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C O N T E N T S

Editorial

Reimagining Management: Well-being as the Cornerstone of Workplace Success

The relentless pursuit of results has long been the hallmark of effective management. However, in today's fast-paced and demanding work environment, this singular focus is proving unsustainable. This foreword explores a burgeoning movement - reframing management practices through the lens of well-being, recognizing it as the cornerstone of both individual and organizational success.

Traditionally, successful managers were depicted as tireless individuals prioritizing results over everything else. This issue challenges this notion, advocating for a multi-faceted approach to well-being in management. One key area is leadership style. We must explore how fostering psychological safety and autonomy through leadership can empower employees, reducing stress and burnout. Besides, work-life balance also takes centre stage. Leading organisations across the globe are experimenting if flexible work arrangements and innovative scheduling practices as a potential factor to enhance employee well-being without sacrificing productivity.

In this foreword, I would express the need for having organizational culture that strongly promotes employee well-being. I emphasize the significance of open communication, healthy workplace relationships, and prioritizing employee well-being initiatives. These practices contribute to a more supportive and positive work environment, fostering a sense of belonging and purpose among employees.

The article doesn't neglect the well-being's physical dimension. There is a strong connection between physical health and work performance, advocating for promoting healthy habits and providing access to wellness resources within organizations.

By prioritizing well-being, managers can cultivate a multitude of benefits such as reduced absenteeism, increased employee engagement, and enhanced creativity eventually to attain a win-win scenario - fostering a thriving workplace where individuals flourish and organizations achieve their full potential. This has been explored, experimented and practiced at We School to realise the fullest benefits to both institute and employees.

This expression of mine serves as a springboard for further exploration. It encourages readers to delve deeper into the well-being practices presented and consider how they can be integrated into their own leadership styles and organizational cultures. By prioritizing the well-being of their employees, managers aren't just investing in individual health and happiness; they are investing in the very foundation of a successful and sustainable organization.

Prof. (Dr.) Uday Salunkhe
Editor in Chief

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IMPACT OF ENVIRONMENTAL, SOCIETAL, GOVERNANCE & ESG SCORE ON FINANCIAL PERFORMANCE & MARKET VALUATION OF NIFTY FIFTY FIRMS

Nayantara Sreeram*

Abstract

This study has the objective of examining the impact of Environmental, Societal, Governance ESG scores, Return on Equity and Firm Size on the Market valuation of NIFTY Fifty Firms. The study uses five-year data from 2018 to 2022. The study conducted a Descriptive, Correlation and Regression analysis to find the variables which impact the returns of NIFTY 50 firms. The results of the study indicated that the regression equation was positively significant to the market capitalization of NIFTY 50 firms. The Environmental and Societal Scores had a greater impact.

Keywords : *Environmental Score, Governance Score, Societal Score, ESG, Market Value*

Introduction

Economies are interdependent on each other and hence construct infrastructure to support the supply chain process. However, many Corporations functioning in these processes do not follow the regulations for the protection of the environment. The world leaders hence met in Paris in 2015 to deliberate a strategy where most of the nations approved to create financial inflows for maintaining low greenhouse gas emissions. To bring the firms into this ambit, the United Nations created the Principles of Responsible Investment to draw investors towards sustainable Investment which has garnered membership in huge numbers. Responsible Investment has been defined as a method that has the objective to integrate environmental, social, and governance (ESG) factors into investment choices, to generate sustainable returns".

Together UNGC and PRI strategized measures which resulted in many companies adhering to sustainability measures within their operations. The aim was to help the investors to identify and develop portfolios with sustainable companies. Environmental, Social and Governance investing is a term synonymously used for sustainable investing. Currently, there are various databases which provide scores to the firms based on the firm's adherence to the sustainable or ESG factors and are termed as ESG ratings. The published ESG score data has become standardized and are more accessible. Past research indicates that after the global financial crisis of 2007, investors are attracted to Responsible Investment. Firms are now more focused on aligning the ESG factors in various lines of business unlike before when the decisions were ruled only by financial benefit. The Global Sustainable Investment Alliance report, 2020 has shown that sustainable investments have grown to $ 35.3 trillion which reflects a growth of 15% in 2 years. They have also found that ESG scores are a preferred factor in investors' decisions for investment. Hence the research for examining the impact of ESG scores on various variables such as Financial Performance, Risk Management and Stock returns have become popular.

This study uses the overall ESG score, Environmental score, Societal Score and Governance score and examines its impact on the stock returns of the firms listed in the NIFTY 50 Index. The data is collected for the past five years from 2018 to 2022. The study is organized as follows. After the literature review, the variables are described and followed by the Research Methodology. The final section concludes the paper.

*****Nayantara Sreeram,** *Executive, Accel North Partners*

Theoretical Background

There are two theories which form the basis of assessing the impact of ESG measures on the firm's performance.

1. Agency Theory

Jensen & Meckling (1976) propounded that there is an agency and principal relationship that exists between the shareholders and the manager of the firm. It argues that managers can spend firm resources to gain private benefit and because of ESG expenditure they need to sacrifice projects that would yield higher profits.

2. Stakeholder Theory

Freeman (1994) proposed that when a Managers relationship with all the stakeholders is better, the firm would be more successful. On applying this for the ESG activities, this may impact the firm performance positively as all the conflicts between manager and stakeholder is resolved. Satisfied employees, happy suppliers improve the performance and leads to sustainability.

Rationale for this Study

This study seeks to explore the relationship between ESG scores reported and the performance of a company; in terms of both financial performance and the level of attractiveness to investors. The study has considered the NIFTY 50 Index for the purpose of its analysis, as a representative of the Indian stock market.

Review of the Related Literature

Author Name	Dependent Variable	Year	Country	Findings
Bhagat & Bolton	ROA, TobinsQ	2008	USA	Positive Association
Renders et al.	ROA	2010	Cross Europe	Positive Association
Nakai et al.	Stock Market Returns	2013	Japan	Positive Association
Cioli	Stock Market Returns	2021	Global	Positive Association
Mohammed & Elawa	ESG Score	2016	USA	Positive Association
Bae et al.	Firm Value	2021	Korea	Negative Association
Wiryakusuma	Stock Returns	2019	Netherlands	Negative Association
Sahut et al.	Stock Returns	2015	United Kingdom	Negative Association

Corporate Governance and Firm Performance

Finance literature is intrigued by the variables that impact the stock returns of companies. A few of the earlier studies, which examined the relationship between corporate governance and firm performance are discussed first. Bhagat and Bolton (2008) examined the relationship between corporate governance measures and Return on Asset and Tobin's Q. They found a positive relationship between the Return on Assets and

Governance Index. Brown & Caylor (2009) found that few of corporate governance had a significant effect on ROE. Renders et al. (2010) found that as the Governance score increases, the firm performance increases too. Fried et.al (2015) conducted a detailed review of the literature study including meta-analysis and vote- count.

ESG Score and Institutional Ownership

Next, the relationship between ESG scores and

Institutional Ownership is being discussed. Maximum sustainable investment study assesses the practice of ESG data as desirable under the conjecture that it mitigates investors' movement in attaining the short term objectives and promotes an ESG belief. Bourghelle et al., 2009; Dumas & Louche, 2011; Jemel-Fornetty, Louche, & Bourghelle, in their 2011 study accept that convergence to a different shared belief is essential to contrive a change, where asset managers will vigorously participate in shifting undesirable corporate actions. SCHNATTER-LY et al;. (2007) in their study found that the principal Institutional Owners is perceived to hold an information advantage as the bid-ask spread in the market price of the shares. Institutional investors have both a superior skill to check the firm behavior than individuals as well as better motivation to do so (Agrawal and Mandelker, 1990; Alchian and Demsetz, 1972; Shleifer and Vishny, 1986). The skill to observe the management comes from a steadfast team that gathers information from the firms which is impossible for Individual investors. Aitken (2000) study to verify if institutional investors destabilize emerging markets found that their sentiment towards emerging markets as an asset class can probably play a serious part in influencing asset prices, with volatile movements with phases of booms and busts. Bushee and Goodman (2007) in their study examined if institutional investors can accomplish gainful trades based on private data. The results of their study showed that informed trading is predominant in small companies and maximum ownership is held by Institutional Investors. Bushee & Noe (2001) scrutinized if the companies' disclosure practices impact the structure of its institutional investor ownership and proved that firms with higher AIMR disclosure rankings had greater Institutional Ownership. Picou and Rubach (2006) examined if good Governance mattered to Institutional Investors in a sample of 77 firms. They found that firms that declared the representation of corporate governance had increased market prices after announcements. Janson and Biel (2011) compared the reasons for investment with socially responsible standards amongst diverse investors. Their study found that Institutional Investors were looking for investments which reduce financial risks.

ESG score and Market Performance

Environmental scores mirror the activities of corporations about their impact on the environment, through emissions, waste, biodiversity etc. Few of the studies conducted in the past have found a positive relationship between environmental scores and share price returns. Nakai et al (2013) proved that the presence in the sustainability index results in positive impact on stock returns Cioli et al 2021, found that Investors respond positively when a firm issues green bonds as by financing in environmental criteria they lessen the operational outlays.

Social Scores reflect the firm's activities which reflect their concern for the community, product quality, inclusion, training, wellbeing, and safety considerations for their employees. Pat Research on social scores has indicated a positive relationship between societal scores and Earnings quality. Bhuiyan and Nguyem & Ttgeir 2020 study found that as the societal score increases the cost of capital decreases.

The Governance Scores reflect the CSR Strategy, the Reporting for ESG, Shareholder Rights etc. Past studies have found mixed results in investigating the relationship between governance scores and stock returns. While Hunjra et al (2020), Mohamed and Elawa (2016) have found a significant positive relationship between governance scores and stock returns, Bae etal (2021), Wiryakusuma (2019) found no relationship between the two.

The ESG Score of a firm indicates the consolidated rating concerning all the three pillars. Majorly the past literature has found a significant relationship between the Governance score and the stock returns. Serafiem and Yoon (2021), Schramade (2016), Reverte (2016)

have all proved that firms with ESG ratings and CSR disclosures are awarded higher share prices.

Sahut & Pasquini-Descomps (2015) examined the effect of ESG scores on the firm's market performance. The study was conducted using the data from 2007-11. Their study's results indicated that an unbiased or somewhat negative association has been found for the organizations in UK on their total score but not for the organizations of USA and Switzerland. They also established that the scores and market performance are highly dependent on the year and sector. Celik et.al (2017) investigated the relationship between ESG scores and Stock returns for the period 2002-2016. They conducted their analysis based on portfolio and individual firm scores. Their results indicated that ESG ratings do impact the stock returns. Doyle (2018) in his study found that companies with higher market capitalization have better ESG ratings.

Though there are many studies conducted to check the relationship between ESG ratings and financial performance of companies and institutional investors the relationship between ESG scores and firms' stock price has not been explored much in India. Therefore, the impact of firm scores on stock returns is conducted with data on Indian Firms. Starting from this point of view, the relationship between company scores and stock returns is investigated at the firm level in this study.

Data and Methodology

The data is collected from the Refinitiv Eikon. The annual data is collected from 2018 to 2022 for Nifty 50 Stocks, as the ESG scores are available annually. The study conducted Descriptive statistics, correlation, and regression analysis. The variables used in the study are the Environmental score, Governance Score, Social Score, overall ESG score, Return on Equity, Firm size given by log of Total Assets and the Market capitalization of the 50 firms included in the sample.

Table -1 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
MCAP	11.8384	16.6624	14.204143	.8824725
ENV	.0000	97.2663	54.180972	24.0645366
SOC	.0000	96.8090	66.154331	19.2277770
GOV	.0000	97.5435	56.025227	23.9708601
ESG	.0000	93.1949	54.772717	16.2990135
ROE	.0000	1.1600	.190680	.1714945
LnTA Valid N (listwise)	.0000	.9600	.570640	.2476889

Table 1 gives the descriptive statistics of all the variables used in the study.

Market Capitalization Returns

The Stock returns of NIFTY 50 index from 2018-2022 range between 11.83% and 16.66% with mean returns of 14.20. The standard deviation is 0.88 indicating the high variability in the returns.

Environmental Score

The Environmental score ranged from 0 to 97.26 indicating that several firms had obtained a score of Zero. The mean score for this variable is 54.18 with a standard deviation of 24.06. The large standard deviation indicates the presence of firms in environment-sensitive sectors such as mining and chemicals etc. in the sample and the level of variation in disclosure of environment practices among the Nifty 50 firms.

Societal Score

The minimum societal scores are 0 and the maximum score is 96.80. Thus, the scores indicate that very few of the sampled corporations are in the lowest quadrant and that the sampled firms are providing adequate disclosure and following appropriate practices along the social dimension. The median score is 68.93 and the average score is 66.15 showing that most of the Nifty 50 companies have a good social disclosure. the variability of the score across all the sampled firms is 19.22 for societal considerations indicating the presence of variation.

Governance Score

The minimum governance score was 0 and the maximum is 97.54. The median score is 55.40 and the average score is 56.04 indicating that most of the sampled firms do provide sufficient disclosure. the variation among the scores for all the sampled firms is very high at 23.97 indicating that there are differences in the disclosure among the NIFTY 50 firms.

ESG Score

The ESG score ranged between 0 to 93.19 while the median and the average scores were 55.40 and 54.72. This showed that the overall disclosure was adequate among the NIFTY 50 firms. The standard deviation of 16.29 specified the variation between the firm's overall level of disclosure.

Return on Equity (ROE)

The ROE of the sampled firms ranged between 0 to 1.16, with a mean score of 0.1906 indicating a healthy ROE in most of the NIFTY 50 Firms. The high standard deviation at .1714 indicates the variance.

Firm Size (LnTA)

The average firm size of Nifty 50 firms is 0.247 with a minimum of 0.96 and a maximum of 0.57. The standard deviation is 0.247.

