + b_p X_{t-p} + \mu_t$$

Where X (t) and Y (t) = Daily stock market indices for the country X & Y respectively

μ_t = Error term at the time t

F test is used to test it jointly

$$H_0: b_1 = b_2 = \dots = b_p = 0$$

H_1 : At least one of them non zero

The test is performed to analyze causality between NIFTY 50 and the other International Stock Market Indices. Similar test is performed between Sensex and other International Stock Market Indices. Also the causality among selected International Stock Indices is checked.

4.3.1 Testing of third hypothesis:

Table 6: Impact of International Stock Market Indices on Indian Stock Market Indices

Null Hypothesis	Prob.	Decision
NYSE does not Granger Cause SENSEX	0.0003	H0 rejected
NIKKEI does not Granger Cause SENSEX	0.0009	H0 rejected
HANGSENG does not Granger Cause SENSEX	0.0357	H0 rejected
FTSE does not Granger Cause SENSEX	0.0025	H0 rejected
DAX does not Granger Cause SENSEX	0.0005	H0 rejected
CAC does not Granger Cause SENSEX	0.0003	H0 rejected
Null Hypothesis	Prob.	Decision
NYSE does not Granger Cause NIFTY 50	0.00008	H0 rejected
NIKKEI does not Granger Cause NIFTY 50	0.0004	H0 rejected
HANGSENG does not Granger Cause NIFTY 50	0.0485	H0 rejected
FTSE does not Granger Cause NIFTY 50	0.0013	H0 rejected
DAX does not Granger Cause NIFTY 50	0.0002	H0 rejected
CAC does not Granger Cause NIFTY 50	0.0002	H0 rejected
NASDAQ does not Granger Cause NIFTY 50	0.0313	H0 rejected

4.3.2 Testing of fourth hypothesis:

Table 7: Impact of Indian Stock Market Indices (SENSEX) on International Stock Market Indices

Null Hypothesis	Prob.	Decision
SENSEX does not Granger Cause NYSE	0.0006	H0 rejected
SENSEX does not Granger Cause NASDAQ	0.0007	H0 rejected
SENSEX does not Granger Cause FTSE	0.0217	H0 rejected
SENSEX does not Granger Cause DAX	0.00002	H0 rejected
SENSEX does not Granger Cause CAC	0.0007	H0 rejected

Table 8: Impact of Indian Stock Market Indices (NIFTY 50) on International Stock Market Indices

Null Hypothesis	Prob.	Decision
NIFTY 50 does not Granger Cause NYSE	0.0007	H0 rejected
NIFTY 50 does not Granger Cause NASDAQ	0.0008	H0 rejected
NIFTY 50 does not Granger Cause FTSE	0.0272	H0 rejected
NIFTY 50 does not Granger Cause DAX	0.00003	H0 rejected
NIFTY 50 does not Granger Cause CAC	0.0014	H0 rejected

Table 9: Impact of International Stock Market Indices on each other (Except Indian Stock Indices)

Null Hypothesis	Prob.	Decision
NYSE does not Granger cause SSE_COMPOSITE	0.0270	H0 rejected
SSE_COMPOSITE does not Granger Cause NYSE	0.0442	H0 rejected
SSE_COMPOSITE does not Granger Cause NASDAQ	0.0054	H0 rejected
HANGSENG does not Granger Cause SSE_COMPOSITE	0.0488	H0 rejected
FTSE does not Granger Cause SSE_COMPOSITE	0.0041	H0 rejected
DAX does not Granger Cause SSE_COMPOSITE	0.0064	H0 rejected
SSE_COMPOSITE does not Granger Cause DAX	0.0052	H0 rejected
CAC does not Granger Cause SSE_COMPOSITE	0.0080	H0 rejected
NASDAQ does not Granger Cause NYSE	0.0049	H0 rejected
NIKKEI does not Granger Cause NYSE	0.0000	H0 rejected
NYSE does not Granger cause NASDAQ	0.0211	H0 rejected
DAX does not Granger Cause NYSE	0.0004	H0 rejected
NIKKEI does not Granger Cause FTSE	0.0019	H0 rejected
NIKKEI does not Granger Cause DAX	0.0005	H0 rejected
NIKKEI does not Granger Cause CAC	0.0047	H0 rejected
HANGSENG does not Granger Cause DAX	0.0120	H0 rejected
HANGSENG does not Granger Cause CAC	0.0413	H0 rejected
DAX does not Granger Cause FTSE	0.0026	H0 rejected

5. Findings:

In the case of risk and return on Indices in the time of the COVID19 pandemic, it is quite visible that maximum indices have given negative daily returns except for NIKKEI, DAX & NASDAQ. Indian stock indices have given negative average daily return; NIFTY (-0.20%) & SENSEX (-0.21%). According to the daily average risk, SSE COMPOSITE has a minimum risk which is 19.44%. By Regression analysis, it is found that the International Stock Market Indices have a significant impact on Indian stock market indices. According to the correlation table below, the minimum correlation is 0.35 between NASDAQ & HANG SENG and the maximum correlation is 0.954

between DAX & CAC40. Correlation between NIFTY & SENSEX with HANG SENG and SSE COMPOSITE is at the higher side; more than 0.85. Correlation between NIFTY & SENSEX with NASDAQ is at the lower side; less than 0.45.

Granger Causality test helps to identify the direct causality between the Indian Stock Market with the International Stock Market Indices and also the directional causality among the selected International Stock Market Indices. The study indicates that Bidirectional causality exists between NIFTY & SENSEX and CAC, FTSE & NYSE. A unidirectional causality exist between NASDAQ and SENSEX where SENSEX granger causes NASDAQ. Similarly, DAX Granger causes NIFTY as it shows unidirectional causality.

Table 10: Correlation Table

	NIKKEI	HANGSENG	SSE	NIFTY	SENSEX	CAC	DAX	FTSE	NYSE	NASDAQ
NIKKEI	1									
HANGSENG	0.529	1								
SSE	0.612	0.875	1							
NIFTY	0.632	0.859	0.869	1						
SENSEX	0.618	0.859	0.863	0.999	1					
CAC	0.743	0.821	0.746	0.832	0.833	1				
DAX	0.926	0.655	0.676	0.730	0.718	0.880	1			
FTSE	0.849	0.763	0.755	0.806	0.800	0.953	0.954	1		
NYSE	0.808	0.785	0.817	0.853	0.845	0.895	0.913	0.934	1	
NASDAQ	0.849	0.351	0.484	0.436	0.414	0.533	0.844	0.711	0.766	1

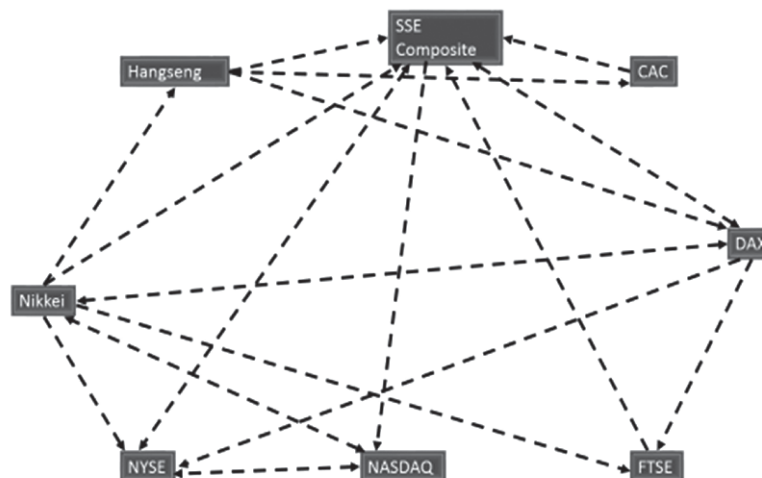


Fig 1: Relationship among selected International Stock Indices

As shown in Figure 1, SSE Composite is getting impacted by all the other International Stock Market Indices except Indian Stock Market Indices; NIFTY 50 & SENSEX. Bidirectional Causality exists between SSE COMPOSITE and NYSE, DAX. Unidirectional Causality exists between HANG SENG, NIKKEI, FTSE & CAC, and SSE COMPOSITE, where HANGSENG, NIKKEI, FTSE & CAC Granger Cause SSE COMPOSITE. Similarly, a unidirectional Causality is visible between SSE COMPOSITE and NASDAQ, where SSE COMPOSITE Granger Causes NASDAQ.

This study also indicates that unidirectional causality exists between NIKKEI and HANG SENG, SSE COMPOSITE, FTSE & NYSE, where NIKKEI Granger Cause HANGSENG, SSE COMPOSITE, FTSE & NYSE. Bidirectional causality exists between NIKKEI and NASDAQ & DAX.

Figure 2 & 3 shows the impact of International Stock Market Indices on Indian Stock Market Indices at the time of COVID19 pandemic and vice versa. The study indicates that bidirectional causality exists between NIFTY 50 and CAC, FTSE, NASDAQ & NYSE. Similarly, bidirectional causality exists between SENSEX and CAC, DAX, FTSE & NYSE. The study also indicates that the Indian Stock Indices do not cause the selected Asian Indices. Unidirectional Causality exists between NIFTY 50 and NIKKEI, HANG SENG & DAX, where NIKKEI, HANG SENG & DAX Granger Cause NIFTY 50. . Unidirectional Causality exists between SENSEX and NIKKEI, HANG SENG & NASDAQ, where NIKKEI & HANG SENG Granger Cause SENSEX and SENSEX Granger Cause NASDAQ. SSE COMPOSITE does not Granger cause NIFTY 50 and SENSEX and vice versa.

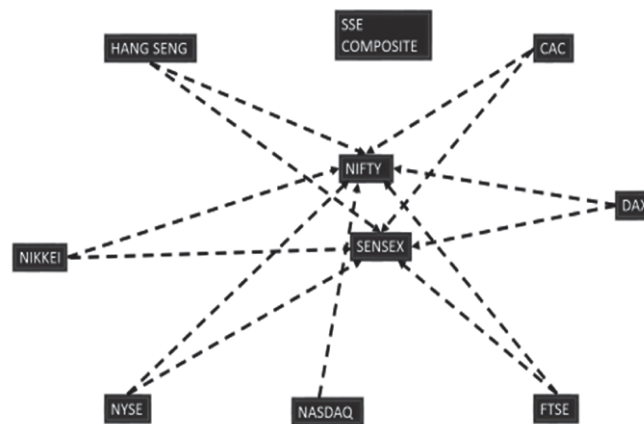


Fig 2: Impact of International Stock Indices on Nifty & Sensex

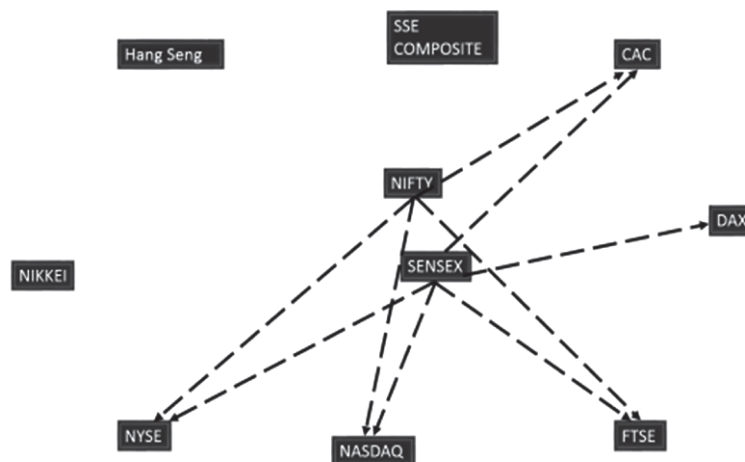


Fig 3: Impact of Nifty and Sensex on International Stock Indices

6. Limitations:

Although this study is titled the impact of International stock market indices on Indian stock market indices, only seven selected major international stock market indices have been considered for the study. There are about 50 major global indices. Further studies can be carried out, including more indices.