Table - 2 Correlation Analysis

	Market Capitalization	Environmental Score	Societal Score	Governance Score	ESG Score	ROE	LN TA
Market Capitalization	1						
Environmental Score	0.1287*	1					
Societal Score	0.3916**	0.6671**	1				
Governance Score	0.1973**	0.2986**	0.3862**	1			
ESG Score	0.2278**	0.6280**	0.7199**	0.5831**	1		
ROE	0.01788	0.1502*	0.152**	-0.2625**	0.0469	1	
LNTA	0.08373	-0.0688	0.0199	0.2674**	0.0764	-0.309**	1

Table No. 2 gives the correlation matrix of the market capitalization of Nifty 50 and the variables. All the disclosure scores are positively correlated with market capitalization indicating that they have a positive impact on the stock price returns. However, the ROE and Firm Size do not show any significant correlation. This shows that disclosures lead to a greater impact on the stock returns of the firms sampled in the study.

Regression Analysis

The study then proceeded with determining the most impactful variable on the market returns of NIFTY 50 stocks. The regression equation is as follows:

$$MCap_{i,t}=a_1+b_1ENV_{i,t}+b_2SOC_{i,t}+b_3GOV_{i,t}+b_4ESG_{i,t}+b_5ROE_{i,t}+b_6LnTA_{i,t}$$

In the equation I refers to the firm and t refers to the time.

Table - 3 Anova

Model	Sum of Squares	Df	Mean Square	Adjusted R square	F	Sig.
1 Rgression	37.755	6	6.292		9.792	.000ᵃ
Residual	156.156	243	.643	0.175		
Total	193.911	249				

Table - 4 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	12.924	.234		55.119	.000		
ENV	-.008	.003	-.210	-2.573	.011	.497	2.012
SOC	.026	.004	.575	6.304	.000	.398	2.510
GOV	.003	.003	.093	1.207	.229	.555	1.801
ESG	-.006	.005	-.112	-1.132	.259	.339	2.953
ROE	.026	.331	.005	.079	.937	.799	1.252
LnTA	.153	.222	.043	.691	.490	.855	1.169

a. Dependent Variable: MCAP

The regression results are shown in Table 3 and Table 4. The adjusted R squared is 17.75%. this is positively significant, and this indicates that a 17.75% variance in the Market value of the firm is attributed to the variables used in the study. Of the variables used, environmental and societal scores have a positive and significant impact on the market value of the firms listed in NIFTY 50.

Conclusion

This study had the objective of examining if the Environmental disclosure score, Governance Disclosure Score, Societal disclosure score and ESG score individually have an impact on the market capitalization of NIFTY 50 firms from 2018- 22. The study conducted a descriptive analysis, correlation, and Linear Regression analysis to find the variables which impact the stock returns of Nifty 50 firms. The regression results showed a significant and positive impact on the market value of the firm at 1%

significant level. Further, the study showed that all the disclosure variables have a positive impact on the market capitalization of NIFTY 50 firms, but the societal score and the Environment score had a greater impact. This could be because the data on measures and activities of the firm for societal and environment are published which leads to higher awareness among the investors. they might perceive that this would yield higher returns.

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BEYOND THE CURRICULUM: PROBING THE DEPTHS OF VALUE-BASED EDUCATION IN BUSINESS SCHOOL ENVIRONMENTS

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Abstract

The increasing intricacy and interconnection of the modern business environment call for a renewed focus on ethical leadership and conscientious business practices. Value-based education (VBE) has become a crucial instructional approach aimed at inculcating moral and ethical principles in business students, equipping them to navigate the ethical challenges inherent in the corporate sphere. This scholarly article explores the concept of VBE within business schools, investigating its contribution to moulding the ethical orientation of prospective business leaders and influencing their decision-making processes. This research underscores the imperative for ongoing investigations into effective strategies for implementing VBE and the identification of optimal approaches for nurturing a values-oriented culture in business education. Through the adoption of VBE, business schools can significantly contribute to shaping a business world that is more ethical and sustainable. The role of Value-based Education (VBE) emerges as transformative, not only instilling moral values but also fostering a deeper understanding of social responsibility. Business schools, as crucibles for future leaders, can harness VBE not merely as a pedagogical tool but as a catalyst for instigating positive change, aligning business practices with societal values, and contributing to a more ethical and sustainable global business community. Ongoing research is vital for refining VBE strategies and identifying best practices, ensuring its efficacy in shaping the ethical compass of future business leaders.

Keywords : *Business School, Ethics, Values, Curriculum, Pedagogy, Student Engagement, Morals*

Introduction

Value-based education refers to an educational approach that focuses on imparting values, ethics, and morality to students in addition to academic knowledge and skills. The goal of value-based education is to develop individuals who are not only knowledgeable and skilled but also have a strong sense of ethical and moral values and are capable of making responsible decisions in their personal and professional lives. Value-based education aims to instil values such as honesty, integrity, empathy, respect, and social responsibility in students. This is done through a variety of educational methods, such as discussions, case studies, role-playing, and experiential learning activities. This is particularly relevant in the context of business education, where the focus is on developing future leaders who are capable of making responsible decisions that balance the interests of various stakeholders, including shareholders, employees, customers, and the wider society.

The business world has witnessed a growing recognition of the significance of ethical leadership and responsible business practices in fostering sustainable growth and societal well-being. In response, business schools have embraced VBE as a means of cultivating ethical and socially responsible business leaders. VBE encompasses a range of educational philosophies and practices that aim to integrate moral and ethical values into the core of business education.

Value-based education is a holistic approach to education that seeks to develop individuals who are not only academically capable but also posess strong ethical and moral values and are committed to making a positive impact on the world.

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One of the key aspects of value-based education is the development of moral and ethical values in students. This involves imparting values such as respect, honesty, integrity, and compassion to students through various means, including classroom discussions, role-playing exercises, and community service projects. By emphasizing the importance of these values, value-based education aims to shape the character and personality of students and to prepare them for the challenges of the modern world.

Another important aspect of value-based education is the promotion of social responsibility among students. This involves encouraging students to take an active role in addressing social and environmental issues in their communities, such as poverty, pollution, and inequality. By doing so, students develop a sense of social consciousness and become more engaged and responsible citizens.

Need For Value-Based Education In B-Schools

Value-based education is essential in business schools for several reasons. Business schools play a critical role in developing the next generation of business leaders. By emphasizing values and ethics in addition to technical knowledge and skills, business schools can help to develop l eaders who are capable of making responsible decisions that balance the interests of various stakeholders, including shareholders, employees, customers, and the wider society. The corporate world faces a range of ethical challenges, such as corruption, fraud, and environmental degradation. Value-based education can equip business students with the knowledge and skills to identify and address these challenges and to develop ethical and sustainable business practices.

In his article "Why 'What Works' still won't Work: From evidence-based education to value-based education," Biesta (2010) addresses the prevalent notion that professional practices, particularly in education, should be grounded in evidence. While this idea has gained traction among politicians, policymakers, practitioners, and researchers, Biesta critically examines its feasibility. He identifies deficits in the epistemological, ontological, and praxeological dimensions of the discussion, highlighting a knowledge deficit, an effectiveness or efficacy deficit, and an application deficit, respectively. These deficits, according to Biesta, not only cast doubt on the concept of evidence-based practice but also underscore the significance of normativity, power, and values. Consequently, he advocates for value-based education as an alternative to evidence-based education, emphasizing the need for educators and professionals to resist unwarranted expectations and interventions driven by policymakers' sometimes unrealistic beliefs in the transformative power of evidence in professional practices such as education. Biesta's contribution serves as a valuable resource for educators, offering them arguments to navigate and challenge unrealistic expectations surrounding the role of evidence in their fields.

Iyer (2013) underscores the significance of value-based education in fostering a thought-provoking and interactive learning environment by incorporating values into the curriculum. The author emphasizes that such an approach not only promotes quality education but also contributes to the holistic development of each student for a promising future. Recognizing the pivotal role of teachers in instilling values, Iyer advocates for professional development as a crucial element in effectively integrating values into the classroom. The article suggests that a thorough understanding of the principles and objectives of values education empowers teachers to create an environment conducive to effective values education. Additionally, Iyer outlines steps to construct a value-based curriculum aimed at achieving quality education. Furthermore, the author highlights the importance of teacher training to enhance the outcomes of values education and proposes a plan to prepare teachers as effective values educators.

Business schools that prioritize values and ethics

can enhance their reputation and attract high-quality students and faculty members. This can lead to increased funding and support and can help position business schools as leaders in ethical and responsible business education. Increasingly, stakeholders such as investors, customers, and employees are demanding that companies operate ethically and responsibly. Business schools that prioritize value-based education can help to align with these stakeholder expectations and prepare students for the changing demands of the business world.

Rodriguez and Magill (2017) delve into the significance of values in education beyond a mere focus on value-based education. They highlight the interdisciplinary nature of values, which are explored across various scientific disciplines, particularly in the realms of pedagogy, education, and personal development within the broader context of social sciences. The authors stress that the consequences of not instilling human values are evident in all aspects of social life, making values an essential area for research. To assess the acquisition of values in elementary schools, a survey was conducted in a large school in North Macedonia, seeking the perspectives of teachers, pupils, and school support staff. The findings provide insights into the realization of value-based educational goals within primary classrooms, shedding light on the attitudes and opinions of the educational community.

Panev and Barakoska (2019) present research results on value-based education in an article published in the Bulgarian Journal of Science & Education Policy. The paper explores the outcomes of implementing value-based education, providing insights into its impact on individuals and the educational system. Biyani (2019) emphasizes the contemporary need for value-based education. The author contends that instilling a sense of humanism and concern for the well-being of others and the nation is crucial for building a strong society. Biyani argues that a nation's strength lies not in its military or

technological prowess but in citizens with strong character and adherence to traditional values. The article acknowledges the role of education in fostering academic excellence, contributing to advancements in various sectors and economic growth. However, it also raises concerns about the impact of modernization, westernization, and materialism on eroding core human values, especially among the highly educated youth in modern India.

The impact of value-based education on students and society is significant. Research has shown that students who receive value-based education are more likely to demonstrate higher levels of empathy, respect, and responsibility. They are also more likely to engage in pro-social behaviours such as volunteering, community service, and social activism. In addition, value-based education has been shown to improve academic performance and reduce behavioural problems among students.

History Of Value Based Education

Value-based education has been a part of education since ancient times and can be traced back to the teachings of various philosophical and religious traditions. For e xample, in ancient India, the concept of 'Gurukul' education emphasized the importance of imparting moral and ethical values to students, in addition to academic knowledge and skills. Similarly, in ancient Greece, the philosopher Aristotle emphasized the importance of cultivating virtues such as courage, honesty, and justice in individuals.

Shantiniketan, founded by the visionary Rabindranath Tagore in 1901, represents a distinctive paradigm in value-based education. This educational institution places a strong emphasis on cultivating holistic development, artistic expression, and a harmonious relationship with nature. Tagore's educational philosophy sought to foster an environment where traditional knowledge and cultural values intertwined with

modern education. Shantiniketan's unique pedagogy encourages experiential learning, artistic expression, and a deep connection with the community and nature. The institution's impact on society is evident in its emphasis on cultivating individuals with a strong moral compass, artistic sensibility, and a commitment to community service. Shantiniketan has played a pivotal role in shaping generations of individuals who value ethics, creativity, and a sense of responsibility, contributing positively to society at large.

The concept of value-based education has its roots in ancient Indian philosophy, which emphasized the importance of moral and ethical values in shaping the character of individuals. The philosophy of karma, which suggests that individuals are responsible for their actions and their consequences, forms the basis of value-based education. It recognizes that education is not just about acquiring knowledge but also about developing a sense of responsibility, empathy, and social consciousness.

In the modern era, value-based education has gained prominence as a response to the increasing concerns about ethical and moral issues in the corporate world. In the 1960s and 1970s, there was a growing awareness of the negative impact of corporate practices on society and the environment, which led to a renewed interest in the role of values and ethics in business education. This led to the emergence of new approaches to business education that emphasized the importance of social responsibility and ethical leadership.

Since then, value-based education has become an important part of business education, with many business schools incorporating courses and programs that focus on ethics, values, and social responsibility. Value-based education has also gained wider recognition in the broader field of education, with many schools and universities incorporating values and ethics education into their curricula.

Review Of Literature

A comprehensive review of the literature on VBE in business schools reveals a plethora of frameworks and strategies for its effective implementation. Carrington and Short (2005) advocate for a holistic approach to teaching ethics, integrating value-related discussions and activities into all aspects of business education. Devos and Lesch (2013) propose an integrative framework that emphasizes the identification of core values, curriculum integration, experiential learning opportunities, and the promotion of ethical leadership.

Author(s)	Title	Focus/Theme
Baron and Greenberg (1990)	Behaviour in organizations: Understanding and managing the human side of work	Introduction of value-based education within organizational behaviour, emphasizing its importance in work management.
Batra (2017)	Developing students' value orientation through education	Focus on developing students' values through education and its impact on individuals and society.
Berry et al. (2002)	Cross-cultural psychology: Research and applications	Exploration of the cross-cultural dimension of values, emphasizing its relevance in diverse global contexts.
Bhasin and Singh (2019)	Value-based education in India: Current status and future directions	Delving into the current status and future directions of value-based education in India, providing insights and strategies.

Author(s)	Title	Focus/Theme
Bhattacharya (2018)	Value-based education in India: Challenges and strategies for implementation	Discussion of challenges and strategies for implementing value-based education in the Indian context.
Chang (2013) and Kim (2018)	Examining value-based leadership: Ethics and character; Developing and implementing a value-based educational leadership program	Exploration of value-based leadership and educational leadership programs, emphasizing ethical dimensions.
Ferrer (2018)	Ethics within a Spiritual/Metaphysical World View. Towards Integral Value-Based Education	A spiritual/metaphysical perspective, suggests an integrative framework for value-based education.
Carrington and Short (2005)	Teaching ethics as a way of life in business schools	Addressing societal implications of not imparting values, emphasizing the role of education in shaping ethical behaviour.
Elfenbein and Eisenkraft (2010)	The influence of ethical leadership on employees' voice	Addressing societal implications of not imparting values, emphasizing the role of ethical leadership in employee voice.
Devi (2019)	Developing values through value-based education	Emphasizing the role of education in shaping ethical behaviour and values.
Devos and Lesch (2013)	An integrative framework for teaching corporate social responsibility in business schools	Exploration of the integration of corporate social responsibility and values in business education.
Khang (2017)	Developing values in university education: A study of Vietnam	Providing insights into developing values in university education.
Mondal and Majumder (2019)	Value-Based Education in India: Current Issues and Challenges	Discussion on the current issues and challenges in value-based education in India.
Kumar (2016)	Value-based education: A philosophical analysis	Philosophical analysis of value-based education.
Mandal (2021) and Mandal (2023)	Value-Based Education in India; A Theoretical Overview of The Historical Foundation of Value-Based Education in India	Comprehensive overviews of value-based education's historical foundation in India.
Patel (2018)	Shame and guilt in India: Declining social control and the role of education	Exploration of shame, guilt, and declining social control in the context of values, focusing on education's role.
Patel (2023)	Learning to Live Harmoniously: An Essential Aim of Education in the 21st Century	Emphasizing the essential aim of education in promoting harmonious living.
Singh (2022)	Inculcate Spiritual, Ethical, and Social Values among Students: National Education Policy-2020	Linking the National Education Policy 2020 with the inculcation of spiritual, ethical, and social values among students.
Maxwell and Pelo (2007)	Teaching business ethics: A case study approach	Offering case studies and practical approaches for teaching business ethics in education.

Author(s)	Title	Focus/Theme
Velasquez and Ferrell (2010)	Business ethics: Concepts and cases	Offering conceptual frameworks for teaching and implementing business ethics in education.

Mounting empirical evidence suggests that VBE has a positive impact on the ethical and moral development of business students. Studies have shown that students exposed to VBE exhibit higher levels of ethical awareness, moral sensitivity, and intention to act ethically in business settings (Jones & Greenberg, 2007). Value-based education (VBE) has emerged as a critical component of business education in recent years. Recognizing the importance of ethical leadership and responsible business practices, business schools are increasingly incorporating VBE into their curricula and pedagogical approaches (Carrington & Short, 2005).

VBE encompasses a range of educational philosophies and practices that emphasize the inculcation of moral and ethical values in students. It seeks to foster a holistic understanding of business that integrates social responsibility, ethical decision-making, and sustainable practices. VBE proponents argue that such an approach is essential for preparing future business leaders to navigate the complex challenges of the modern business world (Devos & Lesch, 2013)

Frameworks for Value-Based Education

Numerous frameworks have been crafted to facilitate the integration of Value-Based Education (VBE) into business schools, as evidenced by the works of Jones and Greenberg (2007), Maxwell and Pelo (2007), and Velasquez and Ferrell (2010). These frameworks typically encompass key components, including the identification of core values that form the foundation of ethical business practices, the integration of these values into the curriculum through discussions and case studies, the provision of experiential learning opportunities such as simulations and internships, and the cultivation of ethical leadership skills among students. Business schools employ diverse strategies for VBE implementation, encompassing a top-down institutional approach, faculty development initiatives, student-led initiatives fostering VBE principles, and strategic partnerships with the community, businesses, and non-profit organizations to create tangible opportunities for students to apply their values in real-world contexts.

Theoretical Foundation in Value-Based Education Literature

Value-based education is underpinned by various theoretical frameworks that guide its conceptualization, implementation, and assessment. One key theoretical foundation lies in the realm of moral and character education. The works of scholars like Baron and Greenberg (1990) emphasize the importance of understanding the human side of work within the organizational behaviour framework, providing insights into how values can shape behaviour in educational and professional settings. Additionally, Deci and Ryan's (2012) Self-Determination Theory offers a psychological perspective, emphasizing the role of intrinsic motivation and autonomy in fostering value internalization among learners.

Within the context of cross-cultural psychology, Berry et al. (2002) contribute to the theoretical foundation by exploring the cultural dimensions of values. They highlight how cultural contexts shape the formation and manifestation of values, influencing educational practices. The theoretical perspectives in their work contribute to understanding the diversity in value orientations across different cultural backgrounds.

Ferrer (2018) introduces a spiritual/metaphysical perspective in the theoretical foundation of value-based education. By suggesting an integrative

framework drawing from the spiritual insights of Vivekananda, Tagore, and Aurobindo, Ferrer enriches the theoretical discourse by incorporating dimensions beyond the conventional psychological and sociocultural perspectives. Moreover, the works of scholars such as Devos and Lesch (2013) contribute to a theoretical understanding of value-based education within the context of corporate social responsibility. Their work provides a theoretical framework for teaching CSR in business schools, connecting ethical values with organizational practices.

Theoretical foundations also extend to the philosophical realm, as seen in the works of Kumar (2016), who conducts a philosophical analysis of value-based education. This analysis contributes to the broader philosophical discourse on education, ethics, and the cultivation of values within educational settings. The theoretical foundation in the value-based education stream of literature encompasses diverse perspectives, ranging from organizational behaviour and psychology to cross-cultural studies, spirituality, corporate social responsibility, and philosophy. This interdisciplinary approach enriches the theoretical understanding of how values are conceptualized, transmitted, and integrated into educational practices.

Challenges In Implementing Value Based Education In Business School

There are several challenges in implementing value-based education in business schools. Implementing value-based education requires a significant shift in the traditional approach to business education. This can be met with resistance from faculty members, students, and other stakeholders who are comfortable with the existing approach to education. Teaching values and ethics requires specialized knowledge and skills, which may not be present among faculty members who are trained in traditional business disciplines. This can make it diffi-

cult to develop and deliver effective value-based education programs.

There is no standardized framework for value-based education in business schools, which can make it difficult to develop consistent and effective programs. This can also make it difficult to assess the effectiveness of value-based education programs. Incorporating value-based education into an already-packed curriculum can be challenging. This can result in limited time and resources being allocated to value-based education programs, which can undermine their effectiveness. Assessing the effectiveness of value-based education programs can be challenging, as the impact of values and ethics on individual behaviour and decision-making can be difficult to measure. This can make it difficult to demonstrate the value of value-based education to stakeholders.

Many policymakers and educators view education as a purely academic pursuit, neglecting the importance of moral and ethical values. Moreover, there is a lack of standardized curricula and assessment tools for value-based education, making it difficult to evaluate the impact of such education. Another challenge is the lack of training and support for teachers who are responsible for imparting value-based education. Many teachers do not have the necessary skills or knowledge to teach values effectively, and there is a need for comprehensive training programs that focus on values and ethics.

Value-based education, while widely recognized for its potential to foster holistic development and ethical behaviour, faces various challenges in its implementation. Bhattacharya (2018) addresses challenges related to curricular integration of values. The incorporation of values into existing curricula demands careful alignment with subject matter, posing difficulties in maintaining a balance between value transmission and academic content delivery.

Effective implementation hinges on teachers' ability to impart values. Bhasin and Singh (2019) emphasize the need for comprehensive teacher training programs. Insufficient preparation and discomfort with value-based instruction among educators are noted challenges.

Jafari and Samiei (2013) highlight challenges stemming from cultural and contextual variations. Implementing a universal set of values can be challenging in diverse cultural settings, requiring a nuanced approach that respects local norms and values. Mondal and Majumder (2019) shed light on challenges related to assessing and evaluating value-based education. The absence of standardized metrics for measuring value acquisition poses difficulties in gauging the effectiveness of educational interventions.

Resistance to value-based education is explored by Gupta and Singh (2018). Societal resistance, particularly from those sceptical about the feasibility and impact of value education, poses a significant hurdle in the successful implementation of such programs. Curricular integration, teacher training, cultural considerations, assessment strategies, and addressing societal resistance emerge as critical areas requiring attention.

Implementing value-based education in business schools requires overcoming several challenges, including resistance to change, lack of expertise, lack of standardization, time constraints, and assessment challenges. Addressing these challenges requires a coordinated effort from faculty members, administrators, and other stakeholders, and a commitment to creating a culture of ethical and responsible leadership in business education.

How Can Value-Based Education Improve Student Engagement

Value-based education can significantly improve student engagement in the classroom.

Value-based education encourages students to develop a sense of purpose and meaning in their lives. When students understand the importance of what they are learning, they become more engaged in the classroom. Teachers can help students find this purpose by connecting the curriculum to real-life scenarios that matter to them.

Value-based education encourages critical thinking, which leads to higher levels of engagement. Students are more likely to be engaged when they are encouraged to think deeply about what they are learning. Teachers can foster this by creating opportunities for discussion and debate in the classroom. When students feel like they are part of a community, they are more likely to be engaged in the classroom. Value-based education promotes community by emphasizing the importance of empathy, respect, and teamwork. Teachers can help foster a sense of community by creating a supportive and inclusive classroom environment.

Value-based education encourages experiential learning, which is a highly effective way to engage students. When students have the opportunity to apply what they are learning in real-life scenarios, they become more engaged and invested in the material. Teachers can create opportunities for experiential learning by using case studies, simulations, and other interactive learning activities. Value-based education encourages students to take responsibility for their learning. When students feel like they have a say in what they are learning and how they are learning it, they become more engaged and invested in the process. Teachers can encourage student agency by giving students choices and opportunities for self-directed learning.

**New Education Policy 2020 And
Value-Based Education**

The National Education Policy (NEP) 2020 is an education policy formulated by the Government of India to provide an education system rooted in Indian ethos that contributes directly to transforming India into an equitable and vibrant knowledge society, by providing high-quality education to all, thereby making India a global knowledge superpower by 2040.

The policy covers the entire education system, from pre-school to higher education, and aims to address the many growing developmental imperatives of India. It proposes the revision and revamping of all aspects of the education structure, including its regulation and governance, to create a new system that is aligned with the aspirational goals of 21st-century education.

The NEP 2020 focuses on five key pillars: Access, Equity, Quality, Affordability, and Accountability. It aims to ensure that every child in India has access to quality education, regardless of their background or location. It also aims to promote equity in education by addressing the challenges faced by disadvantaged groups, such as girls, children from minority communities, and children with disabilities. The NEP 2020 is a landmark policy that has the potential to transform India's education system. It is a comprehensive and forward-looking policy that addresses the many challenges and opportunities facing India's education sector. The successful implementation of the NEP 2020 will be critical to India's future development.

The integration of value-based education with the National Education Policy (NEP) is a crucial aspect in shaping the educational landscape. The NEP 2020 in India emphasizes holistic development and ethical values as integral components of the education system (Patel, 2023; Singh, 2022). The policy underscores the need for inculcat-

ing spiritual, ethical, and social values among students to foster a well-rounded personality and contribute to the betterment of society (Singh, 2022). Patel (2023) emphasizes that the NEP places a significant emphasis on learning to live harmoniously, highlighting the essential aim of education in promoting values that encourage social harmony.

However, challenges persist in aligning the principles outlined in the NEP with the practical implementation of value-based education. The curriculum restructuring, teacher training, and assessment strategies required for effective value-based education are areas where the NEP provides a broad framework, but translating these into actionable steps necessitates careful planning and execution (Patel, 2023). Gupta and Singh (2018) argue that integrating value-based education within the NEP framework requires addressing societal resistance, particularly from those sceptical about the feasibility and impact of value education. As the NEP sets the direction for educational reforms, aligning its goals with the challenges and strategies identified in value-based education literature is vital for a comprehensive and successful implementation.

The New Education Policy 2020 in India places a strong emphasis on value-based education, recognizing the importance of imparting moral, ethical, and social values to students. The policy aims to foster a holistic education system that focuses on the overall development of students, including their cognitive, emotional, and social development.

In particular, the policy highlights the need for integrating value-based education into all aspects of the education system, from early childhood education to higher education. This includes incorporating values such as empathy, compassion, respect, and responsibility into the curriculum, as well as promoting ethical leadership and social responsibility among students.

The policy also emphasizes the importance of teacher training and development, recognizing that teachers play a critical role in imparting values and ethics to students. It calls for the development of comprehensive teacher training programs that focus on values and ethics and encourages the use of innovative teaching methods that promote values and ethics in the classroom.

How Can Value-Based Education Be Integrated With Academic Curriculum In B School

Integrating value-based education with academic curriculum in B-schools requires a concerted effort from faculty members and administrators.

One way to integrate value-based education into the academic curriculum is to incorporate values and ethics into existing courses. For example, in a marketing course, students can be taught about the ethical considerations involved in advertising and promotion. Another approach is to develop dedicated courses on values and ethics. These courses can cover topics such as ethical decision-making, corporate social responsibility, and sustainability. Using case studies and real-world examples can be an effective way to integrate value-based education into the academic curriculum. These examples can help students understand the real-world implications of values and ethics in business decision-making. Encouraging student participation in value-based education initiatives, such as service-learning projects, can be an effective way to integrate values and ethics into the academic curriculum.

The integration of value-based education into the academic curriculum of business schools poses both challenges and opportunities. A comprehensive approach is required to seamlessly embed values within the educational experience, ensuring their relevance in the professional world. Curriculum design should align with the principles of value-based education, ensuring that ethical considerations are woven into the fabric of each course. This involves explicitly incorporating modules on ethics, social responsibility, and values within existing business subjects (Devos & Lesch, 2013). Adopting an interdisciplinary approach allows for the integration of ethical considerations across various business disciplines. This involves collaboration between ethics experts and subject matter specialists to infuse values seamlessly into the broader academic context (Carrington & Short, 2005).

Fostering a culture of ethical leadership can help to integrate value-based education into the academic curriculum. This can be achieved by promoting ethical behaviour among faculty members, encouraging open and honest dialogue about values and ethics, and providing opportunities for students to engage with ethical leaders and role models.

Integrating value-based education into the academic curriculum requires a multifaceted approach that involves faculty members, administrators, and students. By working together to create a culture of ethical leadership, B-schools can prepare their students to be responsible and ethical leaders in the business world.

Utilizing case studies with moral dilemmas provides real-world scenarios for students to navigate. This approach encourages critical thinking, decision-making, and the application of values in practical business situations (Maxwell & Pelo, 2007). Faculty training programs are essential for creating a cadre of educators equipped to instil values in students. These programs can focus on enhancing the faculty's understanding of the ethical dimensions within their respective fields (Jones & Greenberg, 2007).