The time frame of this study was confined to just three months post lockdown 1.0. The time period of three months was considered to understand the immediate impact. The study can be further extended to six months, nine months and 12 months.

The study was based on the general stock market indices. Industry based indices could be studied in the future to understand the impact on different industry-based indices as the impact of COVID on various industries were different.

7. Conclusion:

This study strongly indicates that the Indian Stock Market indices got impacted significantly by the International Stock Market indices during the COVID-19 pandemic situation. As per the regression analysis, 85.2% variance in NIFTY 50 can be explained by other International Stock Market indices, and 84.7% variance in SENSEX can be explained by other International Stock Market indices, mainly by SSE COMPOSITE, NYSE & NASDAQ. The study further indicates that during this period, NIFTY 50 and SENSEX have a casual influence over CAC, DAX, FTSE, NASDAQ, and NYSE, whereas NIFTY & SENSEX do not have any causal influence over NIKKEI, HANG SENG & SSE COMPOSITE. This study also reports a significant positive Correlation between SENSEX & NIFTY 50 with selected International Stock Market Indices using the four months' data. Regression analysis states that there is a significant impact of selected International Stock Indices on Indian Stock Market Indices. CAC, DAX, FTSE & NYSE shows strong correlation with SENSEX & NIFTY50. Granger Causality Test indicates that Asian Indices have a unidirectional causality relationship with Indian Stock Indices. The study further indicates the interdependency among the International stock market indices, excluding Indian stock market indices. There is a bidirectional causality exists between SSE COMPOSITE and NYSE & DAX. Again the study shows a bidirectional causality between NIKKEI and NASDAQ & DAX. Apart from this, the study reveals that, out of ten International stock indices, eight International stock market indices are

getting impacted by NIKKEI. Only CAC does not show any relationship with NIKKEI. Whereas SSE COMPOSITE got impacted by seven different international stock market indices.

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Readability and Sentiment Analysis of Financial Statements: Evidence from India

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Investors have started relying on advanced techniques such as textual analysis to understand the inherent complexities of annual reports. It is believed that annual reports present implicit information of the management that can be invaluable for investors and other stakeholders. Using the NIFTY 50 companies as our sample, we examine the annual reports for the year 2018-19 and analyze the scope and presence of sentiment and readability differentials across various sections of the annual reports covering the Chairman's Speech, the Director's Report, Management Discussion & Analysis (MD&A) and Notes to Accounts. Even though these sections are given in the same annual report, their readability and sentiment scores vary across different sections. Chairman's speech is the most readable and has the highest positive sentiment score. In contrast, Director's Report, MD&A, and Notes to Account have increasing difficulty in readability scores and relatively lower sentiment scores. The implications for practitioners and investors are discussed.

Keywords: *Readability score, annual reports, sentiment analysis, NIFTY 50*

1. Introduction

The existing literature in accounting investigates the data from annual reports based on earnings-related information, growth prospects, and overall financial performance. Most of these investigations are based on quantitative analysis using numerical data. However, recently the textual analysis usage has been increasing for finding out the intricacies of the qualitative data (Ahmed et al., 2013; Li, 2008; Li, 2009; Lehavy et al.; 2011; Miller, 2010). The minimal dependence on textual analysis in accounting literature is mainly due to difficulty in accessing annual reports or the complexities of converting numerical data into software usable text format. We aim to overcome these limitations and examine Nifty 50 annual reports using textual analysis and examine whether there is any sectional differential in readability and sentiment scores within annual reports.

The textual contents reported by the companies include Chairman's speech, Director's report, MD&A, notes to accounts, earnings conference calls, and other press release documents. Prior literature in the field of accounting information systems focused primarily on the readability of the textual reports. In the past decade, sentiment analysis has played a considerable role in text mining from the annual reports. Managers might use more positive sentiments to signal a prosperous future or hide the current poor performance. The firm's financial results cannot be altered. However, how to present the same is at the manager's discretion. Thoughtfully induced positive words can help the poor performer to look attractive. Given that English is a rich language with many words, both in positive and negative sentiments, one can pick the terms that suit them best to his objective. For example, "*we missed our target by 25%*" can be reframed as "*we accomplished 75% of our goals this year*". Both sentences convey the same information in drastically different ways. The former shows the pessimistic sentiment with disappointment, whereas the latter sounds optimistic. Managers reframe their narratives to a great extent, with much more "positive" and "optimistic" words. Investors or analysts reading the reports get swayed by such tactics unconsciously. A well-written financial report with more positive sentiments can get higher ratings or a better valuation than its equally good performing peers, suggesting that users of annual reports have to be careful while reaching conclusions based on such textual contents.

Textual analysis can be performed in many ways. Earlier, readability was a vital measurement that helped decide if some documents were more challenging to read than others. Managers chose to report results more simply during good times, whereas they deliberately reported difficult-to-read

reports when firms did not perform well. Readability is measured by many indices such as Fog, Flesch Kincaid, Smog, average readability score, etc. However, Loughran and McDonald (2014) reported the weakness of readability, which explains why readability was insufficient for textual analysis of annual reports. They advocated a measurement to understand annual reports with the help of sentiment analysis, which detects the positive or negative sentiment words used by the managers to manipulate the real information.

Readability and sentiment scores have a similar purpose; to provide the information to investors, which is not directly given in the financial statements. The annual report contains different textual content, which involves the Chairman's speech, Director's report, MD&A, Corporate Governance Report, Auditor's report, and notes to accounts. All of these documents have different objectives and outcomes. Chairman's speech, Director's report, and MD&A contain information about management's views about the company's past, present, and future performance; whereas Auditor's report, corporate governance report have pre-decided formats to follow, and Notes to account is provided for better understanding of financial jargons used in the financial statements. All the sections mentioned here have their unique objectives and different scopes for alteration. We study the annual reports variability using the Chairman's speech, MD&A, Director's report, and notes to accounts and calculate readability and sentiment scores for Nifty 50 annual reports for 2018-19.

Our results confirm the proposition that there exists significant variability in both the scores (readability and sentiment) for the Chairman's speech, MD&A, Director's report, and Notes to account. Readability is highest (lowest), and the sentiment score is highest (lowest) for the Chairman's speech (Notes to accounts). This evidence suggests that managers tweak the textual contents of the annual reports, and tweaking is limited by the nature and scope of the textual content of the information. Investors, practitioners, and all the stakeholders using the company's financial statements need to be aware of the finding stated here to make better-informed decisions while using non-numerical parts of the annual reports.

2. Literature Review

2.1 Readability Score

The literature on readability has evolved in the past fifty years. The first study in this context was by Smith and Smith (1971). They studied the readability of the footnotes of annual reports. There are different arguments related to the readability of annual reports and their effects. For instance,

readability could be related to the Auditor's identity (Barnett & Leoffler, 1979); readability could be associated with the risk faced by the company (Courtis, 1986), and poor performers have difficult-to-read reports compared to good performers (Subramanian et al., 1993).

Clatworthy and Jones (2006) conducted a textual analysis of the Chairman's speech and found that managers undertake impression management to obfuscate poor financial performance. Li (2008) studied the readability of the annual report using the FOG index and linked it with earnings persistence. He has used two measures for readability, namely the FOG index and the length of the document. The FOG index assumes that the longer words had more than two syllables, and longer sentences are difficult to read and require a higher level of education. The length of an annual report is related to the information processing cost of longer documents. He also found a relationship between readability and earnings quality. Annual reports of poor earnings quality are difficult to read and have more scope for managers to hide adverse information from investors. Bloomfield (2008) provides a detailed explanation of the prevailing difference in the readability of annual reports. The reasons explained to attribute the difference in readability scores include obfuscation hypothesis, ontology, attribution, misdirection, management by exception, conservatism, and litigation.

Courtis (1986) studies the readability of footnotes and the Chairman's statement. The average readability score of the Chairman's speech is less than the score of footnotes. Following readability variability, Courtis (1998) has studied the variability of readability within one particular section of the annual report focusing on the Chairman's speech. Their results are interesting, suggesting that three passages of the Chairman's speech have varying readability scores measured by the coefficient of variation. The first passage is easiest to read with the lowest Flesch Kincaid score of readability, and the following passages have higher readability scores, implying increasing difficulty levels of readability. These results are intuitive. The Chairman of the poorly performing firm would reveal the news in the latter passages in rather confusing language to hide the negative impact related to it. This finding signifies the potential discretion of annual report narratives to (mis)lead the investors. These studies of readability variability within annual reports have focused on the one-to-one comparison.

The textual sections have different objectives and outcomes; they also have a different degree of scope of manipulation. The Chairman's speech focuses on the company's goals, strategies, economic conditions, industry performance, and

future plans. Director's report is mandatory as per Section 217 of the company law. It includes material changes in the company's state affairs, technological advances, explanation of balance sheet parts, organizational commitments, and foreign exchange changes. MD&A informs analysts and investors about the company's current performance and other projects to be completed shortly. Notes to accounts are mandatory, requiring disclosure about any policy change or accounting principles. All these sections have different objectives and scopes for manipulation. We examine the evidence of such manipulation based on the nature and extent of a particular section and test the hypothesis if all the sections of the annual reports depict different readability scores.

H1: Readability scores vary across different sections of the annual reports

2.2 Sentiment Analysis

Readability is a flawed measure for the FOG index measures the number of syllables in a word to consider it as a complex word. Annual reports include words with more syllables, such as *employees, operations, management*, and so on, which are long but not complex. The users of financial reports easily understand them. Such words account for more than half of the complexity of the readability index, which shows the weakness of the FOG index (Loughran & McDonald, 2014).

Sentiment analysis captures the degree of sentiments used in the annual report. There are several methods for sentiment analysis, namely the targeted phrase method, word list, naïve Bayes method, and thematic structure in documents. We have used the word list method for our study. In this method, all the words sharing the same sentiment are compiled together and tested against an annual report. This word list, also known as a dictionary, associates each word with positive, neutral, or negative sentiment. In information analysis literature, a dictionary created for the specific objective is known as a lexicon. A typical sentiment analysis process involves calculating positive and negative sentiment words to find the overall sentiment score. A document is said to have a negative tone if it has more negative words than positive words. There are four dictionaries commonly used in finance parlance: Henry dictionary, GI dictionary, Diction, and Loughran & McDonald (LM) dictionary (Loughran & McDonald, 2014).

Newspaper sentiment also plays a vital role in mutual fund investments. Irrespective of past performance, investors chase the funds which had positive media coverage. Garcia (2005) measured the impact of the tone of newspaper articles on the future performance of the stock market using data from two columns of the New York Times. Mayew and

Venkatachalam (2012) conducted a sentiment analysis of earnings conference calls made by directors for analysts. The tone and pitch of managers were regressed against subsequent stock market returns. Positive sentiment was related to the higher subsequent return and vice versa. In a study by Liu and McConell (2013), newspaper articles were analyzed for 636 acquisition announcements. The number of articles published before acquisition and tone of articles combined had a negative effect on investor reaction. LM word list can help to predict which funds would get investment inflow (Solomon et al., 2014). When positive media coverage can help bump the prices up, managers may always benefit from this finding. It was observed that many press releases come before the merger announcement, especially in the case of fixed bidding ratio deals (Solomon, 2012).