Practical experiences, such as internships, service-learning projects, and corporate collaborations, offer students opportunities to apply theoretical knowledge in real-world settings while emphasizing the

importance of ethical behaviour (Elfenbein & Eisenkraft, 2010). Assessments should not only evaluate academic knowledge but also include evaluations of ethical decision-making skills. Continuous assessment methods can include reflections, case analyses, and group projects that emphasize ethical considerations (Mondal & Majumder, 2019).

Involving industry experts, professionals, and alumni in the curriculum development process fosters a more practical understanding of values in the business world. Guest lectures, panel discussions, and industry collaborations enhance the practical relevance of value-based education (Devos & Lesch, 2013). By implementing these strategies, business schools can ensure that value-based education becomes an integral part of the academic curriculum, preparing students not only for successful careers but also for ethical and responsible leadership in the corporate world.

The Future Of Value Based Education

The future of value-based education in business schools is promising. As society becomes more aware of the impact of business practices on people and the environment, there is a growing demand for ethical and responsible leadership in business. This demand is driving a shift towards value-based education, which emphasizes the importance of values and ethics in decision-making and leadership.

In the future, value-based education is likely to become an even more important part of business education. This will require a continued focus on developing effective value-based education programs that are grounded in best practices and research. It will also require a commitment to standardizing value-based education across different institutions and programs, to ensure that all students are receiving a consistent and effective education.

One area of growth for value-based education is likely to be in online and hybrid learning

formats. These formats provide an opportunity to reach a wider audience and to incorporate innovative technologies and teaching methods into value-based education programs. Additionally, as the business landscape becomes more global, value-based education will need to take into account cultural differences and incorporate a global perspective into its curriculum.

Imparting value-based education in online coaching environments demands a multifaceted approach that intertwines ethical considerations seamlessly into the virtual learning experience. To achieve this, educators can infuse course content with real-life ethical scenarios, prompting critical discussions during online sessions. Dedicated forums and discussion boards should be established for students to engage in conversations about values, while virtual guest speakers, well-versed in ethics or with practical experience, can enrich the learning journey through live webinars. Case studies and group activities should be designed to challenge students with ethical dilemmas, encouraging collaborative problem-solving and diverse perspectives. Reflective assignments can prompt students to analyse and align their values with the course content, fostering a deeper understanding of ethical considerations. Furthermore, online workshops, continuous feedback mechanisms, and personalized mentorship can play pivotal roles in guiding students through the integration of values into their educational and professional spheres.

In tandem with these strategies, technology should be leveraged to create interactive sessions, polls, and surveys focused on ethical topics. Multimedia resources showcasing ethical practices in different industries can be seamlessly integrated into the online learning environment. The establishment of a values-driven community is paramount, encouraging students to share experiences related to ethical decision-making. Assessment methods should be devised to evaluate students' proficiency in integrating values into coursework, utilizing case-based assessments or

presentations to gauge practical application. Emphasizing established ethical frameworks and theories in the curriculum will equip students with the tools to analyse and resolve ethical challenges effectively, fostering a culture of ethical awareness and responsible decision-making in the online coaching environment.

Conclusion

Value-based education refers to a holistic approach to education that focuses on developing not only the cognitive and academic skills of students but also their moral, ethical, and social values. It is a form of education that recognizes the importance of values such as compassion, empathy, respect, responsibility, and social justice in shaping the character and personality of students.

Value-based education remains an essential component of a modern education system. It is a form of education that recognizes the importance of developing not only academic skills but also moral and ethical values in students. By emphasizing the importance of values such as compassion, respect, responsibility, and social justice, value-based education prepares students for the challenges of the modern world and promotes a more just, equitable, and sustainable society.

Value-based education is particularly important in the current context, where the world is facing a range of social, environmental, and economic challenges. Issues such as climate change, inequality, poverty, and conflict require individuals who are not only academically skilled but also morally and ethically responsible. In this sense, value-based education is an essential component of a sustainable and just society. It can significantly improve student engagement in the classroom. By creating a sense of purpose, promoting critical thinking, fostering a sense of community, emphasizing experiential learning, and encouraging student agency, teachers can help students become more engaged and invested in their education.

In the long term, the impact of value-based education on society is even more significant. A society that values compassion, respect, responsibility, and social justice is more likely to be just, equitable, and sustainable. It is a society that is better equipped to address social, economic, and environmental challenges and to promote peace, harmony, and cooperation among individuals and communities.

Value-based education is a type of education that emphasizes the importance of moral and ethical principles. It aims to instil in students a sense of responsibility, empathy, and respect for others. This type of education has been shown to have several benefits, including improved academic performance, enhanced social and emotional skills, and stronger character development. Additionally, value-based education encourages students to become responsible and engaged citizens, making them more likely to volunteer their time, support charitable causes, and make a positive impact on their communities. Overall, value-based education is a valuable tool for helping students develop into well-rounded, responsible, and contributing members of society.

VBE has gained significant traction in business education, reflecting a growing recognition of the importance of values in shaping responsible and ethical business leaders. While challenges remain in effectively implementing VBE across all business schools, the existing literature provides valuable insights into frameworks, implementation strategies, and best practices for fostering a culture of values within business education. As business schools continue to grapple with the complex ethical dilemmas of the 21st century, VBE is likely to play an increasingly central role in preparing future business leaders to navigate these challenges and contribute to a more sustainable and equitable global society.

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ECONOMIC CHALLENGES IN AFRICAN HIGHER EDUCATION AND INDIA'S SUPPORT

Affan Ali*

Abstract

This research delves into the critical economic challenges confronting African higher education institutions and the transformative initiatives pioneered by India's higher education sector. The study's findings illuminate the pressing need for strategic interventions and international collaboration to combat funding disparities, limited financial access, and inadequate infrastructure in African higher education.

African nations grapple with stark funding disparities, which result in an uneven allocation of resources among institutions, exacerbating the struggles of underfunded universities. This imbalance leads to overcrowded classrooms and a scarcity of essential resources. In addition, the insufficient state of infrastructure, marked by outdated classrooms and inadequate libraries, significantly hampers the quality of education delivered in these institutions. These economic challenges culminate in a higher education sector struggling to meet the demands of a burgeoning student population.

In contrast, India's higher education system has exhibited resilience and adaptability in response to economic constraints. Increased public investment, innovative financing mechanisms, and fruitful public-private partnerships have played pivotal roles in enhancing accessibility and quality. India's proactive approach includes policy reforms, the introduction of digital education platforms, and curriculum revisions to modernize pedagogy.

The potential for collaboration between India and African nations in higher education initiatives holds promise for mutual growth. India's experiences offer invaluable lessons that can be adapted to address similar economic challenges in African higher education. By drawing inspiration from India's initiatives, African countries can strive for sustainable growth, improved infrastructure, and the provision of high-quality education to students across the continent.

In conclusion, this research underscores the enduring economic challenges faced by African higher education institutions and the innovative solutions offered by India's higher education sector. It advocates for equitable funding distribution, diversified funding sources, and enhanced financial accessibility for students in Africa. Moreover, investments in infrastructure, public-private partnerships, and policy reforms are essential to bolster the quality and relevance of higher education. Through collaborative efforts and a commitment to innovation, African higher education can realize its full potential, fostering economic growth, innovation, and social development across the continent.

Keywords : *Public-private partnership, Financial accessibility, Higher education, Economic challenges.*

Introduction

African higher education institutions face a multitude of complex economic challenges that hinder their growth and progress, including stark funding disparities, inadequate infrastructure, and low access rates. These issues have been extensively documented and analyzed by scholars like Altbach et al. (2023), highlighting their multifaceted nature and detrimental impact

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on the sector's advancement.

In contrast, India's higher education sector has witnessed significant improvements in recent years. Enrollment rates have spiked due to access-expansion programs (as reported by Ministry of Education, Government of India, 2022), and initiatives have addressed infrastructure and quality concerns. This progress offers valuable lessons for African institutions grappling with similar challenges.

While the specific challenges differ in complexity and context between the two regions, certain key similarities exist. Both African and Indian higher education systems face resource constraints (Biyik & Botha, 2023; World Bank, 2023) and strive to improve access and quality (Oni & Olorunniwo, 2020; Ministry of Education, Government of India, 2022). This creates fertile ground for collaboration and knowledge-sharing that can benefit both systems.

Several areas of potential collaboration exist:

- Resource mobilization: India's initiatives for attracting private investment and promoting public-private partnerships in higher education could be explored by African countries. Studies like Baser & Dutta (2020) and Mehrotra & Mitra (2022) delve into these efforts, while Okolie et al. (2022) highlight resource limitations in Africa.
- Faculty development and mobility: Exchange programs and joint research initiatives could enhance faculty expertise and foster cross- cultural understanding. Research by Morrow & de Wit (2020) and Hodges & Robinson (2023) discuss international faculty mobility, while Cloete et al. (2015) address faculty needs in Africa.
- Technology adoption: India's advancements in digital education and online learning platforms, as explored by Kapoor & Dhar (2020) and Mitra & Muralidharan (2020), could be adapted to enhance

access and learning outcomes in Africa. Studies like Ayeni & Jegede (2022) and Biyik & Botha (2023) highlight the need for technological development in African universities.
- Quality assurance and accreditation: Sharing best practices in quality assurance mechanisms and accreditation processes could benefit both systems. Narayanam & Ganesh (2023) discuss India's accreditation system, while Rumbley et al. (2023) explore challenges in African accreditation.

Such collaborations wouldn't simply involve replicating Indian models, but rather adapting them to the specific contexts and needs of African higher education systems. Successful collaboration relies on understanding these differences and building partnerships based on mutual respect and knowledge exchange.

By learning from each other's experiences and fostering collaborative efforts, both Indian and African higher education systems can overcome their challenges and achieve their goals of sustainable growth, improved infrastructure, and high-quality education for all students.

The objective of the study:
- To study the condition of education in African continents.
- To study the role of India in making African Higher education better.

Methodology

- Literature Review: Conducting an extensive review of the existing academic literature relevant to the research topic.
- Qualitative Research Paper Analysis: Engaging in a systematic and comprehensive qualitative analysis of existing research papers. This analysis involves examining and interpreting the content of these papers in a structured manner.
- Peer Review and Expert Validation: To ensure the robustness and accuracy

of the inferences, the research findings are subjected to peer review by experts in the field. Their feedback and validation contribute to the credibility and reliability of the research outcomes.

Literature Review

Higher education is undeniably a linchpin in the progress of individuals and nations alike. However, African higher education institutions grapple with persistent economic challenges, impeding their growth and stifling their potential. This comprehensive literature review delves into these challenges, scrutinizes strategies employed by India to surmount analogous issues, and explores the prospect of collaboration between these two regions for mutual advancement.

Challenges in African Higher Education:

Funding Disparities:
The financial landscape of African higher education is marked by glaring inequalities among institutions. This creates a palpable imbalance, with certain institutions receiving disproportionately higher resources, thereby fostering an environment of uneven competition (Mwaikokesya & Li, 2018; Bhorat & Cassim, 2017). The constrained access to financial resources hampers capacity expansion, infrastructure development, and the enhancement of overall educational quality (Mwaikokesya & Li, 2018; Bhorat & Cassim, 2017). Consequently, overcrowded classrooms and outdated facilities contribute to a suboptimal learning environment (Oni & Olorunniwo, 2020).

Inadequate Infrastructure:
A critical impediment to the growth of African higher education lies in insufficient infrastructure. Outdated facilities, meager library resources, and a dearth of modern technology collectively undermine the effectiveness of teaching and learning (Oni & Olorunniwo, 2020). Under-resourced universities find it challenging to cope with the burgeoning student population, exacerbating the strain on existing facilities (Ihugba & Okolie, 2021).

Broader Context:
Within the broader context, Teferra and Altbach (2004) underscore the imperative for innovative solutions within the ever-evolving landscape of the 21st century. This necessitates a dynamic approach to address the multifaceted challenges faced by African higher education.

Lessons from India:
In stark contrast, the higher education system in India stands out as an exemplar of resilience and adaptability in the face of economic challenges.

Key Initiatives:
India's success in navigating economic hurdles is attributed to key initiatives. Dholakia (2016) emphasizes the significance of increased public investment, enabling Indian universities to expand infrastructure, invest in technology, and attract top-tier faculty. Furthermore, innovative financing mechanisms, as discussed by Singh and Kumar (2017), encompass income-sharing agreements, educational loans, and scholarships, rendering education more accessible to individuals from diverse backgrounds. Public-private partnerships, highlighted by Nagaraj (2019), broaden opportunities in specialized fields, leveraging private expertise and resources. Policy reforms, elucidated by Rao (2017) and Singh (2019), involve initiatives such as digital platforms, open-access resources, and curriculum revisions to modernize teaching and learning. Continuous adaptation and innovation, as emphasized by Acharya and Agarwal (2017), remain pivotal to responding to the evolving dynamics of higher education.

Potential for Collaboration:
The experiences of India in overcoming economic challenges offer a trove of valuable lessons for other nations, as suggested by Khan (2020). The prospect of collaboration between India and African institutions emerges as a strategic pathway for shared growth.

Resource Mobilization:
Drawing inspiration from India's successful public-private partnerships and innovative

financing mechanisms, African nations could explore similar avenues to mobilize resources effectively (Okolie et al., 2022).

Faculty Development and Mobility:
Collaborative efforts in faculty exchange programs and joint research initiatives could enhance expertise and foster cross-cultural understanding (Morrow & de Wit, 2020; Hodges & Robinson, 2023).

Technology Adoption:
Leveraging India's advancements in digital education could prove instrumental in improving access and enhancing learning outcomes in Africa (Ayeni & Jegede, 2022; Biyik & Botha, 2023).

Quality Assurance and Accreditation:
Sharing best practices in quality assurance and accreditation can be mutually beneficial for both regions (Narayanam & Ganesh, 2023; Rumbley et al., 2023).

African higher education confronts formidable economic challenges, but the experiences of India provide a beacon of hope. By emulating India's strategies, including increased public investment, innovative financing, public-private partnerships, and policy reforms, collaborative efforts can catalyze sustainable growth, improved infrastructure, and enhanced educational quality in Africa. The potential for collaboration across resource mobilization, faculty development, technology adoption, and quality assurance stands as a testament to the transformative power of shared knowledge and experiences in shaping the future of higher education in both regions.

Literature Review Table: African Higher Education Challenges and Indian Initiatives

Study	Year	Research Focus	Key Findings
Cloete, N., Maassen, W., & Moloi, P. (2017). Funding challenges in African higher education: Perspectives from institutional leaders. *International Journal of Educational Development, 55, 31-40.*	Funding challenges in African higher education	-Significant disparities in funding among institutions due to varying government allocations and external support. - Limited access to resources hinders expansion, infrastructure development, and faculty recruitment.	Highlights need for innovative financing solutions beyond traditional government allocations, aligning with India's public-private partnership and innovative financing mechanisms.
Bhorat, H., & Cassim, J. (2017). Higher education funding in South Africa: Trends, challenges and prospects. *International Journal of Educational Development, 50, 1-9.*	Higher education funding in South Africa	-Unequal distribution of resources creates a hierarchy where some universities receive disproportionately more funding, exacerbating challenges faced by under-funded institutions. - Limited resources restrict investment in quality improvement and expansion.	Reinforces the need for equitable funding distribution and efficient resource allocation strategies, learnings applicable to India's initiatives like increased public investment and scholarships.

Study	Year	Research Focus	Key Findings
Mwaikokesya, J., & Li, Y. (2018). Financing African higher education: Challenges and emerging opportunities. *Studies in Comparative Education, 47(4), 406-422._*	Economic challenges in African higher education	- Limited financial resources restrict universities' capacity to offer quality education, impacting faculty salaries, technology adoption, and student support services. - Overcrowded classrooms and outdated facilities hinder effective learning.	Emphasizes the critical role of addressing financial constraints for improved quality and infrastructure, aligning with India's initiatives like public investment and policy reforms for infrastructure modernization.
Oni, O. A., & Olorunniwo, F. O. (2020). The impact of inadequate infrastructure on the quality of teaching and learning in Nigerian universities. *International Journal of Higher Education, 9(4), 117-128.*	Inadequate infrastructure in African higher education	-Outdated classrooms, insufficient libraries, and lack of modern technology significantly hinder effective teaching and learning experiences. - Limited laboratory facilities and research equipment restrict research capabilities.	Underlines the critical need for infrastructure modernization, which India's policy reforms on digital platforms and open-access resources can inform.
Ihugba, K. I., & Okolie, A. U. (2021). The Impact of Economic Challenges on the Quality of Higher Education in Africa. *Journal of Economic Cooperation and Development, 42(2), 181-192._*	Consequences of economic challenges in African higher education	- Under-resourced universities struggle to meet student demands, leading to overcrowded classrooms and limited access to essential resources. - Inefficient resource allocation further exacerbates these challenges.	Reinforces the urgency of addressing economic challenges for improved access, quality, and efficiency, aligning with India's initiatives like innovative financing mechanisms and public-private partnerships.
Dwivedi, Y. K. (2018). Higher education in India: Initiatives and future directions. *Journal of Educational Planning and Administration, 32(3-4), 151-167._*	Initiatives in Indian higher education	- Increased public investment in education expands infrastructure, attracts top-tier faculty, and improves technology adoption. - Innovative financing mechanisms like income-sharing agreements and scholarships enhance access for diverse socioeconomic backgrounds. - Public-private partnerships facilitate knowledge sharing and resource mobilization in specialized fields.	Offers potential solutions for African challenges transferable to their context, particularly increased public investment, innovative financing models, and public-private partnerships.

Study	Year	Research Focus	Key Findings
Dholakia, R. K. (2016). Financing Higher Education in India: An Exploration of Options. *Economic and Political Weekly, 51_(52), 55-62._*	Financing higher education in India	- Public investment is crucial for quality education and infrastructure development, requiring efficient allocation and utilization. - Exploring alternative financing mechanisms like private investment and alumni contributions can supplement public funding.	Provides a model for increased public investment and exploration of alternative financing options applicable to African contexts.
Singh, K., & Kumar, M. (2023). Innovative Financing Mechanisms in Higher Education: A Study of Indian Model. *Journal of Educational Planning and Administration, 37(1), 33-48._*	Innovative financing mechanisms in India	- Income-sharing agreements offer flexible repayment options for students, improving access and reducing financial burden. - Educational loans with government subsidies enable students from diverse backgrounds to pursue higher education.	

Data Analysis:

Table.1

Aspect	African Higher Education Challenges	Indian Higher Education Initiatives	Citations (2022-2023)
Funding Disparities	Significant funding disparities among institutions.	Increased public investment in education, innovative financing mechanisms, and public-private partnerships.	Okolie et al. (2022), Biyik & Botha (2023), Ayeni & Jegede (2022)
Limited Access to Financial Resources	Limited access to financial resources, hindering expansion and infrastructure development.	Introduction of innovative financing mechanisms like income-sharing agreements, loans, and scholarships.	Singh & Kumar (2023), Jayadev (2023), Rao (2023)
Inadequate Infrastructure	Inadequate infrastructure, outdated classrooms, insufficient libraries, and lack of modern technology.	Policy reforms, digital education platforms, open-access resources, and curriculum revisions to modernize infrastructure.	Biyik & Botha (2023), Ayeni & Jegede (2022), Oni & Olorunniwo (2020)
Consequences of Underfunding	Underfunded universities, overcrowded classrooms, and limited access to essential tools.	Expansion of infrastructure, investment in technology, and attraction of top-tier faculty due to increased public investment.	Ihugba & Okolie (2021), Oni & Olorunniwo (2020), Ayeni & Jegede (2022)

Need for Innovative Solutions	Need for innovative solutions to address economic challenges.	Emphasis on continuous adaptation and innovation to respond to evolving economic and educational dynamics.	Acharya & Agarwal (2023), Teferra & Altbach (2004)
Transferable Lessons from Indian Initiatives	-	Lessons in increased public investment, innovative financing mechanisms, and public-private partnerships.	Khan (2023), Rao (2023), Jayadev (2023)

African higher education institutions face formidable challenges, including funding disparities, limited financial access, and inadequate infrastructure. These disparities hinder growth and affect education quality. In contrast, India's initiatives showcase increased public investment, innovative financing, and public-private partnerships as effective strategies. By introducing innovative financing mechanisms, India enhances access and affordability, addressing financial constraints. Policy reforms and technology integration improve infrastructure and teaching quality. The consequence of underfunding in Africa includes overcrowded classrooms, while India's investment leads to expanded infrastructure and faculty attraction. Both regions acknowledge the need for innovation, with India emphasizing continuous adaptation. African nations can learn valuable lessons from India's experiences in financial sustainability, infrastructure development, and policy reforms to elevate higher education quality and relevance.

Findings:

Persistent Economic Challenges:
African higher education institutions face enduring economic challenges that hinder their growth and development. These challenges encompass funding disparities, limited access to financial resources, and inadequate infrastructure. These challenges have a profound impact on the quality of education and the overall development of the sector.

Funding Disparities:
One of the key findings is the significant funding disparities among African higher education institutions. Some universities receive disproportionately more resources than others, creating an uneven playing field that exacerbates the challenges faced by underfunded institutions. These disparities contribute to the inequities within the higher education landscape.

Limited Access to Financial Resources:
Another critical finding is the limited access to financial resources in African higher education. The lack of adequate financial resources restricts the capacity of institutions to expand, improve infrastructure, and enhance the quality of education. This limitation affects both the institutions and the students they serve, hindering the overall educational experience.

Inadequate Infrastructure:
Many African higher education institutions suffer from inadequate infrastructure, including outdated classrooms, insufficient libraries, and a lack of modern technology. This inadequacy hampers effective teaching and learning, impacting the quality of education delivered to students.

Consequences of Underfunding:
The cumulative outcome of these economic challenges is an underfunded higher education sector in Africa. This situation leads to overcrowded classrooms and a lack of access to essential tools and resources, limiting the sector's potential for growth and development. It also affects the employability of graduates and their ability to compete in the global job market.

Need for Innovative Solutions:
To address these economic challenges, the

findings underscore the imperative need for innovative solutions. African higher education requires strategic interventions and investments to overcome these barriers and foster sustainable growth. Lessons from other regions, such as India, can provide valuable insights into potential solutions.

Regarding Indian higher education initiatives, the findings are as follows:

Resilience and Adaptability:
India's higher education system demonstrates resilience and adaptability in the face of economic constraints. India has adopted a range of strategies and initiatives to enhance the quality of education, emphasizing the importance of flexibility and innovation.

Increased Public Investment:
India has significantly increased public investment in higher education, recognizing the critical role of adequate funding for institutions to provide quality education. This investment has facilitated infrastructure development and the attraction of top-tier faculty, contributing to improved educational outcomes.

Innovative Financing Mechanisms:
Innovative financing mechanisms, such as income-sharing agreements, educational loans, and scholarships, have played a pivotal role in making higher education in India more accessible and affordable for students from diverse backgrounds. These mechanisms address financial barriers to education.

Public-Private Partnerships:
Collaborations between government entities and private institutions have emerged as a promising avenue for addressing economic challenges. These partnerships expand educational opportunities, particularly in specialized fields, and demonstrate the potential for effective cooperation betweenpublic and private sectors.

Policy Reforms:
India's higher education system has undergone policy reforms aimed at expanding access and improving quality. The integration of digital education platforms, open-access resources, and curriculum revisions has modernized teaching and learning methods, aligning them with evolving educational dynamics.

Adaptation to Changing Dynamics:
India's higher education system recognizes the need for continuous adaptation and innovation in response to evolving economic and educational dynamics. This adaptability ensures that Indian higher education remains relevant globally and continues to meet the needs of students and the job market.

In terms of the role of India in African higher education:

Transferable Lessons:
The findings highlight that India's experiences in addressing economic constraints and enhancing higher education outcomes offer valuable transferable lessons for African nations. African countries can draw inspiration from India's initiatives in funding, financing mechanisms, and public-private partnerships as they seek to overcome similar challenges and improve the quality of education.

Suggestions and recommendations:

We should consider implementing policies and mechanisms that promote equitable distribution of funding among African higher education institutions. This step can significantly reduce funding disparities and create a more level playing field.

Diversified Funding Sources:
Exploring a rangeof funding sources, including public, private, and international partnerships, can greatly enhance the financial resources available to higher education institutions in Africa.

Financial Accessibility:
To make higher education more financially accessible to students from diverse backgrounds, we should develop financial aid programs, scholarships, and income-sharing agreements.

Infrastructure Development:
Investment in infrastructure development, including modern classrooms, libraries, and technology, is essential to create a conducive learning environment and improve the overall quality of education.

Public-Private Partnerships:
Encouraging collaborations between governments and private institutions can expand access to specialized fields of study and leverage the private sector's expertise in higher education.

Policy Reforms:
Policy reforms that focus on expanding access, improving quality, and aligning curricula with the changing demands of the job market are necessary. Leveraging digital education platforms and open-access resources can be particularly impactful.

Resilience and Adaptability:
It is crucial to foster a culture of resilience and adaptability within African higher education systems, allowing them to respond effectively to economic constraints and evolving educational dynamics.

Knowledge Transfer:
Facilitating knowledge transfer and collaborative research efforts between African and Indian higher education institutions can promote information exchange and innovative solutions.

Student-Centred Approaches:
Implementing student-centered approaches that focus on holistic student development, including employability skills, can enhance graduates' competitiveness in the global job market.

Monitoring and Evaluation:
Robust monitoring and evaluation mechanisms should be established to assess the impact of interventions and ensure accountability in resource allocation and utilization.

Government Commitment:
Sustained government commitment to higher education is vital. Prioritizing investments in the sector and fostering an environment conducive to innovation and growth is crucial.

Regional Collaboration:
Encouraging collaboration among African nations to share best practices, lessons learned, and resources in addressing higher education challenges can amplify the impact of interventions.

International Partnerships:
Seeking partnerships with international organizations, including India, can provide access to technical expertise, funding, and knowledge-sharing opportunities. Learning from India's experiences can offer valuable insights.

Long-Term Vision:
Developing a long-term vision and strategy for higher education that aligns with the sustainable development goals of African nations, focusing on economic growth, innovation, and social development, is essential.

Stakeholder Engagement:
Engaging stakeholders, including students, faculty, industry leaders, and policymakers, in the decision-making process ensures that initiatives are responsive to the needs of all stakeholders.

By implementing these suggestions and drawing inspiration from Indian higher education experiences, we can work towards overcoming economic challenges, enhancing innovation capabilities, and ultimately improving the quality of higher education in Africa. It's essential to prioritize these recommendations within a broader strategy for sustainable development and educational advancement.

Conclusion:

The research conducted sheds light on the formidable economic challenges facing African higher education institutions and the transformative initiatives undertaken by India's higher education sector. These findingsunderscore the urgent need for strategic interventions and collaboration to address the disparities in funding, limited access to financial resources, and inadequate infrastructure in African higher education.

African nations grapple with persistent funding disparities, leading to an uneven distribution of resources among institutions. This inequality exacerbates the challenges faced by underfunded universities, resulting in overcrowded classrooms and limited access to essential tools. Furthermore, the inadequate state of infrastructure, including outdated classrooms and insufficient libraries, hampers the quality of education offered by these institutions. These economic challenges culminate in a higher education sector struggling to meet the demands of a growing student population.

In stark contrast, India's higher education system has demonstrated resilience and adaptability in response to economic constraints. Increased public investment, innovative financing mechanisms, and public-private partnerships have been instrumental in enhancing the quality and accessibility of higher education. India's proactive approach includes policy reforms, digital education platforms, and curriculum revisions to modernize teaching and learning methods.

The potential for collaboration between India and African nations in higher education initiatives holds promise for mutual benefit. India's experiences offer valuable lessons that can be adapted to address similar economic challenges in African higher education. By drawing inspiration from India's initiatives, African countries can work toward sustainable growth, improved infrastructure, and the provision of high-quality education to students across the continent.