The earnings press release can be altered with abnormally high positive words to get media attention and analyst recommendation. In a study by Huang, Zang, and Zheng (2014) using the LM word list, an earnings press release was found to use an excessively positive tone to mislead the market participants. LM word list has been used intensively for textual analysis in recent years, with 354 positive and 2329 negative words. The sentiment is a powerful tool for management to soothe factual data. We study sentiment across textual contents reported in the financial statements and how they differ based on the nature and scope of manipulation. Based on the fact that each text section has a unique objective, such as the Chairman's speech is mainly given to address the investors about the present and prospects of the company, whereas notes to accounts are highly technical having the least scope of manipulation. We have reported the sentiment scores for all the four textual sections reported earlier and presented a piece of evidence for the possible sentiment induced in certain sections.

H2: Sentiment scores vary across different sections of the annual reports.

3. Data and Methodology

We have collected data from the annual reports of NIFTY 50 companies listed in the National Stock Exchange (NSE) India. The four different textual contents used were Chairman's speech, Director's report, MD&A reports, and notes to account for the year 2018-19. Reports were collected from the ACE Equity database. We collected 49 Director's reports, MD&A report, and Notes to account, and 37 Chairman's speech reports from NIFTY 50 companies. For sentiment analysis, we follow the Laughran and McDonald dictionary of sentiment analysis.

3.1 Readability and Sentiment Scores

Readability is calculated by the SMOG¹ index, FOG² index, and Flesch Kincaid³ score. In this textual analysis, the annual report is first cleaned, and all the text is parsed. On the parsed textual data, readability analysis was conducted. FOG, SMOG, and Flesch Kincaid scales are three different ways to determine the difficulty levels of each word used in the document based on how easy or difficult it is to read a particular word. There are predetermined scores for each word, and based on all the words used in the document, the software determines the final readability scores (FOG, SMOG, and Flesch Kincaid) for the entire document. The higher readability score depicts more difficulty levels present in the document. Sentiment analysis is conducted using sentiment software packages in R using Laughran and McDonald (LM) dictionary. This dictionary is specifically prepared for accounting and business-related textual analysis. It is essential to have a separate reference dictionary for the financial statements because some words used in the business language are lengthy but extremely common. For example, the word 'employment' may sound long. Still, to conduct sentiment analysis, it needs to be decided whether this word carries positive sentiment, negative sentiment, or no sentiment. Thus, we use the LM dictionary, which considers all such business and organization specific concerns and provides a well-accepted word dictionary for identifying underlying sentiment in the textual content of the annual reports.

4. Results and Analysis

Tables 1 and 2 report result for readability scores, and the results for sentiment scores are given in Tables 3 and 4.

In Table 1, we have reported three readability scores, namely FOG score, SMOG score, and Flesch Kincaid score. These are the scores calculated in R software to measure the readability of a document. The higher scores indicate the more difficult to read (less readable) document. The SMOG score means 70.36 for the Chairman's speech, 212.41 for MD&A, 211.38 for notes to accounts, and 188.19 for Director's report, which provides evidence for inter-section

¹ For more details about the calculation of SMOG score, refer to Mc Laughlin (1969).

² For more details about the calculation of FOG index, refer to Gunning (1969)

³ For the detailed method of calculation of Flesch Kincaid score, refer to Courtis (1986)

variability readability scores of the presence of annual reports. A similar pattern is observed for the FOG index and Flesch Kincaid scores as well. Both the scores are highest for the MD&A and lowest for the Chairman's speech. Thus, based on these highly distinct readability scores across textual sections of annual reports, managerial discretion to choose the textual content across different annual report sections may be present.

Director's reports have the SMOG score mean of 188.19, Fog score mean of 2059.21, and Flesch scores mean of 2010.38. All three scores suggest that the Director's report is a little more difficult to read than the Chairman's speech but simpler than MD&A. The notes to the account are the most technical parts of the textual reporting and have the least

scope of inducing managerial discretion; thereby, we expected it to be more challenging to read. The same is observed in the tables reported.

The results reported for the median score are not much different. SMOG score median is the least for the Chairman's speech (57.22), Director's report (167.54), MD&A (203.89), and Notes to account (205.55). A similar pattern follows for medians of Flesch Kincaid scores. Overall, we get the support for the question in research that certain sections of annual reports are easier to read compared to others, and such variability is a result of the availability of the scope for managerial discretion. Table 2 reports results for the analysis of variance for the SMOG readability score. The variance reported above is significant at the 0.05% level.

Table 1: Descriptive analysis of readability scores

	SMOG	FOG	Flesch Kincaid
Chairman's speech			
Mean	70.36	325.91	370.36
Standard Error	6.38	71.28	74.21
Median	57.22	269.34	263.31
N	37	37	37
MD&A			
Mean	212.41	3111.13	3016.11
Standard Error	10.21	316.88	309.63
Median	203.89	2509.71	2431.30
N	49	49	49
Notes to accounts			
Mean	211.38	2759.02	2632.57
Standard Error	7.01	175.11	171.52
Median	205.55	2386.14	2329.51
N	49	49	49
Director's report			
Mean	188.19	2059.21	2010.38
Standard Error	7.64	209.09	208.95
Median	167.54	1398.34	1385.67
N	49	49	49

Note: Table 1 reports mean, median and standard errors calculated with the help of FOG, SMOG, and Flesch-Kincaid scores of four textual contents of annual reports, namely Chairman's speech, MD&A, Director's report, and Notes to Accounts.

Table 3 reports LM sentiment scores. The first column reports the overall sentiment score measured from negative and positive sentiment scores reported respectively in column 2 and column 3. When both the positive sentiment and negative sentiment are higher, the total sentiment score gets nullify so we focus on column 3 (positive sentiment score) to analyze the inducement of positive sentiment scores across textual sections of annual reports. The mean positive sentiment score is 0.051 for the Chairman's speech,

0.037 for MD&A, 0.023 for Notes to account, and 0.029 for the Director's report. Positive sentiment is the highest for Chairman's speech (0.049). As per our conjecture, based on the nature and scope of manipulation for managerial discretion, the notes to account have the least sentiment score. MD&A reports are more comprehensive than the Director's report having more opportunity to induce positive sentiment, which can be observed in Table 3.

Table 2: Analysis of Variance based on the SMOG scores

Source of variation	Sum of squares	Degree of freedom	Mean sum of squares	F statistic	P-value
Between Groups	544219.000	3.000	181406.333	59.409	0.000
Within Groups	549632.000	180.000	3053.511		
Total	1093851.000	183.000			

Note: Table 2 reports ANOVA results for readability measured by SMOG scores of Chairman's speech, MD&A, Director's report, and notes to accounts.

Table 3: Descriptive analysis for sentiment scores

Items	Sentiment score	Negative sentiment score	Positive sentiment score
Chairman speech			
Mean	0.023	0.027	0.051
Standard Error	0.005	0.003	0.005
Median	0.021	0.04	0.049
MD & A			
Mean	0.006	0.04	0.037
Standard Error	0.001	0.001	0.001
Median	0.005	0.029	0.036
Director's report			
Mean	-0.026	0.005	0.023
Standard Error	0.002	0.001	0.001
Median	-0.024	0.049	0.021
Notes to account			
Mean	0.007	0.027	0.029
Standard Error	0.001	0.001	0.001
Median	0.004	0.023	0.027

Note: Table 3 reports the descriptive analysis of sentiment scores based on the Loughran and McDonald dictionary. The scores are separately reported for the Chairman's speech, MD&A, Director's report, and notes to accounts based on positive sentiment (Positivity LM), negative sentiment (Negativity LM), and overall sentiment (Sentiment LM).

We get the difference between positive and negative sentiment used across the sections considering the overall sentiment scores. We get the highest scores for the Chairman's speech, indicating higher positive sentiment than negative sentiment. A similar pattern follows for MD&A and Director's report. We can observe the dominance of positive sentiment for all Indian Nifty 50 companies. Surprisingly Notes to account has a negative tone giving a negative overall sentiment score. As reported in Table 4, the Analysis of variance of positive sentiment score is significant at 0.05% level.

5. Conclusion

The objective of the study was to examine textual content variability within annual reports using readability and sentiment scores. The readability and sentiment analysis shows a significant difference in readability scores and sentiment scores within an annual report. One of the possible reasons could be that management uses its discretion for deciding the content of the textual sections according to their motives. We find that the Chairman's speech has the least readability score making it the easiest to read and the highest sentiment score showing a positive tone.

The results reported here indicate that using discretion while reporting the textual content in the annual reports. We have conducted this study using the annual reports of 2018- 19. Future studies may extend the findings, and the findings can be analyzed using the time series data. Future research can observe earnings management, earnings quality, and capital market performance concerning annual reports readability and sentiment scores variation. The findings of the study are useful to regulators, accounting professionals, investors, and academicians. The presence of variation in the annual report across different textual sections indicates the richness of the possible sources of discretion in the annual reports. Though one of the limitations of the study is that we have not provided any causal linkages of the effect of variability in the textual content, and scholars may investigate the outcomes of these sectional variations in readability and sentiment analysis concerning earnings management earnings quality, or analyst's forecast. Finally, our findings are based on the Indian data, which is one of the non-English speaking countries. A similar inquiry for English-speaking countries may provide further insights.

Table 4 – Analysis of Variance of Positive Sentiment Scores

Source of variation	Sum of squares	Degree of freedom	Mean sum of squares	F statistic	P-value
Between Groups	0.019	3.000	0.006	51.306	0.000
Within Groups	0.022	180.000	0.000		
Total	0.042	183.000			

Note: Table 4 reports ANOVA results for positive sentiment scores (Positivity LM) of Chairman's speech, MD&A, Director's report, and notes to accounts.

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AI- IPR Intersection: An Analysis of Emerging Issues in the Indian Context

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A b s t r a c t

The paper analyses how Artificial Intelligence (AI) enabled systems can be brought into the Intellectual Property (IP) ecosystem. It dwells upon the question of AI- IP interface from three perspectives, viz., (a) AI as a technology to manage IPRs, (b) IP rights as an obstacle to the transparency of AI and, (c) patents as well as copyrights as legal systems that can foster AI. The three-step test for obtaining a patent- novelty, inventive step and utility - is looked at through the lens of AI technology. Issues such as patent evergreening, best vs worst embodiment and liability for illegal acts which cannot be traced to human actors are delved into. The article concludes with the need for a uniform treatment of the AI system across the board by bringing in an amendment to TRIPS and the necessity to usher in regulators for adjudication.

Keywords: *Artificial Intelligence, Intellectual Property, Super-intelligence, Machine Learning, AI in India, IPR in India.*

1. Introduction

Artificial Intelligence (AI) is the science and engineering of making shrewd machines. The term was officially instituted by John Mc Carthy (2006), who, alongside Marvin Lee Minsky, coordinated the Dartmouth gathering in 1956. As per his vision, it is the thought of a program, preparing and following up on data to such an extent that the outcome corresponds to the way in which a smart individual would react in response to a comparable input (Acosta, 2012). In other words, AI is the capacity of a machine to impersonate a canny conduct. Such conduct, it should be referenced here, may arise either from a psychological methodology or a computational methodology.

In the Indian setting, the NITI Aayog conversation paper characterizes AI as “a star grouping of advances that empower machines to act with more significant levels of insight and imitate the human capacities of sense, appreciation and activity” (Soni & Singh, 2019). This arrangement is to be seen in the context of the educational meaning of AI, as proposed by the research and advisory organization, Gartner Inc., as the technology that turns up to mimic and match human performance typically by acquiring and collating skills, making decisive conclusions, comprehending multifarious subject matters, engaging in communication with the physical environment, strengthening human intellectual and perceptive actions or superseding human involvement in the execution of unusual tasks and missions (Soni & Singh, 2019).

2. From Weak AI to Strong AI and Super-intelligence

The contemporary state of AI is prominently alluded to as frail AI. Its qualities are twofold, viz., (a) it has direct human intercession in its creation, and (b) it is restricted to a solitary errand. Siri, for instance, is a frail AI framework utilized by numerous individuals to help them even in daily routine tasks. The following phase of advancement is solid AI wherein human-like deduction – with an emotional and cognizant psyche – is prompted. An exemplary model is a “Creativity Machine”, commissioned by the US military to plan weapons (Sayler & Harris, 2020). Some information technology researchers are of the assessment that solid AI frameworks may develop to geniuses, outperforming people in the manner of thinking.

3. The Turing Test

The Turing Test was proposed by Sir Alan Turing (1950) to ascertain if the outcomes being delivered by a machine are the result of its own insight or that of calculations and orders. The test called upon persons to interact with a machine or

human and afterwards to conclude whether they could differentiate if they spoke to a human or a machine. Turing was of the view that an AI machine showed insight if the reactions submitted were indistinguishable from genuine human reactions. Regardless of the underlying achievement, the test endured a turnaround in later years, and its application was to a great extent confined to discourse machines and certain testing purposes.

4. WIPO Classification

The World Intellectual Property Organization (WIPO) propounded three classifications of AI, namely, master frameworks, insight frameworks and common language frameworks. Master frameworks are programs that tackle issues in particular fields of information like diagnosing ailments and suggesting treatment. They depend fundamentally on a hand-made information base and set of rules made by people. However, a framework that is wholly dependent on the flow of information cannot scale, and after a certain stage, master frameworks got rigid. Also, there are numerous genuine difficulties that are too unpretentious to be in any way addressed by shortsighted intelligent thinking that observes a bunch of rules composed by human specialists. Insight frameworks enable us to see the world with the feeling of sight and hearing. A common language program, by contrast, is planned to comprehend the significance of words mulling over various syntactic and literary settings to give a semantic examination. (Kurzweil et al., 1990).

5. AI vs Machine Learning

The latest advances in AI enable the programming of PCs to gain from past experience. An exemplary model is the identification of apples from among natural products in a bin of food supplies. By depicting what an apple resembles, we can program a PC so the machine can perceive apples dependent on their shape and shading. AI can be utilized to anticipate whether a client will default on bank credit or to utilize side effects to foster a clinical determination. Independent driving is another feasible development forecasted with AI. Despite the fact that the numerical thoughts behind AI date back to many years, ongoing advances in information stockpiling, computational speed and sensors have drastically diminished the expense of AI-based forecasts. Obviously, AI is starting to make its presence felt increasingly, more in the everyday setting. An exemplary case is x.ai, a New York City-based startup that gives an individual virtual associate to book arrangements over email and oversees schedules. A brief framework for understanding AI is illustrated in Figure 1.

Human Intelligence	Artificial Intelligence
Cognitive Science (Thinking Humanly)	Natural Language Processing, Knowledge Representation, Automated Reasoning (Acting Humanly)
Syllogism, Logic (Thinking Rationally)	Rational Agent Models (Acting Rationally)

Figure 1: Framework for understanding artificial intelligence

Source: Russel and Novig, 2009 as cited in Kathuria et al., 2020.

Machine Learning is a subset of AI. The concept discusses the ability of machines to solve problems by learning through the data, beyond the programming, and it involves

three characters, namely, supervised learning, unsupervised learning and reinforced learning. Figure 2 illustrates the characteristics of AI and ML.

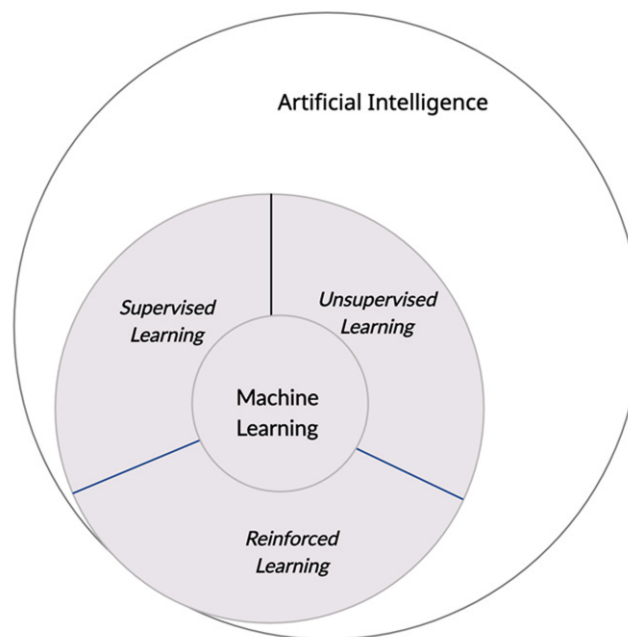


Figure 2: Machine Learning as a subset of AI

It is pertinent here to highlight the following concepts of deep realizing, reinforced learning and transfer discovery. Deep realizing mirrors the action in the layers of neurons in the cerebrum to figure out how to perceive complex examples in information. This may be the most encouraging innovation where neural organizations are prepared on very huge informational collections. Reinforcement learning relates to the programming specialists that learn objective oriented conduct by experimentation in a climate that gives prizes or punishments by accomplishing that objective. And the transfer discovering refers to that centers around utilizing information acquired in one issue to an alternate or related issue.

6. The AI-IPR Intersection

The AI-IPR convergence can be comprehensively arranged under three heads:

6.1 AI as an innovation to oversee IPRs

Across the globe, IP workplaces have conveyed different AI applications, exemplary models being WIPO Translate and WIPO Brand Image Search that utilize such applications for computerized interpretation and picture recognition. Notice should be made here of the 2018 gathering coordinated by WIPO to examine these applications and energize their sharing.

6.2 IP rights as an impediment to the straightforwardness of AI frameworks

In a period of straightforwardness and responsibility, an inquiry emerges regarding whether this necessity will keep on being fulfilled in cases wherein the AI cycle includes components that are misty for legitimate or mechanical reasons (Wexler, 2018). Indeed IP rights as a rule and proprietary innovations specifically could make hindrances and raise a contention between IP arrangements from one viewpoint and the social need for straightforwardness. The need of the hour lies in featuring the truth that revelation for fulfilling these objectives does not concern the algorithmic guidelines but just their outcomes.

6.3 IP as a legal system that can protect, nay foster AI.

Patent and copyright are the most pertinent frameworks of assurance with respect to AI. In any case, when patent laws were imagined, the idea of a machine as a creator didn't exist. Along these lines, patent laws overall presented innovation rights just to people. An example of this is the Japanese law specification implying that only an individual can be a creator, and not any machine. What's more, the

circumstance has not gone through a sea change even today. To refer to a model, an AI framework dedicated as DABUS was named as the creator in patent applications documented in the UK, US and Europe in 2017 (Ireland & Lohr, 2020). But the equivalent was dismissed in all three because of it not being a legitimate individual. In this manner, from a patent point of view, the accompanying issues need extraordinary notice:

a. Whether AI as a development is a qualified topic. (In many countries, calculations without help from anyone else qualify as dubious frameworks lacking specialized character and consequently cannot be ensured protection under IP laws. Nonetheless, it will be counterproductive in the event that we adopt a sweeping strategy that patents ought not to be granted to AI-based creations)

b. Who is the valid and first innovator? (Should the law allow that the AI application be named as the creator, or would it be advisable for it to be indicated that a person be named as the designer? Provided that this is true, should the law let the partners take the choice by interior courses of action with regards to how the human designer is to be resolved. In the event that we award patent to AI as the designer, would it be able to be relegated to the gathering who will get the most extreme benefit through commercialization? Would ownership be able to be chosen based on Coase Theorem?)

c. Who claims and is in this way obligated for the demonstrations of the AI innovation? Does the legitimate duty of the illicit activity of an AI lie with its proprietor or its client or its administrator? Should the position of the maker being at risk regardless of him lacking mens rea or even actus reus go through a radical change? In the event that the reason for the illicit demonstration cannot be attributed to a human entertainer, who has the risk?

d. Interpretation of non-obviousness

e. Issues relating to divulgence (explicitly how it very well may be satisfied where calculations of AI are not static but rather change over the long haul and handling best versus most exceedingly awful encapsulation issues: AI application may keep the best exemplification undisclosed and get patent without total honesty.)

f. The manner in which any harms be resolved in case the AI copies a creation or replicates an innovation.

g. Adequateness of current laws. Should a sui generis arrangement of IP rights for AI produced creations be raised? Or, on the other hand, should the AI-IPR interface be required to be postponed till the D-day shows up when AI innovation

is better perceived? (Considering the way that at the current phase of improvement, instances created by totally self-sufficient AI frameworks are rare).

7. The Indian Context: Patent Protection for AIs

7.1 Subject matter eligibility

Artificial Intelligence empowered frameworks can make innovations that commonly result from the use of human intellectual cycles. Nonetheless, there are legal hitches. For example, the disallowance in Section 3(k) of the Indian Patents Act 1970 (as altered in 2002) has triggered a hornet's nest and has led to patents at times being allowed to mixes of equipment and programming or programming with certifiable specialized applications. The Indian Patent Office's position on patentability of PC related developments needs clarity. Anyway, a silver line is the elimination of the inflexible prerequisite of just programs related to novel equipment being qualified for a patent. However, we have a long way to go. The need of great importance is a strong system for protecting AI developments, the sign of which will be consistency, consistently guaranteeing that the country stays responsive towards trend-setters. Dismissing all AI patents on the reason that all AI will utilize the fundamental modalities of information assortment, normalization, re-repeat/self-AI, information association, information handling, and output as wanted by the human cerebrum will be counterproductive. One can rely on the experience of the European Patent Office, which has effectively held its first gathering on AI and patenting. Obviously, the focus of such a system will be to make India a maker of AI instead of an uninvolved adopter of the equivalent. Simultaneously, AI, which can be a potential danger to mankind, may be sorted out as “destructible/perilous development”.

7.2 Who can apply for a patent?

As innovation pushes ahead from a period of frail AI to solid AI, also of super-intelligence, the query that evolves is whether AI innovations can be considered as creators. Be that as it may, this is as yet an ill-defined situation. Section 6 of the Patents Act, 1970 endorses that any individual professing to be the valid and first designer of the creation can apply for a patent. This expression is characterized in Section 2(1)(y) as follows: It does exclude either the initial shipper of an innovation into India or an individual to whom a creation is first imparted outside India.