In conclusion, the findings presented in this research underscore the persistent economic challenges faced by African higher education institutions and the innovative solutions offered by India's higher education sector. It is imperative that African nations prioritize equitable funding distribution, diversify funding sources, and promote financial accessibility for students. Additionally, investments in infrastructure, public-private partnerships, and policy reforms are essential to enhance the quality and relevance of higher education.

This research serves as a foundation for future efforts aimed at addressing the economic constraints in African higher education and fostering collaboration between nations. It is through such collaborative endeavours and a commitment to innovation and adaptability that the full potential of higher education in Africa can be realized, contributing to economic growth, innovation, and social development across the continent.

Limitations:

While this research sheds light on economic challenges in African higher education, it is constrained by a predominantly descriptive approach. The study lacks a quantitative analysis of the impact of India's initiatives on specific African institutions. Additionally, a more extensive exploration of student perspectives and a longitudinal assessment of policy reforms could provide a nuanced understanding. Future research should consider a broader comparative framework and delve deeper into the evolving dynamics of collaborative efforts between India and African nations.

Future Scope of Research:

The research paper, focusing on the economic challenges in African higher education and the

transformative initiatives in India, provides a solid foundation for understanding the current state of affairs. To enhance the impact and relevance of the study, the following avenues can be explored for future research.

Comparative Analysis with Other Regions:

Extend the research to include a comparative analysis with higher education systems in regions beyond Africa. This could involve examining successful strategies from countries in Asia, Europe, or South America that have overcome economic challenges. Understanding a broader spectrum of solutions will enrich the recommendations for African nations.

Impact Assessment of Digital Education Platforms:

Investigate the specific impact of digital education platforms in India on accessibility and quality of higher education. Analyze how these platforms have adapted to diverse learning needs and assess their effectiveness in addressing economic constraints. This could involve case studies of specific digital initiatives and their outcomes.

Longitudinal Study on Policy Reforms:

Conduct a longitudinal study to assess the long-term effects of policy reforms in India's higher education sector. Track the evolution of initiatives such as curriculum revisions, public-private partnerships, and increased publicinvestment. Understanding the sustainability and scalability of these measures will provide valuable insights for other nations.

Case Studies of Successful Collaborations:

Explore in-depth case studies of successful collaborations between Indian educational institutions and African counterparts. Examine the challenges faced, lessons learned, and the overall impact on the quality of education. This can serve as a guide for fostering meaningful international collaborations in higher education.

Innovation in Financing Mechanisms:

Investigate emerging trends and innovations in financing mechanisms within higher education globally. This could include novel approaches such as income-sharing agreements, impact investing, and alternative funding models. Assess the feasibility of adapting these innovations to the African context.

Student Perspectives on Financial Accessibility:

orate the perspectives of students in both Indian and African higher education systems. Conduct surveys or interviews to understand how financial accessibility influences their educational choices and experiences. This qualitative aspect can add a human dimension to the economic challenges discussed in the paper.

Exploration of Technological Solutions for Infrastructure Development:

Explore the role of technology in addressing infrastructure challenges in African higher education. Investigate how technological solutions, such as e-learning platforms and smart infrastructure, can contribute to overcoming limitations in physical facilities. This can include a review of innovative projects and their outcomes.

Policy Advocacy and Implementation Strategies:

Develop a section focused on policy advocacy, outlining specific recommendations for policymakers in African nations. Provide detailed implementation strategies for adapting successful initiatives from India and other regions to the unique contexts of African higher education systems.

Dynamic Nature of Economic Challenges:

Acknowledge the dynamic nature of economic challenges and the need for continuous research and adaptation. Propose a framework for ongoing monitoring and evaluation of economic factors affecting higher education, emphasizing the importance of flexibility in response strategies.

Integration of Sustainable Development Goals (SDGs):

Align the research with the United Nations Sustainable Development Goals (SDGs), particularly those related to quality education, reduced inequalities, and partnerships. Highlight how the proposed interventions contribute to broader global objectives and advocate for a holistic approach to higher education development.

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RESEARCH

IMPORTANCE OF STOCK WEIGHTAGE IN PORTFOLIO MANAGEMENT (WITH A FOCUS ON THE SOLVER AS A TOOL FOR DETERMINING OPTIMUM STOCK WEIGHTAGE)

Dhanashree Pradeep Kamthekar*

Abstract

Navigating the intricate tapestry of financial markets necessitates a strategic approach to optimizing stock weightage, the fulcrum balancing risk and return. This paper embarks on a journey to explore its profound impact on portfolio allocation. We delve into various strategies, from equal weighting to market capitalization, dissecting their benefits and limitations. Utilizing historical data and diverse case studies, we illuminate the practical implications of different weightage approaches. Ultimately, the paper emphasizes tailoring stock weightage to an investor's risk tolerance and goals. However, achieving optimum allocation presents a challenge. This is where Solver, a powerful tool embedded in common software like Excel, emerges. We introduce Solver as the key to unlocking optimal stock weightage, empowering investors to craft robust portfolios aligned with their unique profiles. This exploration underscores how a well-crafted stock weightage strategy, bolstered by Solver's optimization capabilities, forms the cornerstone of effective portfolio management, paving the way for investors to pursue optimal performance.

Keywords : Financial Markets, Stock Weightage Strategies, Solver, Risk Tolerance, Optimal Performance

Introduction

In the dynamic landscape of financial markets, navigating risk and maximizing returns requires meticulous crafting of investment portfolios. Among the key factors sculpting performance, stock weightage emerges as a pivotal force. This paper delves into the profound significance of allocating weights within portfolios, wielding it as a tool to optimize outcomes and empower investors.

We embark by establishing the foundational principles of portfolio management, emphasizing diversification and the intricate dance between risk and return. We then zoom in on stock weightage, unveiling its critical role in distributing investment capital amongst diverse assets. By strategically assigning weights, investors can directly influence the portfolio's risk profile and potential returns.

The investigation expands to explore various methodologies for assigning stock weightage, ranging from the fundamental equal-weight approach to more nuanced strategies like return-based weighting, risk-based weighting, and even sophisticated quantitative models. Each approach possesses distinct advantages and limitations, which will be meticulously analyzed.

Our analysis leverages historical market data to paint a vivid picture of how different stock weightage strategies impact portfolio performance. Through carefully constructed case scenarios, we illustrate how variations in weight allocation can mitigate risk or capitalize on market opportunities.

However, a crucial piece of the puzzle remains: identifying the optimal weights amidst a multitude of possibilities. This is where Solver, a powerful optimization tool, steps onto the stage. We will unveil how Solver,

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embedded in widely used software like Excel, can be harnessed to calculate the optimal weightings for each stock, considering individual characteristics, portfolio goals, and risk tolerance.

In conclusion, this paper elevates stock weightage beyond a mere allocation practice, showcasing it as a potent tool for constructing robust and successful portfolios. We emphasize the paramount importance of aligning weightage strategies with individual investor profiles, demonstrating how Solver empowers this alignment. As markets evolve, comprehending the nuances of stock weightage, alongside the optimization prowess of Solver, becomes increasingly crucial for building resilient and thriving investment portfolios.

Review of Literature

(Nashirah Abu Bakar, 2019) The primary goal of this research is to create a hybrid optimization strategy for minimizing investment portfolio risk. This study's approaches are a blend of Modern Portfolio Theory (MPT) and a genetic algorithm optimization strategy. The results show that contemporary portfolio theory can provide optimal portfolio magnitude with the greatest return for a given amount of investment risk. Furthermore, the evolutionary algorithm improved the optimal searching approach to determine the world's lowest level of investment risk. The significance of this study is that it will help investors make better decisions to maximize their return for a given degree of investment risk. Furthermore, this hybrid strategy predicts investment return and portfolio risk with greater accuracy.

(Ma Yechi, 2020) This study examines the effects of diversification on four standard asset portfolios by adding five cryptocurrencies between November 2015 and November 2019. The findings demonstrate that, in the majority of cases, diversity boosted returns, and enhanced results compared to all other portfolios and decreased portfolio volatility with the same level of risk as the conventional portfolios. We might also deduce that the addition of many Ethereum is one of the cryptocurrencies that improves portfolio diversity. offers more opportunities for diversification than Bitcoin does.

(Campbell, 2021) The research paper studies growth stock cash flows that are particularly susceptible to fluctuations in aggregate stock prices that are driven by shocks to market discount rates, whereas value stock cash flows are more sensitive to fluctuations that are permanent and caused by shocks to aggregate cash flows. Therefore, the fundamentals of growth and value firms' cash flows determine the high betas of growth (value) stocks with the market's discount-rate (cash-flow) shocks. More generally, accounting measures of firm-level risk can forecast firm betas concerning market-wide cash flows, and this ability is based on the way that firm cash flows behave. The systematic risks of their fundamentals are what primarily determine the systematic risks of stocks with identical accounting features.

(Chhabra, 2022) The goal of this research work is to investigate the value of a mean-variance portfolio. The return is estimated using s everal scenarios, including one-time investment, systematic investment, and SIP over a specific period. The return from all possible outcomes is then evaluated to identify the optimum technique for assisting an investor in increasing the value of their portfolio. The mean-variance portfolio technique is subsequently employed to calculate multiple investment scenarios and weightage for each stock. The return on systematic investment strategy is compared for a variety of investors depending on their stock selection, and a conclusion is reached regarding the usefulness of establishing an investment strategy.

(S D. N., 2022) The major goal of this research is to create an optimal portfolio utilizing the Sharpe single index model regarding the BSE Sensex. This study attempts to apply the Sharpe

single index methodology to BSE Sensex 30 stocks. The suggested method develops a unique cut-off rate and selects securities with excess return to beta ratios greater than the cut-off rate to build optimal portfolios. It was found that the pre and post-COVID-19 era Pharmaceutical and Financial services companies posted fair returns with the biggest risk over the study period.

(Zahra Hatami, 2022) The goal of this research is to build a financial network to determine optimal portfolios with network centralities measurements. This study proposes an improved stock community detection technique that may be regarded as an optimal stock portfolio for investors to employ. A collection of stocks was chosen for each period by taking advantage of the benefits of a network and its property in extracted communities. The efficacy of the optimal portfolios in comparison to the well-known index.

Their Sharpe ratio was determined efficiently to evaluate their profit for decision-making. The analysis demonstrates that the selected potential portfolio of stocks with low centrality measurements can outperform the market; nevertheless, they have a lower Sharpe ratio than stocks with high centrality scores.

(Gaurav Nagpal, 2023) This study investigates the dynamics of the association between risk and returns in the case of optimum portfolios created for various goals, as well as validating the efficient frontier for the Indian capital market. It demonstrates that when an investor's risk appetite increases, a boost in the returns of optimal portfolios decreases, showing a non-linear connection between risks and returns. It has also been argued what this means for management and investors.

- **Key findings of the literature**

Nashirah Abu Bakar (2019)	Hybrid optimization of MPT and genetic algorithm outperforms MPT alone in minimizing portfolio risk.
Ma Yechi (2020)	Adding cryptocurrencies to portfolios can improve returns and reduce volatility.
Campbell (2021)	Growth stock cash flows are more sensitive to market discount rates, while value stock cash flows are more sensitive to permanent changes in cash flows.
Chhabra (2022)	Mean-variance portfolio optimization can help investors increase portfolio value, with systematic investment plans offering the best returns.
S D. N. (2022)	Sharpe single index model can be used to build optimal portfolios with high excess return to beta ratios.
Zahra Hatami (2022)	Network centrality measures can be used to identify optimal portfolios with lower risk and higher returns than the market.
Gaurav Nagpal (2023)	The risk-return relationship for optimal portfolios is non-linear, with higher risk leading to smaller increases in returns.

Research Gap

The research landscape of portfolio management boasts numerous studies, yet a crucial element often receives limited attention: individual stock weightage. While existing research explores aspects of asset allocation and diversification, the granular impact of stock weightings on portfolio dynamics, risk profiles, and returns remains under-investigated. This paper bridges this gap by placing stock weightage at the

forefront, examining its pivotal role in optimizing performance. It delves beyond traditional portfolio construction methods to reveal how strategic weightings, informed by powerful tools like Solver, can empower investors to unlock optimal allocation and maximize returns. This nuanced approach provides a fresh perspective on portfolio management, enriching the understanding of how individual stock selection and weightings significantly influence overall success.

Research Objective

- To understand the efficacy of Solver, in de-termining optimal stock weightage across various investment objectives.
- To investigate the impact of individual stock weightage on portfolio performance.
- To develop insights for effective portfolio management.

Research Methodology

Quantitative:
Being the Quantitative nature of the study, the weightage given to each stock is determined by using the **Excel Solver function.**

Population:
The population of the study is all the listed companies from all the sectors on the National Stock Exchange as on 1st August 2019.

Sample of the study:
Ten listed companies (randomly selected) as one company each from ten sectors (randomly selected) on the National Stock Exchange as on 1st August 2019.

Statistical tools:
Statistical tools used for the analysis and interpretation of data include standard deviation, covariance, expected return, and Sharpe Ratio.

Hypotheses

H0: Difference in weightages to each stock **does not significantly affect** the risk and return outcomes of the portfolio.

H1: Difference in weightage to each stock **significantly affects** the risk and return outcomes of the portfolio.

Data Collection

Under the project title "Importance of Stock Weightage in Portfolio Management" for building a balanced and diversified portfolio, one company is selected (by random sampling) from each of the ten different sectors.

Companies and Sectors as selected are as follows:

Sr. No.	Company	Sector
1	Cipla Ltd.	Pharma
2	Bajaj Finance Ltd.	Non-Banking Financial Services (NBFC)
3	Oberoi Realty Ltd.	Real Estate/ Realty
4	Britannia Industries Ltd.	FMCG
5	Mahindra and Mahindra Ltd.	Auto
6	Tata Power Company Ltd.	Power/ Energy
7	GMR Airports Infrastructure Ltd.	Infrastructure
8	ICICI Bank Ltd.	Bank
9	KPIT Technologies Ltd	Information technology (IT)
10	Star Cement Ltd	Cement

[All companies are listed on the National Stock Exchange (NSE)]

Daily closing prices of these 10 companies (NSE Stock) for the period 1st August 2019 to 1st August 2023 are used for the purpose of study and its analysis

Data Analysis & Interpretation

The art and science of choosing and managing a group of investments, such as stocks, bonds, and other assets, to meet financial objectives while taking market circumstances and risk tolerance into account is known as **Portfolio Management.**

Stock Portfolio Management involves strategically assembling and overseeing a collection of individual stocks with the aim of optimizing returns and managing risk. Decisions regarding stock selection, allocation, and timing are made based on an investor's goals and market analysis.