The part advances an exclusionary definition and doesn't explicitly express that the valid and first innovator ought to be a human. Thus the Act gives the fortitude to the

incorporation of works by AI frameworks. In any case, the drawing on the divider isn't clear enough. For example, Section 2(1) (p) characterizes the expression “patentee” as an individual for the time being entered on the register as the grantee or owner of the patent (Indian Patent Act, 1970). The Act also talks about individuals occupied with or advancing exploration in the very field as that to which the creation relates.

The above discussion expresses the view that it ought to be an individual (legal individual), and hence the aim of the governing framework for the Act overall can be perceived to be shifted towards entities that are persons in the eyes of the law. This underlines the need to correct the enactment to suit the evolving scenario of advancing logical frameworks.

7.3 The Three-Step Test

As regards innovations by AI-empowered frameworks, the greatest test towards acquiring a patent is fulfilling the three-stage test. The term 'new' is not characterized in the Act. In spite of the fact that the expression “new invention” is characterized in the Act, this definition is superfluous as the term is not utilized elsewhere in the Act. Consequently, depending on the precedent-based law significance of the term, we can securely infer that a case is viewed as new if every one of the components of the case cannot be found in a solitary prior art, which here implies everything made accessible to the general society through a composed or oral depiction, by use or in some other way before the date of development of the invention (*Glaverbel SA vs Dave Rose and Others*, 2010 (43) PTC 630). The essential query that emerges with regard to AI can thus be expressed in the accompanying terms.

Tripathi and Ghatak (2018) posed a question, “While an AI framework will unquestionably draw upon earlier craftsmanship, because of its administering human researchers taking care of input data, is it genuinely competent to arrive at a judgment on whether its innovation can represent something novel?”

The aspect of the inventive step is more confounded. The Act defines the term under Section 2(ja).

The Supreme Court in the Novartis case separated Section 2(ja) into its components in the following way:

“It [The product] should appear because of a development which has an element that: (a) entails specialized development over existing information, or (b) has a monetary importance and furthermore, (c) makes the creation not clear to an individual gifted in the craftsmanship”.

In the light of the above-mentioned facts, it should be stated with regard to AIs that odds of making developments on existing models or ideas which are not clear to individuals talented in the workmanship is surely harder to accomplish than mere novelty. Obviously, the innovation should initially progress to furnish these frameworks with a human-like insight so that careful decisions in the new circumstances can be made by them (Tripathi & Ghatak, 2018)

7.4 Issues identified with evergreening:

A significant inquiry that should be looked into is whether an AI patent application referring to another AI application will make the very nature of the creation crumble as even a minor intelligent change would prompt another development. Whether in such cases we need to bring in legal provisions akin to Section 3(d) of the Patent Act is an issue that should be debated exhaustively. Obviously, this point is significant not just to keep away from patent evergreening but in addition to managing the issue of patent trolls.

7.5 Issues relating to provisional applications:

The approaches towards the manner in which the temporary applications need to be permitted (as a simple expression of thought to guarantee priority date will give a timeline of one year to widen claims to a limitless degree) should be examined.

8. Copyright and AI

The primary inquiry brought up in this setting is whether copyright ought to be credited to unique scholarly and imaginative works that are in the self-governing mode, produced by AI or should a human maker be required. It should be referenced here that even the craftsmanship of Picasso has been reproduced by AI-based frameworks, and in 2018, one such work was sold for close to half a million US dollars (Emerging Technology from the arXiv, 2019). In any case, the reality stays that AI workmanship is a subset of generative craftsmanship and is algorithmic - repeatable in nature to be explicit - and regularly open-source - shareability being its trademark. One side contends that systems cannot be as inventive as humans, while the other argues to the contrary (Gelender, 1994). The most acknowledged answer as on date is that, while AI applications are fit for delivering such works in self-governing mode, this limit does not fit with the copyright framework, which is, after all, connected with the inventive human soul. The practitioners consider the Lovelace test to be better than the Turing test. Hypothetically, Lovelace states the viewpoint that machines do not possess

inventiveness (Neill, 2019), highlighting the rationale that inventiveness is the capacity to do the eccentric, dissimilar to something machines consistently do. Machines, the corridor sign of which, is rule-bound to conduct (and hence AIs) cannot be brought within the ambit of copyright framework. The counter view depends on decisions that the nonhuman idea of the wellspring of a work ought not to be a bar to copyright.

The US copyright office's update to the Compendium of Practices (December, 2014) adds weight to the first view. Nonetheless, the IP Clause of the US Constitution does not unequivocally specify a human necessity. Notice additionally should be made of the WIPO meaning of IP that dwells on manifestations of the psyche yet does not determine whether it should be a human imaginative mind. Notwithstanding these, as of late, a San Francisco Court held that creatures not being people do not have locus standi under Copyright Act to sue for infringement (*Naruto vs Slater*, No. 16-15469, 9th Cir. 2018). Obviously, the judgment built up contentions that if Naruto, the monkey, cannot sue for copyright violation, comparable ought to be the circumstance for AI frameworks. Also, as appropriately brought up by Tripathi and Ghatak (2018), regardless of whether nations confessed to giving copyrights to works crafted by an AI, the topic of who gets that copyright stays mysterious in the light of the fact that the current status of law requires legitimate personhood of a holder, something which an AI needs except if its maker is conceded that for its sake. Nonetheless, what occurs if the AI framework was based on sale-purchase remains an open question. The appropriate response lies for the maker in nations like England and New Zealand; however, this actually does not address the above question in its totality.

Three milestone decisions need references here:

a. *Burrow Gilles Lithographic Co. vs Sarony* (III US 53 (1884))

The case talked about the chance of giving copyright assurance to an item which is the yield of a machine. The Court held that absolutely mechanical work is essentially not imaginative. If methodology on these lines is followed, allowing copyright for works made by AI would be troublesome.

b. *Bleistein vs Donaldson Lithographing Co*, 188 US 239 (1903)

Justice Holmes depicted the uniqueness of human character and specified it to be essential to get a copyright.

c. *Alfred Bell and Co vs Catalda Fine Arts Inc.* 191 F. 2d 99 (2d Cir, 1951)

The Court brought down the norm for originality and held that for the work to be so, it should not be a duplicated one. This judgment was a relief for the promoters of copyrights for AI-created works as it is not replicated despite the fact that it is produced through calculations.

In the Indian setting, the test to copyright for works of AI is Section 2(d) of the Copyright Act, 1957, which defines an author as a person.

For an individual to make a work, the nearness of the individual with the work is significant, and thus person here implies a human or a legal individual, a lot to the dismay of promoters of copyright to AI frameworks.

9. Conclusion

As we move away from IA (Intelligent Automation) to AI-driven machines, the inquiries around ramifications of such an innovation are developing. Daimler-Benz has effectively tried self-driving trucks on open streets, AI innovation has been applied successfully in clinical headways, a film composed by an AI appeared online as of late, and AI has even discovered its way into the advocate fraternity. Also, Sophia, a social humanoid robot created by Hanson Robotics, a Hong Kong-based organization as of late, turned into a citizen. Another energizing field interweaved with AI is the idea of Artificial Neural Networks (ANNs) frameworks of equipment and programming designed after the activity of neurons in the cerebrum. Neural nets are viewed as venturing stones in the quest for AI. The principal computational model of ANNs - prevalently called threshold logic - was created by Warren McCulloch and Walter Pitts in 1943 (Palm, G., 1986). From there on, ANNs have progressed significantly, especially due to their particular capacity to distinguish the fundamental connection between various arrangements of information and because of their dynamic nature - adjusting to changes in yield so that they give the best achievable outcome without changing the input nodes. A significant capability of ANNs lies in the fiscal field. Anyway, the exactness of ANNs relies upon the design chosen for a particular issue and training pattern of ANNs, among different elements.

Add to this the issue of "deep fakes", and the situation is much more intricate. These are AI-improved phoney pictures and recordings that take the influence of an AI calculation to embed faces and voices into video and sound chronicles of real individuals and empowers the making of impersonations wrongly depicting individuals saying or doing things they never said or did. In 2012, an AI chatbot named Sim Simi purportedly figured out how to show itself

'Thai' through correspondence with clients in Thailand. Utilizing the new dialect and expressions it had gained from dealings with clients, Sim Simi went on purportedly to slander the Thai Prime Minister (Metaratings, 2012)

In this unfurling situation, what is required is a uniform treatment of the AI framework in all cases wherein countries who are signatories to multilateral trading arrangements start to perceive its presence by getting through a revision to TRIPS. The passing of an AI Information Insurance Act, which could introduce the institution of a controller to settle and adjudicate acts of AIs and all the more explicitly set forth solutions for common and criminal offences carried out by them, is additionally the need of great importance. It should bring in laws to keep honest makers from being indicted for demonstrations of the AI for which they have no control whatsoever. Also, these actions should introduce visionary advances focused on determining how solid AI and super-intelligence ought to be treated in the IP system. For, we must be ready for the D-day when machines implement, safeguard and even indict. Obviously, the test before the comity of countries and its inhabitants is to bridle this stunning innovation for the advancement of humankind by establishing the framework of a strong legitimate system; nay, an AI explicit, yet humankind driven law.

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Learning Circle: A Mediating Aspect in Assimilating Individual Learning to Organizational Learning in a Learning Organization

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Organizational Learning integrates the knowledge of its employees and other resources through experiments, experiential learning, and Learning Circles. Learning Circles are discussion forums. The sample size of this research is 390, comprising of respondents from three job positions, manager, mid-manager and executives from public and private enterprises in Bangalore. Multinomial Logistic Regression Model is used to analyze the data as the feedback was taken in 'Five-point Likert Scale' and independent variables were in '11-point scale'. The results show that the Learning Circle is an effective tool to assimilate knowledge in the organization and to enhance experiential learning and employee competency.

Keywords: *Learning Circle, Organization Learning, Experiential Learning, Multinomial Logistic Regression, Personality Traits, Learning Curve*

1. Introduction

Learning Circle in organizations is a platform for employees in a team or task to do training or discuss work or projects. So, the key role of the learning circle is to encourage 'discussions' and to promote four things: collective cognitive process, idea contribution of employees, inculcating innovation and creativity in the process, and continuous improvement (Siegel et al., 2006). This collective process reduces conflicts to enhance team spirit, power centralization and minimizes communication barriers. The Learning Circles increase the involvement of employees in planning, policy-making and strategy formation.

Learning Circles initiates knowledge sharing, discussions on new ideas, brainstorming to solve current issues, exploring new opportunities, probable strategies to overcome unexpected threats, etc. Hence, they are platforms to develop Knowledge Management Systems to promote knowledge exchange from individuals to the system and vice-versa. Learning Circles integrate personal level knowledge, experiential learning, brainstorming for improvisation and continuous improvement to organizational learning. Organizational learning and learning organization are two theories based on theoretical allegories. Organizational learning occurs across the individual, group, and organizational levels through intuiting, interpreting, integrating, and institutionalizing. It is a purposeful process designed and sustained by inspired leadership (Bratianu, 2015).

Organizational learning uses two concepts across levels, feed-forward and feedback processes. In feed-forward, knowledge is channelized to the organization from individuals and groups by embedding new knowledge through routines, procedures, and strategies, while feedback analyses the results of the learning processes. The four processes, i.e., intuiting, interpreting, integrating, and institutionalizing, occur over all three ontological levels: individual, group, and organizational (Crossan et al., 1999). Each component of organizational learning is predisposed by shared emotions, feelings, values, and vision. Positive emotions and feelings support the motivational system, while negative emotions and feelings create an emotional tension that may oppose the creative tension (Senge, 1999).

Organizational learning is a process of updating knowledge of the organization through experiments and lessons from experience to modify future policies, approaches and strategies. It is a strategic approach in which the internal processes are updated continuously to convert the

possibilities to opportunities to perform and to convert the threats to possibilities through internal competency development. Learning Organization is the outcome of strategies in organizational learning to develop knowledge for continuous improvement and sustainability. So, experiential learning, learning circle, and experiments inculcate innovation in all levels of organizational learning to emerge as a 'Learning Organization' (Odor, 2018).

1.1 Experiential Learning and Learning Styles

The learning of an individual depends on personality traits (Fuertes et al., 2020), needs, environmental effect, and learning potential (Bushe Lekang et al., 2017), and need for adaptability with new technologies. Every individual has two levels of learning in life, academic learning and experiential learning. In academic learning, a scholar learns existing concepts and technologies and experiments in laboratories to understand the practical aspects. The practical sessions ignite the interest in students in experiential thinking and proceed with more experiments to get more clarity in their ideas. But in experiential learning, an individual explores more areas in their domains to solve evolving issues based on their academic knowledge and experiments to contribute to the existing knowledge.

Learning is a continuous process of transforming experience and information into knowledge. It is a cognitive process of integrating information acquired from the senses with perception and experience. It follows all five phases of a product design, but in a different sequence: Sensation (feel and image acquired by the senses), logical integration of senses (an image of idea integrated from feel), perception (a concept or idea generated from logic integration), experiencing the perception (planned action or experiment) and the experience (final feel or idea or feedback from the nature or beneficiaries) (Gatti et al., 2014). Adaptive learning is 'person-centred- a unique learning experience' in which the learning experience is based on an individual's interests, attitude, personality, and performance to achieve a set of learning goals viz. academic interest, learning satisfaction, etc. (Bachari et al., 2010). It is characterized by how the learners receive and process information. The three components of Bloom's Taxonomy- Cognitive, Affective, and Psycho-Motor give an insight into how a learner processes information in intellectual, emotional and action levels (Isani, 2020)

There are many learning style scales that measure the effects of different combinations of learning styles on learners. The Grasha Reichman Learning Styles Scale explained six categories of learners, viz. avoidant, collaborative, competitive, dependent, independent, and participant. This

classification gives the involvement of the learner in the learning process. This scale can be used to differentiate the interest of students. The three responses of these are positive, and they are- competitive, independent, and participant. Hence, the respondents can be clustered based on these attributes (Ford et al., 2016).

The experiential learning of Kolbe's learning cycle (Active experimentation → Concrete experience → Reflective observation → Abstract conceptualization → Active experimentation) is the learning from planning- do, review, improve and plan corrective measures (Kolb, 1984).

The Big Five frameworks of personality traits explain the way a learner approaches the learning process. The Big Five Traits are conscientiousness (disciplined, organized, and achievement-oriented), neuroticism (emotional intelligence, impulse control, and anxiety), extraversion (Alghraibeh, 2015) (sociability, assertiveness, and talkativeness), openness (strong intellectual curiosity, novelty, and variety), agreeableness (helpful, cooperative, and sympathetic) (Costa & McCrae, 1992). The concept 'Whole Brain Thinking', developed by Ned Herrmann, divides the brain into four quadrants to represent four senses: Analytical, Practical, Relational and Experimental (Herrmann, 1995). The three intelligence essential in decision making processes are, Analytical, Practical and Emotional intelligences (Baczynska & Thornton, 2017). This matches with the traits linked with the 'Big Five Model' (Alghraibeh, 2015).

Cognitive styles are relatively stable strategies, inclinations and approaches in perceiving, remembering and problem-solving (Pithers, 2002). The Field Dependence/Independence Theory has distinguished the learners into two groups based on their way of experiencing the environment, viz. analytical and global approach (Keefe, 1979). The field-dependent learners use an approach to derive knowledge from their environment and choose instructional situations that elicit their feelings and understandings. They depend more on external stimuli and interpersonal contact as well. On the contrary, the field independent uses an analytical approach in problem-solving. They are independent, innately stimulated, focused, contemplative, disciplined, and task-oriented. They prefer a formal and competitive learning environment (Wooldridge, 1995). The Dunn and Dunn's style dimension explained five factors, environmental, emotional support, sociological composition, physiological and psychological elements (Dunn, 2000). Personality traits influence the response to the stimuli and the transformation of stimuli to information (Murray & Mount, 1996).

2. Review of Literature

Learning Circles are the platforms to develop organizational learning through consolidating the knowledge gained through experiments and contributed by experienced employees. Learning circle gives a platform for sharing knowledge and initiating thought processes to solve complex problems (Beard & Wilson, 2013)

The two environmental factors for learning are process and learning. Learning requires resolution between two conflicts in adaption: viz, reflection and action, feeling and thinking. Learning is a holistic process comprising of cognitive, perceiving, feeling and feeling. The Experiential Learning Theory model portrays two dialectically related modes of grasping experience – Concrete Experience (CE) and Abstract Conceptualization (AC) – and two dialectically related modes of transforming experience – Reflective Observation (RO) and Active Experimentation (AE) (Kolb & Kolb, 2011). The developmental model defined three stages, acquisition, specialization and integration. Four modes of the experiential learning cycle – experiencing, reflecting, thinking, and acting – are also integrated. The sequence is problem identification, situation analysis, problem-solving, information gathering, problem definition, solution analysis, decision making, implementation analysis, and planning for the right solution. This resembles the nine learning style types in position: Initiating style (initiating action to deal with experiences and situations), Experiencing style (finding meaning from deep involvement in experience), Imagining style (imagining possibilities by observing and reflecting on experiences), Reflecting style (connecting experience and ideas through sustained reflection), Analyzing style (integrating ideas into concise models and systems through reflection), Thinking style (disciplined involvement in abstract reasoning and logical reasoning), Deciding style (using theories and models to decide on problem solutions and courses of action), Acting style (a strong motivation for goal-directed action that integrates people and tasks), Balancing style (adapting by weighing the pros and cons of acting versus reflecting and experiencing versus thinking) (Kolb, 1984).

Classification of organizational learning (Saadat & Saadat, 2016) is based on different learning patterns, which include, source of learning/ knowledge (hereditary, experiential and vicarious) (Dawes, 2003), learning process (monocyclic, two cyclic and three cyclic) (Argyris & Schon, 1978), type of learning (adaptive learning, forward learning and practical learning) (Marquardt, 2002). It is a continuous process of vitalizing the organizational memory through unlearning and learning process, and the role of employees is high.

The role of emotional intelligence is especially important in developing a learning organization as it binds together the employees and retains experiential learning (Nazeer & Isani, 2021).

3. Need, Scope, and Limitation of Research

Involvement and opportunity are the first two criteria for an individual to grow in an organization. Involvement is the opportunity given to the employee to perform and prove, and it is an outcome of the recognition of his/her competency in performing that task. Opportunities will be repetitive if the learning skill is high and the learning curve has a high slope. It is an open survey to learn how the employees and entrepreneurs had an opportunity to develop experiential learning and expertise that their experience contributes to the firm. The contribution can be as a solution, idea, product or managing scarcity. This paper analyzes three factors, managing opportunities, learning constraints and organizational learning opportunities.

The respondents of this research are employees in the private, public sectors and entrepreneurs. The limitation of this research is that the data collected is not sector-specific. So the results give a general picture. Since the employees participated willingly, they gave a lot of new inputs that we could not convert into instruments. Hence, there is a scope for further research.

4. Objectives of the research

1. To analyze the effect of Learning Circle in the organization in assimilating knowledge
2. To analyze the scope of opportunities and involvement in enhancing experiential learning
3. To analyze the effect of personality traits on the choice of learning platforms

5. Hypothesis Development

5.1 Learning Circle and Employee Involvement

The Learning Circles are the discussion forums in organizations at different levels in which the employees of different hierarchies join to discuss a particular aspect or issue that collective effort will be taken to achieve or solve it. Periodic learning circles improve the quality, performance and team effectiveness of the firm, and it increases the involvement and voluntary responsibility in taking new challenges in benchmarking, customer issues, business process re-engineering, and organizational performance (Keefe, 1979). The role of management is important in developing a culture in which the learning circle is a platform for the employees to come together by

reducing the bureaucratic difference in attitude among employees and inculcating responsibility in employees. This helps to complete the task through developing an internal supply chain of workflow and conceptualization of an idea as the central goal. In experiential learning, the employee uses the available knowledge within the firm, his or her acquired skills and knowledge, and the information gained from the environment to develop an innovative idea. In this, both individuals and organizations together form a learning process (Hsu & Lamb, 2020).

Hence the hypothesis:

H01: There is no significant relationship between the opportunities for employees in Learning Circles and their performance.

5.2 Employee Involvement and Assigning of a New Task

An organization is an 'identity' that has many employees do different tasks to achieve a common goal, and the human resources are 'the critical and unique' competency of any organization. So, it is an integration of heterogenetic activity with a homogenous goal. Opportunities given to employees depend on their capabilities and experience in doing that specific task perfectly in time. In the service sector, the employees may have to manage the customer queries or situations spontaneously, and it needs experience and skill. The organization can train the technical and managerial aspects, but managing a situation depends on both interpersonal and intrapersonal skills. This can be developed only through real-world learning and practice. The role of management in assigning the right task to the right employee depends on the history of that employee's performance. Modern management techniques like total quality management (TQM), re-engineering, etc., has helped organizations to use employee skills to enhance quantity and output. Hence, the opportunities offered to employees depends on their employability, and involvement depends on the competencies of employees to complete the task effectively in time. Work environment, supervisor feedback, decentralization, and employee delegation strategies enhance employee involvement and performance (Kontoghiorghes, 2003). This enhances innovation and creativity among employees leading to a reduced rate of resource consumption but high productivity. In the case of small firms, the contribution of intellectual ideas in improving current products and services is important in maintaining competency (Czarnitzki & Dirk, 2014).

Hence, the hypothesis:

H02: There is no significant relationship between opportunities received and the repeated environment.

5.3 The Effect of Personality Traits on the Learning Process

There is a significant effect of employee behaviour, perception, attitude, and interest on the learning process. It depends on an employee's communication and personality traits. A few factors that influence learning are interest, domain, cognitive intelligence, emotional intelligence, and type of learning activities (Bayaram et al., 2008). In the learning circle, participation and involvement are important in which the employees must explain what their plan of action is, concept, process and expected outcome. Extraversion helps the learning process to be a team experience, maintaining an emotionally firm approach to bring everyone actively into the learning platform. The nervousness of employees having neuroticism can be overcome by the motivation of the team members through identifying the reasons for fear and lack of confidence. Conscientiousness enables the learners to be systematic, responsible, time-bound and conscience centred. Agreeableness is especially important in learning circles and organization learning to maintain a benchmark in knowledge assimilation through self-involvement in solving the problems and doubts of team members. Openness to experience is the driving force in experiential learning (Awadh & Ismail, 2012).

Hence the hypothesis:

H03: There is no significant relationship between personality and learning platform.