Diversification in stock portfolio management refers to spreading investments across different stocks and sectors to reduce overall risk, as all sectors react differently to various market conditions. By holding a variety of stocks, potential losses from individual stocks' poor performance are mitigated. It's important as it can enhance the portfolio's stability and potentially improve returns by reducing the impact of market fluctuations on the entire portfolio.

The **Risk-Return Trade-off** in portfolio management is the concept that higher potential returns come with increased risk. Investors seeking greater returns often expose themselves to higher levels of risk, while those aiming for lower risk might settle for lower potential returns. Striking the right balance between risk and return is crucial in aligning a portfolio with an investor's goals and risk tolerance.

The **Portfolio Return** reflects the overall performance of a collection of investments over a specific period. It quantifies the gain or loss generated by considering the returns of individual investments, weighted by their respective allocations within the portfolio. Calculated as a percentage, the portfolio return helps investors gauge the collective outcome of their investment decisions.

However, it solely measures performance and doesn't consider risk. Therefore, the Sharpe Ratio or similar metrics are used to assess risk-adjusted returns, providing a more comprehensive evaluation of portfolio performance with the level of risk taken.

The formula for calculating the weighted portfolio return is:

Portfolio Return = (Weight of Investment 1 * Return of Investment 1) + (Weight of Investment 2 * Return of Investment 2) + ... + (Weight of Investment n * Return of Investment n)

The Portfolio risk refers to the potential variability in returns of a group of investments. It's a measure of uncertainty in achieving expected outcomes. The formula to assess portfolio risk is the standard deviation (σ) of the portfolio's returns. It considers the individual investments' risks and their correlations. Managing portfolio risk is essential for investors to balance potential returns with their risk tolerance, aiming for a more stable and predictable investment journey.

Solver is an **Excel add-in** that helps you find the optimal value for a specific cell (called the objective cell) by adjusting other cells (called decision variables) within set constraints. It utilizes optimization techniques like linear programming to find the best solution based on your defined criteria. In simple, we can call it an automated "what-if" tool for finding the best outcome for your spreadsheet.

• **Stock Weightage in Portfolio Management**
In the intricate realm of portfolio management, the significance of stock weightage stands as a

pivotal factor that can greatly influence an investor's success. Delving into this topic will uncover how the allocation of weight to different stocks within a portfolio can shape risk exposure, potential returns, and overall performance. Through a thorough examination of five distinct cases, the profound importance of this aspect in effective portfolio management will become abundantly clear.

I. Calculation of the Expected Return of each stock

Series of returns are calculated for each stock using the following formula -

Return = [(Today's closing price) - (Previous day's closing price)] *100 / Previous day's closing price

Then annualised expected return of each stock is calculated by using the following formula –

Expected Return = (Average of series of returns) *253

[The given were the trading days in respective years in India. Hence, their average '253' is considered as a multiplying factor for calculating annualized return]

2019	252
2020	253
2021	251
2022	256

	ER
Cipla	25.288360
Bajaj Finance	29.724117
Oberoi Realty	26.070817
Britannia	19.081041
M&M	31.642937
Tata Power	43.636032
GMR Airport Infra	39.996243
ICICI Bank	28.566349
KPIT	78.590781
Star Cement	16.312713

Table 1: Expected Returns of each stock (Author's work)

II. Calculation of the Covariance among stocks

Using the following Excel formula, the Covariance between two stocks is calculated -

Covariance = COVAR (Series of return X, Series of return Y)

Table 2: Table of Covariance: (Author's work)

Cover	Cipla	Bajaj Finance	Oberoi Realty	Britannia	M&M	Tata Power	GMR Airport Infra	ICICI Bank	KPIT	Star Cement
Cipla	3.246580	0.511449	0.252422	0.565088	0.140929	0.716379	0.848176	0.580321	0.581874	0.183326
Bajaj Finance	0.511449	6.842700	2.348935	1.656235	2.763872	2.624689	2.423880	3.626212	1.543250	1.331700
Oberoi Realty	0.252422	2.348934	6.775534	0.470064	1.634994	2.077215	2.195032	2.035463	1.567972	1.092937
Britannia	0.565088	1.656235	0.470064	2.723131	1.099190	0.897281	0.991711	1.243268	0.779277	0.565442
M&M	1.140929	2.763872	1.634994	1.099190	5.040533	2.340652	2.068863	2.332030	1.464621	1.025834
Tata Power	0.716379	2.624689	2.077215	0.897281	2.340652	6.666083	2.976490	2.146118	1.863333	1.243464
GMR Airport Infra	0.848176	2.423880	2.195032	0.991711	2.068863	2.976490	6.663175	1.980790	1.576228	1.272518
ICICI Bank	0.580321	3.626212	2.035463	1.243268	2.332030	2.146118	1.980790	4.891127	1.254917	1.093804
KPIT	0.581874	1.543250	1.567972	0.779277	1.464621	1.863333	1.576228	1.254917	9.352908	1.328345
Star Cement	0.183326	1.331700	1.092937	0.565442	1.025834	1.243464	1.272518	1.093804	1.328345	4.648101

III. Calculation of the Portfolio Return

The Portfolio Return is calculated as a summation of products of the expected return of each stock and their respective weightage, using the following Excel formula -

> Portfolio Return = Sum (column containing the product of the expected return of each stock and their respective weightage)

IV. Calculation of the Portfolio Standard Deviation

The portfolio standard deviation is calculated Using the following Excel formula –

> Portfolio S.D. = SQRT(MMULT(TRANS-POSE(Weightages), MMULT (covariance table, weights))) * SQRT (253)

[Multiplying by SQRT (253) for annualized portfolio standard deviation]

V. Sharpe Ratio

A popular financial indicator that assists investors in determining the risk-adjusted return of an investment or a portfolio is the Sharpe Ratio. The Sharpe Ratio considers both the amount of risk taken to get the return on investment and the return itself.

In simple terms, it measures the excess return of an investment (or portfolio) per unit of risk.

The formula for calculating the Sharpe Ratio is as follows:

> Sharpe Ratio = (Portfolio Return - Risk-Free Rate of Return) / Portfolio Standard Deviation

The Indian 10 Years Government Bond has a 7.214% yield (last update 20 Aug 2023 2:15 GMT+0).

Hence, the Risk-Free Rate of Return is taken as 7.214% for calculation purposes.

The maximum value of the Sharpe Ratio is advisable i.e., maximum return of aninvestment (or portfolio) per unit of risk

- **Different cases of weightage allocation to each stock and their effect on Portfolio Risk and Portfolio Return**

a) **Case 1: Equal weightage to all 10 stocks**

Table 3: Outcomes when equal weightages to 10 stocks are given (Author's work)

	Weightage	Portfolio	(Annualized)
Cipla	0.1	Return	33.890939
Bajaj Finance	0.1	SD	21.895025
Oberoi Realty	0.1		
Britannia	0.1		
M&M	0.1		Rf
Tata Power	0.1		7.214
GMR Airport Infra	0.1		
ICICI Bank	0.1		
KPIT	0.1		
Star Cement	0.1	Sharpe Ratio	1.218402
	1		

Case 1 : Equal Weightage to all 10 Stocks

In this case, the Portfolio Return is 33.89% and the Portfolio Standard Deviation (Risk Spread) is 21.90%.

This indicates that by investing equal weightage in each stock, investors can earn a return of 33.89% by taking a risk of 21.90%.

Sharpe ratio of 1.218402 indicates that for every unit of risk, 1.218402 units of return is possible if equal weights are maintained.

b) **Case 2: Maximize Sharpe Ratio (without investing in all ten stocks)**

Table 4: Outcomes when the Sharpe ratio is maximum, but investment is not made in all ten stocks (Author's work)

	Weightage	Portfolio	(Annualized)
Cipla	0.223143	Return	53.983430
Bajaj Finance	0	SD	28.442786
Oberoi Realty	0		
Britannia	0.008924		
M&M	0.012844		Rf
Tata Power	0.155299		7.214
GMR Airport Infra	0.117137		
ICICI Bank	0.032582		
KPIT	0.450070		
Star Cement	0		
	1	Sharpe Ratio	1.644334

Case 2: Maximize Sharpe Ratio (without investing in all ten stocks)

To achieve the objective of Case 2 (i.e. Maximise the Sharpe ratio, without investing in all 10 stocks), the following are the steps:

1. Select 'Solver' from the Data Tab
2. Enter the answer cell of Sharpe ratio as 'Set Objective'
3. Select 'Max' option
4. Select all ten cells of weightage for 'By Changing Variable Cell'
5. Enter constraint as "**total of weightages cell = 1**" for 'Subject to Constraint'
6. *Click 'solve' for desired results.
7. Click 'OK' to retain solver results.

In this case, the Portfolio Return is 53.98% and the Portfolio Standard Deviation (Risk Spread) is 28.44%.

This indicates that by investing (not in all ten stocks) with a pre-decided weightage to earn the maximum return per unit of risk on investment in each stock, investors can earn a return of 53.98% by taking a risk of 28.44%.

For achieving the maximum Sharpe ratio i.e., maximum return of an investment (or portfolio) per unit of risk; given weightage for each stock is advisable.

In this case for maximizing the Sharpe ratio, investing in all 10 stocks is not ideal.

Investing only in 7 stocks is advisable for maximizing the Sharpe ratio.

Sharpe ratio of 1.644334 indicates that for every unit of risk, 1.644334 units of return are possible if the above weights are maintained.

c) **Case 3: Maximize Sharpe Ratio (by investing in all ten stocks)**

Table 5: Outcomes when the Sharpe ratio is maximum, but investment is made in all ten stocks (Authors work)

	Weightage	Portfolio	(Annualized)
Cipla	0.220985	Return	53.427672
Bajaj Finance	0.010000	SD	28.172834
Oberoi Realty	0.010000		
Britannia	0.010000		
M&M	0.010000		Rf
Tata Power	0.150803		7.214
GMR Airport Infra	0.112215		
ICICI Bank	0.021603		
KPIT	0.444394		
Star Cement	0.010000		
	1	Sharpe Ratio	1.640363

Case 3 - Maximize Sharpe Ratio (by investing in all 10 stocks)

To achieve the objective of Case 3 (i.e. Maximise the Sharpe ratio, by investing in all 10 stocks), the following are the steps:

1. Select 'Solver' from the Data Tab
2. Enter the answer cell of Sharpe ratio as 'Set Objective'
3. Select 'Max' option
4. Select all ten cells of weightage for 'By Changing Variable Cell'
5. Enter constraints as "**total of weightages cell = 1**" and "**all ten cells of weightage >= 0.01**" for 'Subject to Constraint'
6. *Click 'solve' for desired results.
7. Click 'OK' to retain solver results.

In this case, the Portfolio Return is 53.43% and the Portfolio Standard Deviation (Risk Spread) is 28.17%.

This indicates that by investing (in all ten stocks) with a pre-decided weightage to earn the maximum return per unit of risk on investment in each stock, investors can earn a return of 53.43% by taking a risk of 28.17%.

For achieving the maximum Sharpe ratio i.e., maximum return of an investment (or portfolio) per unit of risk but investing in all 10 stocks; given weightage for each stock is advisable.

Sharpe ratio of 1.640363 indicates that for every unit of risk, 1.640363 units of return are possible if the above weights are maintained.

d) **Case 4: Minimise Risk (by investing in all 10 stocks)**

Table 6: Outcomes when Risk is Minimum (Authors work)

	Weightage	Portfolio	(Annualized)
Cipla	0.298622	Return	24.769894
Bajaj Finance	0.010000	SD	18.039394
Oberoi Realty	0.093461		
Britannia	0.309328		
M&M	0.010000		
Tata Power	0.024128		Rf
GMR Airport Infra	0.010000		7.214
ICICI Bank	0.034430		
KPIT	0.038587		
Star Cement	0.171444		
	1	Sharpe Ratio	0.97319752

Case 4 - Manimize Risk (by investing in all 10 Stocks)

To achieve the objective of Case 4 (i.e. Minimise Risk, by investing in all 10 stocks), the following are the steps:

1. Select 'Solver' from the Data Tab
2. Enter the answer cell of SD as 'Set Objective'
3. Select 'Min' option
4. Select all ten cells of weightage for 'By Changing Variable Cell'
5. Enter constraints as "**total of weightages cell = 1**" and "**all ten cells of weightage >= 0.01**" for 'Subject to Constraint'
6. *Click 'solve' for desired results.
7. Click 'OK' to retain solver results.

In this case, the Portfolio Return is 24.77% and the Portfolio Standard Deviation (Risk Spread) is 18.04%.

This indicates that by investing (in all ten stocks with minimum risk) with a pre-decided weightage to earn the maximum return on investment in each stock, investors can earn a return of 24.77% by taking a risk of 18.04%.

In this case; to **minimize the Portfolio Risk,** the investor is ready to take a **Portfolio Return** which is the **least** in all cases.

Sharpe ratio of 0.973198 indicates that for every unit of risk, 0.973198 units of return are possible if the above weights are maintained.

e) **Case 5: Maximize Return (by investing in all 10 stocks)**

Table 7: Outcomes when Return is maximum (Authors work)

	Weightage	Portfolio	(Annualized)
Cipla	0.01	Return	74.120797
Bajaj Finance	0.01	SD	44.928204
Oberoi Realty	0.01		
Britannia	0.01		
M&M	0.01		Rf
Tata Power	0.01		7.214
GMR Airport Infra	0.01		
ICICI Bank	0.01		
KPIT	0.91		
Star Cement	0.01		
	1	Sharpe Ratio	1.48919366

Case 5 - Manimize Risk (by investing in all 10 Stocks)

To achieve the objective of Case 5 (i.e. Maximise Return, by investing in all 10 stocks), the following are the steps:

1. Select 'Solver' from the Data Tab
2. Enter the answer cell of Return as 'Set Objective'
3. Select 'Max' option
4. Select all ten cells of weightage for 'By Changing Variable Cell'
5. Enter constraints as **"total of weightages cell = 1"** and **"all ten cells of weightage >= 0.01"** for 'Subject to Constraint'
6. *Click 'solve' for desired results.
7. Click 'OK' to retain solver results.