6. Research Methodology

The research was conducted among entrepreneurs, employees in the private and public sectors in different segments. The research was conducted in two stages. After the completion of the conceptual background, the objectives and hypothesis were framed. The measuring instrument was developed and tested in the pilot study in which 390 respondents participated. The test and retest were used such that the variation in response was nullified, and the consistency was checked using an independent samples t-test so that the t value becomes low as the difference in the mean was reduced. The reliability was tested using Cronbach Alpha. The Cronbach Alpha for all data was more than 0.69.

Multinomial Logistic Regression is used in this research when the dependent variables are in 'ordinal' form, and independent variables are in 'scale' format.

The Probability of 'Odds' and Probability of 'Events' are taken for performance comparison.

$$\ln\left(\frac{P(y)}{1-P(y)}\right) = \sum \beta_0 + \beta_n * x_n = \beta_x$$

$$\frac{P(y)}{1-P(y)} = e^{\beta_x} \quad P(y) = \text{Probability of odds} = \frac{e^{\beta_x}}{(1+e^{\beta_x})}$$

$$\text{Probability of event} = \frac{\text{Odds of event}}{(1+\text{Odds of event})}$$

The statistically significant chi-square is taken as the model criteria, and statistically significant 'Wald' is taken for the selection of components.

The β_0 and β are taken from the multinomial regression model, and they are the regression coefficients of the independent variable. ' x_n ' is the average of each variable in the regression equation to calculate β_x .

The probability of event is calculated for different controlling factors to understand the effect of emotional intelligence competencies on employee performance. The probability of event gives the probability for the criteria to be favourable for a specific set of respondents. Hence the variation in the probability of event is a good measure to assess the effect of a variable on a system.

6.1 Instrument for Data Collection

The instrument for data collection was prepared based on OCAI (Organizational Culture Assessment Instrument), Training Instruments in HRD and OD (Pareek & Purohit, 2018) and the Kolb Learning Style Inventory 4.0 (Kolb & Kolb, 2013) and the Personality Trait short questionnaire (Ortet et al., 2017).

7. Analysis and Interpretations

The response profile of the research is explained in Table 1. The respondent's profile has age, gender, employment domain, sector, and job position. 64% of the respondents are male and 36% females. The respondents comprise of entrepreneurs (13%), employees from the public sector (38%) and private sector employees (49%). Another classification of the respondents shows that they are employed in manufacturing (15%), service sector (48%) and office (34%). The classification of respondents based on the job position includes, entrepreneurs (13%), managerial (22%), mid-management (14%), supervisors (15%) and executive/ labor (35%).

Table 1: Response profile of the research

Response profile	Number of responses	Percentage
Age		
< 20 years	52	13
20-40 years	205	53
40-60 years	133	34
Total	390	100
Gender		
Male	249	64
Female	141	36
Total	390	100
Employment Domain		
Entrepreneurs	52	13
Private sector	190	49
Public sector	148	38
Total	390	100
Sector		
Manufacturing	59	15
Service sector	189	48
Office	132	34
Total	390	100
Job position		
Entrepreneur	52	13
Managerial	86	22
Mid Management	56	14
Supervisor	59	15
Executive/Labour	137	35
Total	390	100

Source: Primary data

7.1 Relationship between the Opportunities for Employees in Learning Circles and their Performance

The descriptive analysis of the effect of participation of the respondents in the learning circle shows that the mean and standard deviation is varying significantly in all the variables taken to measure the effectiveness of the learning circle (Table 2).

Feedback was taken for training sessions in both live and online sessions. All the respondents attend both live sessions and online sessions. Feedback was taken with an ordinal scale with a five-point Likert Scale. The measures for evaluating the experience from Learning Circles was taken on an 11-point scale. The variables for evaluating the perception of participants of Learning Circle are effectiveness, interaction, opportunity, team support, clarification, experience, curiosity, freedom and viewpoint.

Table 2: Response to the Effectiveness of Learning Circles in Different Types of Enterprises and Genderwise Response

Sub variable	Criteria	Gender				Sector					
		Male		Female		Entrepreneurs		Private Sector		Public Sector	
		μ	σ	μ	σ	μ	σ	μ	σ	μ	σ
Effectiveness	Effectiveness of Classes Live Classes/Trainings/ meetings	6.9	2.1	7.4	2.9	4.8	2.3	5.9	2.1	5.7	2.3
	Online training/classes/ training sections	5.3	2.4	5.9	3.1	5.2	2.5	5.3	2.7	4.9	2.9
Interaction	Live classes are more interactive	6.5	1.9	6.1	1.9	5.9	2.4	5.8	2.2	5.4	2.4
	Online classes are more effective	5.8	2.1	5.6	2.3	5.4	2.2	5.6	2.1	4.5	2.1
Opportunity	Opportunity to explain our view points in Live meetings are high	5.9	3.2	5.6	3	4.9	3.2	6.2	1.9	4.9	2.3
	Opportunity to explain our view points in online meetings are high	5.3	2.9	5.4	2.9	4.6	3.1	5.6	2.1	4.3	2.1
Team support	Trainers and supervisors assign activities to juniors to present in meeting	4.9	3.5	4.8	3.1	4.3	3.5	5.9	2.6	3.9	1.8
	Trainers and supervisors assign activities to juniors to present in meeting	5.1	3.4	4.9	2.9	4.8	3.2	5.4	2.1	3.8	2.2
Clarification	Trainers are available to give clarifications if needed in live classes	5.3	2.9	5.1	3.1	4.3	3	4.9	2.3	4.6	2.3
	Trainers are available to give clarifications if needed in online classes	5.1	2.8	5.1	2.8	5.1	3	4.5	1.9	4.5	2.1
Experience	The explanation of team members who have experience is deep and informative in Live classes	5.4	3.1	4.9	3.3	5.2	2.6	5.6	2.3	4.6	2.4
	The explanation of team members who have experience is deep and informative in online classes	4.8	3.3	4.7	3.2	5.6	2.8	5.8	2.6	4.4	2.2

Curiosity	The training sessions provide curiosity to know more and join in that team in live classes	5.3	2.8	5.7	2.9	5.1	2.4	5.9	2.6	3.9	1.9
	The training sessions provide curiosity to know more and join in that team in online classes	5.1	2.4	5.6	2.4	4.6	2.3	4.8	2.4	3.3	1.7
Freedom	There is freedom to choose the area to work after attending sessions for newcomers after their training in live classes	4.8	3.3	5.3	2.9	4.9	2.4	5.2	2.4	4.1	2.6
	There is freedom to choose the area to work after attending sessions for newcomers after their training in online classes	4.7	3.6	4.9	3.2	4.8	2.9	4.7	2	4.4	2.3
View point	There is provision for Juniors to give their viewpoints after the explanation of seniors in Live classes	5.6	2.9	5.1	2.5	4.9	2.3	4.9	2.4	3.9	2.1
	There is provision for Juniors to give their viewpoints after the explanation of seniors in online classes	5.3	2.8	5.1	3	5.2	2.9	4.7	1.5	4.1	1.8
Adequate data	There is adequate data for learning and understanding live classes	5.2	2.6	5	2.9	4.9	2.3	5.3	1.6	4.3	1.9
	There is adequate data for learning and understanding online classes	5.1	2.7	5.3	2.6	4.9	1.9	4.3	1.3	4.9	1.7
Confidence level	Sessions are giving confidence to take task independently and team wise as well in live classes	5.3	2.9	5.1	2.7	5.2	2.4	5.9	2.1	4.6	1.5
	Sessions are giving confidence to take task independently and team wise as well in online classes	5.1	3.2	4.9	3.3	5.1	1.8	4.2	1.2	4.2	1.4

The multiple linear regression equation is given for both live and online sessions as

$$\ln\left(\frac{P(y)}{1-P(y)}\right) = \sum \beta_0 + \beta_n * x_n = \beta_x$$

The multiple linear regression equation is given as:

$$\beta_x = \beta(\text{feedback}) = \beta_0 + \beta_1 * (\text{effectiveness}) + \beta_2 * (\text{interaction}) + \beta_3 * (\text{opportunity}) + \beta_4 * (\text{team support}) + \beta_5 * (\text{Clarification}) + \beta_6 * (\text{Experience}) + \beta_7 * (\text{Curiosity}) + \beta_8 * (\text{freedom}) + \beta_9 * (\text{View point}) + e$$

7.2 Probability of events of Online and Live Learning Circle Programs

Table 3 shows the response to the live and online sessions based on gender in terms of the probability of the event. It is the measure to explain the extent to which the three levels of satisfaction of the respondents match the measurement of parameters of Online and 'Live' classes on an 11-point scale. The results show that the response of male and female respondents to learning circles is encouraging though their acceptance level varies. Both male and female respondents prefer 'live' sessions to online sessions. The probability of event for opportunity, experience, and viewpoint are high for live sessions. In the case of female participants, view, clarification, effectiveness, clarification, and freedom are attractive factors in online learning circles.

In general, the live training sessions have a higher mean compared to the online sessions for executives and mid-management, while the managers prefer online training. Female employees felt live classes were more effective than online classes, while other variables are close values. Similarly, executives also prefer live training sessions to online sessions. It may be due to the real-time feel in live classes, and the technical hindrances are minimum. Direct interactions in Learning circles helps to clarify views and doubts on the spot. In 'Live' meetings, all participants are in the same location, while in online meetings, participants are in different locations, which limit the freedom of inter-participant interaction for a collective process.

Table 4 shows the variation in the probability of event of different job positions. The managers prefer online sessions to live sessions due to their higher rate of involvement in multitasking. Executives and mid-management (including supervisors) prefer live sessions to online sessions. Managers found online learning circles more attractive, and they view effectiveness and interaction are important factors in online learning circles. Effectiveness, interaction, opportunity, and freedom are the attractiveness of live sessions for mid-management and executives. Clarification and confidence level are high for online sessions for executives.

Table 3: Probability of event for mode sessions – Live and Online

Performance indicator	Probability of events					
	Live			Online		
	Low	Normal	High	Low	Normal	High
Effectiveness	0.23	0.35	0.39	0.23	0.22	0.37
Interaction	0.15	0.29	0.46	0.13	0.21	0.36
Opportunity	0.23	0.38	0.41	0.23	0.29	0.33
Team Support	0.29	0.33	0.35	0.21	0.26	0.29
Clarification	0.15	0.36	0.31	0.1	0.23	0.29
Experience	0.23	0.38	0.32	0.23	0.28	0.2
Curiosity	0.26	0.33	0.32	0.19	0.24	0.26
Freedom	0.19	0.31	0.26	0.19	0.31	0.26
Viewpoint	0.23	0.38	0.19	0.12	0.25	0.24
Adequate Data	0.26	0.33	0.32	0.2	0.23	0.25
Confidence Level	0.11	0.39	0.23	0.11	0.32	0.21

Source : Primary data analysis

Table 4: Probability of Event for Mode Sessions based on Job Position

Performance indicator	Managerial Probability of events					
	Live			Online		
	Top	Mid	Exe	Top	Mid	Exe
Effectiveness	0.35	0.37	0.37	0.22	0.28	0.28
Interaction	0.21	0.29	0.29	0.21	0.32	0.32
Opportunity	0.2	0.31	0.31	0.29	0.23	0.23
Team Support	0.33	0.35	0.33	0.36	0.23	0.23
Clarification	0.18	0.33	0.33	0.34	0.23	0.23
Experience	0.32	0.3	0.35	0.28	0.28	0.28
Curiosity	0.33	0.33	0.33	0.24	0.21	0.21
Freedom	0.18	0.29	0.33	0.31	0.33	0.33
Viewpoint	0.22	0.33	0.33	0.25	0.24	0.24
Adequate Data	0.19	0.35	0.35	0.23	0.26	0.26
Confidence Level	0.18	0.35	0.35	0.32	0.35	0.35

Source : Primary data analysis

Hence, there is a good response of respondents to learning circles in their organizations, whether they are live meetings and interactions or online meetings. The response shows that it is an active part of all firms. The data on the frequency of learning circle meetings are more in private firms (average of three to four meetings per month) in different levels compared to the public sector (one meeting per month).

Hence, the Null hypothesis is rejected, and the results show that the employees are getting opportunities for involvement in learning circles.

7.3 Employee Involvement and Assigning of New Task

The assignment of tasks depends on the competency of the employees to do a specific task on time at a benchmarked quality. A few cases of assignment considered here are new assignments, repeated assignments, critical assignments, field issues, critical customer issues, new product

developments, and existing product improvement. All these cases are strategic issues that may affect the sales or customer satisfaction, or reputation of the firm.

Here experience and capabilities matter. Table 5 shows the descriptive statistics of the assignment of tasks in different job positions. The mean of different job assignments of managers and mid-managers are similar while the same for supervisors and executives are higher than managers and mid-managers. The managers assign work and delegate appropriate supervisors and a team of executives who are competent to complete work.

Hence the regression equation is framed as

$$\beta_x = \beta_0 + \beta_1 * (\text{New assignments}) + \beta_2 * (\text{repeated assignments}) + \beta_3 * (\text{Critical assignment}) + \beta_4 * (\text{Field issues}) + \beta_5 * (\text{Critical Customer issues}) + \beta_7 * (\text{New Product Development}) + \beta_8 * (\text{Existing Product improvement}) + e$$

Table 5: Descriptive Statistics of 'Assignment of Tasks based on Employee Competency'

Sub- variable	Job Position							
	Managerial		Mid Management		Supervisor		Executive	
	μ	σ	μ	σ	σ	μ	σ	μ
New assignments	5.8	2.7	5.4	3.1	5.8	2.7	6.3	2.7
Repeated assignments	5.4	2.3	5.9	2.8	5.9	2.1	5.9	2.1
Critical assignment	4.6	1.8	5.9	2.1	5.8	2.2	5.9	2.2
Field issues	5.3	1.1	5.8	2.2	6.2	1.9	5.8	1.9
Critical Customer issues	5.7	1.9	6.2	1.9	6.2	2.6	6.2	2.6
New Product development	5.1	1.1	5.9	2.6	4.9	2.3	5.9	2.3
Existing product improvement	3.9	1.3	4.9	2.3	5.6	2.3	4.9	2.3

Source: Primary data analysis

Table 6 shows the probability of an event for managers, mid-management, and executives. Results show that the probability of an event for managers is low compared to mid-management and executives. This shows that the managers are engaged in managing resources and activities at the central point and delegate the middle management and executives based on their competencies. In both cases, the

probability is high for normal and high satisfaction levels. This trend shows that the task assignment is done based on the confidence of management in the competencies of employees. The variables taken here have a statistically significant Wald coefficient. Other variables omitted include problem identification, critical thinking, unique solution, and technological expertise.

Table 6: Probability of Event for Assigning New Tasks to the Employees Based on Experience

Opportunities	Managerial			Mid Management			Executive		
	Probability of events			Probability of events			Probability of events		
	Low	Normal	High	Low	Normal	High	Low	Normal	High
New assignments	0.13	0.2	0.23	0.23	0.22	0.26	0.12	0.37	0.43
Repeated assignments	0.11	0.13	0.29	0.26	0.31	0.38	0.23	0.36	0.42
Critical assignment	0.1	0.21	0.23	0.23	0.29	0.38	0.23	0.39	0.38
Field issues	0.16	0.23	0.29	0.28	0.36	0.37	0.26	0.35	0.39
Critical Customer issues	0.15	0.18	0.21	0.1	0.34	0.33	0.19	0.33	0.34
New Product development	0.23	0.32	0.2	0.23	0.28	0.32	0.21	0.36	0.39
Existing product improvement	0.26	0.33	0.26	0.36	0.34	0.33	0.26	0.33	0.38

Source: Primary data analysis

New assignments, repeated assignments, field issues, new product development and existing product development have a higher probability of events for executives. The mid-management employees feel repeated assignments, critical assignments, and field issues as their opportunities in regular operations. This shows that the Learning Circles improves the Learning Curve of executives, who are the upcoming generation in our operations.

New assignments are the experimental opportunities in which the firm is new to the problem, and hence, experts of the team take up the tasks first to explore the case and how to solve it, and an outline for experiments will be developed and a design for it. In the implementation stage, the design and idea will be transferred to the mid-management and executives through Learning Circle and select a team with experience and expertise to lead the project while others assist them. Repeated assignments will be assigned to one employee if he or she has a hand in experience in resolving that type of problem or delegate others under his or her or her supervision. Critical cases also demand a high degree of experience and expertise in handling them. Hence, the learning curve of employees is important in assigning a task to them. The results show that the respondents can improve their skills through learning circles so that they can manage critical assignments.

Hence, the null hypothesis is rejected as the assignment of task is based on the confidence level of management on employees.

7.4 Effect of Personality Traits on Learning Involvement in Learning Circle

Though the Big Five personality traits explain five traits with a clear set of characteristics, every individual has a blend of all of them in which one or two traits will be prominent. The extraversion helps to take the lead in activities while the same person has the potential for agreeableness, conscientiousness, and openness. Based on the Big Five personality traits, a set of behaviour was used to analyse the response of employees to the learning process in the firm, and they are innovativeness (openness), resource exploration and management (conscientiousness), continuity in the learning process (conscientiousness), identifying training need within the team (agreeableness), team management (conscientiousness), thinking new ideas in different domains (openness), motivating peers to bring new ideas (extraversion, agreeableness), analyze existing issues of the firm (conscientiousness), Encouraging employees for new ideas (extraversion, openness and

agreeableness), and appreciate new ideas (conscientiousness, agreeableness).

Table 7 shows the descriptive statistics for the effect of personality traits on the learning process in the organization. The means of executives and supervisors are higher than that of managers and mid-managers.

Based on this, the regression equation is made as follows:

$$\beta_x = \beta_0 + \beta_1 * (\text{Innovativeness}) + \beta_2 * (\text{resource exploration and management}) + \beta_3 * (\text{Continuity in learning process}) + \beta_4 * (\text{identifying training need within team}) + \beta_5 * (\text{Team management}) + \beta_6 * (\text{Thinking new ideas in different domains}) + \beta_7 * (\text{Motivating peers to bring new idea}) + \beta_8 * (\text{Analyze existing issues of firm}) + \beta_9 * (\text{Encouraging employees for new ideas}) + \beta_{10} * (\text{Appreciate new ideas}) + e$$

The results show that the probability is high for the performance level 'high' as well as 'normal' for mid-managers and executives (Table 7). This shows that personality traits have a high influence on involvement in the learning process. The learning circle will function only if all employees take the initiative for continuous interaction. The high probability shows the initiative of executives in exploring opportunities to learn and sharpen their competencies.

The role of mid-management in enriching the Learning Circles with activities like identifying new topics for discussions, identifying new resource persons, thinking new ideas in different domains and analyzing existing issues in the firm gives a new perspective to the executives, which will shape their managerial perspectives. The role of executives in using the Learning Circle for new discussions, coordinating with management for the continuity in organizing Learning Circles regularly, identifying training needs, participating in discussions on developments in other domains, motivating peers to be active in Learning Circles, taking the initiative in understanding and resolving the contemporary issues faced by the firm, training of new employees, helping the new employees to identify right domains to start their work and in appreciating ideas shows the effective involvement and interest in Learning Circles. This revitalizes the environment of the organization with participation, ideas, involvement and innovativeness.

Hence, the null hypothesis is rejected that the executives and mid-management are taking initiatives for exploring new learning opportunities within the organization. It is particularly important in assimilating knowledge within an organization.

Table 7: Descriptive statistics of 'Effect of Personality Traits on Learning Process'

Personality Trait variables	Job Position							
	Managerial		Mid Management		Supervisor		Executive	
	μ	σ	μ	σ	μ	σ	μ	σ
New assignments	5.8	2.7	5.4	3.1	5.8	2.7	6.3	2.7
Repeated assignments	5.4	2.3	5.9	2.8	5.9	2.1	5.9	2.1
Identifying new discussions	4.6	1.8	5.9	2.1	5.8	2.2	5.9	2.2
Identifying resource person	5.3	1.1	5.8	2.2	6.2	1.9	5.8	1.9
Coordinating with management for continuity in program	5.7	1.9	6.2	1.9	6.2	2.6	6.2	2.6
Identifying training need within team	4.6	1.8	5.9	2.1	5.8	2.2	5.9	2.2
Team Management	5.3	1.1	5.8	2.2	6.2	1.9	5.8	1.9
Thinking new ideas in different domains	5.7	1.9	6.2	1.9	6.2	2.6	6.2	2.6
Motivating peers to bring new idea	5.1	1.1	5.9	2.6	4.9	2.3	5.9	2.3
Analyse existing issues of firm	4.6	1.8	5.9	2.1	5.8	2.2	5.9	2.2
Train new employees	5.3	1.1	5.8	2.2	6.2	1.9	5.8	1.9
Encourage the new employees to identify their interests matching to firm needs	5.7	1.9	6.2	1.9	6.2	2.6	6.2	2.6
Appreciate new ideas	5.1	1.1	5.9	2.6	4.9	2.3	5.9	2.3

Source: Primary data analysis

8. Conclusion

Organizational Learning is a continuous process in which the Learning Circle plays a vital role in bringing all employees of some tasks or domain together. This leads to a learning organization. This study analyzed the involvement of employees in the Learning Organization in sharing the knowledge with other employees. This leads to the transformation of individual knowledge to organizational knowledge, and a new team will be developed. The three stages of organizational knowledge development are experiential knowledge of employees, knowledge sharing, and new knowledge developed through collective cognitive thinking.

This study was conducted among 390 respondents, of which 15% are entrepreneurs. The results show that all the respondents actively participate in the Learning Circle in the organization, which is conducted as informal or formal. The results of the mid-management and executives show that they are participating in the learning circle actively. The results of the second hypothesis show that the mid-management and executives are getting new opportunities in job assignments. The higher probability of an event of executives and mid-management shows that the internal knowledge assimilation through the learning circle

increases the performance of employees. This is a positive result of organizational learning.

The results of personality traits show that the mid-management and executives take initiatives to conduct the learning consistently to gain more competencies fast. The team cohesiveness and individual performance are integrated to form a dynamic learning circle.

Learning circles are effective in the transition of a task from the planning and scheduling level of managerial level to the mid-management and execution level smoothly and to ensure the involvement of all employees. As the information is shared clearly to the team, rework, redundancy in work and wastage in time reduces. Also, the participation of executives is a motivation for them to express their ideas based on their skilled experience. Learning Circles is a tool to integrate the departments to a holistic learning process and to a Learning Organization. Learning Circles acts as a catalyst in improving the slope of learning curves of the employees as well.

Though the respondents are from different industries or segments, the results emphasize the existence of learning circles in all organizations, either as formal or informal, it plays a vital role in assimilating knowledge in the organization.

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