In this case, the Portfolio Return is 74.12% and the Portfolio Standard Deviation (Risk Spread) is 44.93%.

This indicates that by investing (in all ten stocks with maximum risk) with a pre-decided weightage to earn the maximum return on investment in each stock, investors can earn a return of 74.12% by taking a risk of 44.93%.

In this case; to **maximize** the **Portfolio Return,** the investor is ready to take the **highest Portfolio Risk** among all cases.

Sharpe ratio of 1.489194 indicates that for every unit of risk, 1.489194 units of return are possible if the above weights are maintained.

[*before clicking solve for desired results, make sure (i) GRG Nonlinear solving method is selected and (ii) 'Make unconstrainted variable nonnegative' option is ticked/checked]

Conclusion and Testing of Hypotheses

Table 8: Data Analysis & Interpretation (Authors Work)

	Case 1 (Equal Weights)	Case 2 (Maximize Sharpe Ratio, not all stocks)	Case 3 (Maximize Sharpe Ratio, all stocks)	Case 4 (Minimize Risk, Risk Averse)	Case 5 (Maximize Return, Risk Taker)
Portfolio Return	33.89%	53.98%	53.43%	24.77%	74.12%
Portfolio Standard Deviation	21.90%	28.44%	28.17%	18.04%	44.93%
Sharpe Ratio	1.2184	1.6443	1.6404	0.9732	1.4892

After going through the above analysis and its interpretation we can conclude as follows:

1. A direct relationship exists between Portfolio Return and Portfolio Standard Deviation (Risk) i.e., when Portfolio Return increases, Portfolio Risk also increases and vice versa.
2. To minimize the Portfolio Risk, the investor receives the least Portfolio Return in comparison to all cases.
3. To maximize the Portfolio Return, the investor faces maximum Portfolio Risk in comparison to all cases.
4. When Portfolio Risk is minimal, the Sharpe ratio is also the minimum of all.
5. The Shape ratio is maximum, when the return of an investment (or portfolio) per unit of risk is maximum and not when absolute Portfolio Return is maximum.

Testing of Hypothesis:

It is evident from the above 5 cases, that when different weights are assigned to each stock, Portfolio Return and Portfolio Risk varies.

Hence, **H1 is Accepted,** i.e. **Difference in weightage** to each stock **significantly affects the risk and return outcomes of the portfolio**

That means the difference in weightage to each stock **significantly affects** the risk and return outcomes of the portfolio.

While manual stock weighting offers insights, Solver empowers portfolio management by automating the quest for optimal allocations. It considers individual stock characteristics, investor goals, and risk tolerance, unlocking customized weightings that maximize Sharpe Ratio, minimize risk, or maximize return. This data-driven approach transcends guesswork, equipping investors with a powerful tool to build resilient and successful portfolios.

Limitations of the Study

The study is subject to certain constraints that influence the scope and applicability of its conclusions:

- **Data Limitations:** Reliance on historical data, short time horizon (4 years), and narrow factor focus may hinder accurate market predictions and adaptation.

- **Diversity and Scope:** A limited portfolio size (10 Stocks) and exclusive exchange (NSE) focus might lead to skewed market representation and overlook valuable insights.

- **Sector Complexity:** Oversimplified sector inclusion and exclusion may neglect crucial sector-specific intricacies impacting overall portfolio performance.

While the study contributes insights into stock weightage's role, these limitations urge careful interpretation and consideration in practical investment decision-making.

Scope for further research

While the paper offers valuable insights into the role of stock weightage in effective portfolio management, there are several avenues for future research and exploration:

- **Exploring Alternative Optimization Tools:** While Solver presents a powerful tool, investigating other optimization techniques, such as genetic algorithms or evolutionary algorithms, could offer alternative perspectives on optimal weightings. These methods may handle complex non-linear relationships between stocks and facilitate diversification strategies beyond traditional mean-variance optimization.

- **Machine Learning Techniques for Risk Management:** Integrating machine learning models with optimization tools like Solver could enhance risk management capabilities. By analyzing historical data and market trends, these models could predict potential risks associated with different weightings, allowing for more informed and dynamic portfolio adjustments.

- **Cross-Asset Class Comparison:** Comparing the impact of stock weightage across different asset classes, such as stocks, bonds, and commodities, could reveal valuable insights into portfolio diversification strategies. This analysis could help investors determine the optimal allocation of weights across asset classes based on their risk tolerance and investment goals.

- **Behavioral Finance and Investor Biases:** Understanding how investor biases and emotions influence stock weightage decisions can provide valuable insights for portfolio management strategies. By incorporating behavioral finance principles, research could explore how to mitigate these biases and guide investors toward more rational and objective weightings.

Further research in these directions would contribute to a more comprehensive understanding of the intricate relationship between stock weightage and portfolio management, facilitating better-informed investment decisions.

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EXPLORING THE ADOPTION OF ARTIFICIAL INTELLIGENCE IN THE INDIAN HEALTHCARE SYSTEM: THE CASE OF CANCER TREATMENT

Deepshikha Chhaperia, Dr. Kamini Khanna*

Abstract

On the Indian subcontinent, where a billion hearts beat, cancer casts a long shadow. In this crucible of healthcare innovation, the researchers shift their focus to India, a land as diverse as its challenges. This research delves deep into the potential of artificial intelligence (AI) to transform cancer care within India's unique ecosystem. Journeying to Kharghar, Maharashtra, a microcosm of the nation's hopes and realities, the researchers assess the community's attitude towards embracing AI-driven solutions. But amidst the enthusiasm lies a sobering truth: the specter of high cancer care costs looms large across India's healthcare landscape. This research serves as a call to action, urging targeted government interventions tailored to the Indian context. Envisioning a future where AI-powered cancer care is democratized, hope replaces despair for millions battling this formidable foe

Keywords : Artificial intelligence (AI), Healthcare, India, Cancer care, Cost

Introduction

"Health is wealth," as the age-old adage goes, yet for many in today's India, achieving true health remains a distant dream, especially in places like Kharghar, and Maharashtra, where access to quality healthcare is a constant struggle. But amidst these challenges, there's a glimmer of hope shining through - Artificial Intelligence (AI). It's where innovation meets possibility, holding the promise to transform healthcare for millions. In the face of critical issues like affordability and accessibility, AI stands as a beacon of hope, offering revolutionary solutions.

In India, healthcare mirrors the struggles of many developing nations, burdened by diseases like cancer and limited resources. While AI presents innovative solutions, the reality is that its benefits are often out of reach for a significant portion of the population. This research delves into the aspirations and hurdles faced by India and similar nations in leveraging AI in healthcare. It emphasizes the urgent need for government

intervention to make these transformative technologies accessible and affordable, ultimately aiming to reduce mortality rates and provide hope to millions.In semi-urban and rural areas of India, healthcare access is marred by vast disparities, with diseases like cancer, diabetes, and cardiovascular ailments posing significant challenges. Early detection is crucial, yet the shortage of healthcare professionals and stretched-thin infrastructure hinder effective diagnosis and treatment.

The potential of AI in Indian healthcare is vast. With its ability to analyze vast amounts of healthcare data, AI offers solutions ranging from early disease detection to precision medicine and telemedicine. AI-powered systems can analyze medical images like X-rays and CT scans, facilitating accurate diagnoses, particularly in regions with a scarcity of specialists. Moreover, predictive analytics by AI can identify individuals at risk of diseases, enabling preventive care—a proactive approach crucial in a country where healthcare resources are limited.

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However, the reality of the cost barrier cannot be ignored. AI technologies in healthcare come with a hefty price tag, making them inaccessible to many in developing nations like India, where a significant population lives below the poverty line. Additionally, low digital literacy poses a significant challenge in the widespread adoption of AI-driven healthcare solutions, particularly in rural areas. Limited exposure to technology and health information literacy further compounds the issue, highlighting the need for comprehensive government intervention.

Governments in developing countries must recognize AI in healthcare as a necessity, not a luxury, and invest in research, development, and partnerships with AI technology providers to ensure affordability and accessibility. Public-private partnerships hold promise in leveraging resources and expertise to deploy AI healthcare solutions effectively, tailored to the specific needs of the population.

The challenges and opportunities presented by AI in healthcare resonate across many Asian countries. Awareness campaigns and government initiatives are crucial to addressing barriers to healthcare access, ultimately offering hope for improved healthcare outcomes across the region. AI's role in the health sector is pivotal, promising transformative solutions to address longstanding healthcare disparities and enhance the quality of life for millions across Asia.

Literature Review:

In the landscape of healthcare across India, where cancer incidence is on the rise, there's a growing need for innovative solutions to address the healthcare challenges. One such solution is the integration of Artificial Intelligence (AI) into the field of medicine, offering a glimmer of hope for improved diagnosis and patient care.

Table 1.1 Summary of Literature Review

Title	Year	Author	Findings
Dermatologist-level classification of skin cancer with deep neural networks	2017	Esteva et al.	Esteva et al. demonstrated the efficacy of deep learning algorithms in classifying skin lesions with a level of accuracy comparable to board-certified dermatologists. This breakthrough study showcased the potential of AI in dermatology, particularly in improving early cancer detection and reducing the need for invasive procedures such as biopsies.
A survey on deep learning in medical image analysis	2017	Litjens et al.	Litjens et al. conducted a comprehensive survey highlighting the transformative impact of AI, particularly deep learning, in medical image analysis. By augmenting diagnostic accuracy, AI-powered algorithms have the potential to revolutionize cancer diagnosis, transcending geographical boundaries and healthcare settings.
Automated breast cancer diagnosis using deep learning and data fusion	Not specified	Wang et al.	Wang et al. introduced an innovative approach combining Convolutional Neural Networks (CNNs) and Multilayer Perceptrons (MLPs) to enhance diagnostic accuracy in breast cancer diagnosis. By integrating image analysis with demographic data, this study exemplifies how AI-driven technologies can streamline diagnostic processes and improve patient outcomes.

Title	Year	Author	Findings
Automated diagnosis and classification of liver cancer using deep learning and radionics	Not specified	Hwang	Hwang's study focused on the integration of radionics data with deep learning models to enhance the accuracy and comprehensiveness of liver cancer diagnosis. This approach has significant implications for resource-constrained regions like India, where timely and accurate cancer detection is crucial for improving patient outcomes.
Predicting cancer outcomes with multi-modal data fusion: A deep learning approach.	Not specified	Chen et al.	Chen et al. proposed a multi-modal data fusion approach leveraging deep learning techniques to predict cancer outcomes. By integrating diverse data sources such as genomics, imaging, and clinical data, this study exemplifies the potential of AI in personalized cancer treatment, facilitating more targeted and effective interventions.
Enhancing cancer immunotherapy response prediction with deep learning.	Not specified	Lee et al.	Lee et al. investigated the use of deep learning algorithms to predict patient responses to cancer immunotherapy. By analyzing complex biomolecular data, including tumor mutational burden and immune cell profiles, this study highlights the role of AI in optimizing treatment strategies and improving patient outcomes in the era of precision medicine.

While AI holds immense potential to optimize cancer treatment and reduce costs, affordability remains a significant hurdle to widespread adoption across Asian countries. The promise of AI-driven cancer care is hampered by the formidable price tags associated with these technologies. Consequently, ensuring universal access to AI-driven healthcare remains an ongoing challenge in many parts of the region.

Objective:

This research paper seeks to address a critical issue at the intersection of healthcare and technology: the urgent necessity of democratizing access to Artificial Intelligence (AI) in healthcare, particularly in developing nations like India. Our primary objective is to delve into the multifaceted challenges and promising opportunities associated with AI adoption in healthcare. We aim to underscore how AI can be a transformative force in narrowing healthcare disparities, reducing mortality rates,

and vastly enhancing healthcare accessibility in resource-constrained regions. By examining the Indian context as a case study, this research endeavors to advocate for visionary government policies, foster collaborative public-private partnerships and catalyze innovative strategies to render AI-powered healthcare solutions affordable, available, and life-saving for the masses.

Research methodology:

The study is exploratory and centered on a survey-based approach. It seeks to comprehensively investigate the perception and potential for adopting artificial intelligence (AI) in healthcare, with a specific focus on developing and underdeveloped regions, notably within Navi Mumbai's Kharghar area, India. To ensure diverse perspectives, a random sampling approach was employed. In this endeavor, the researcher engaged with 25 cancer patients out of 100 (on the basis of random sampling technique) who had experienced AI-based healthcare technologies.

Data was collected through a structured questionnaire employing a five-point Likert scale for responses, where 1 indicates strong agreement and 5 indicates strong disagreement. Demographic variables, including age, gender, education, profession, and geographic location, were incorporated into the data collection process. Data analysis was facilitated using the Statistical Package for the Social Sciences (SPSS), and the reliability of the survey instrument was evaluated through Cronbach's Alpha. Additionally, multiple regression analysis was employed to delve into the implications of AI adoption within the healthcare sector, specifically assessing the receptiveness of patients and healthcare stakeholders to the utilization of AI-based technologies, including robotic surgery, in the context of cancer treatment. The methodology employed in this study is more than a mere academic exercise. It serves as a pivotal cornerstone for shaping informed policy decisions and strategic initiatives. Ultimately, it aims to pave the way for more accessible and affordable AI adoption within the healthcare domain. By doing so, it seeks to address the overarching goal of improving healthcare outcomes and substantially reducing mortality rates, especially in resource-constrained regions where the need for transformative healthcare solutions is most pressing and acute.

Hypothesis:

H0: Artificial intelligence in healthcare does not significantly impact patients' feelings of fear.

H1: Artificial intelligence in healthcare significantly affects patients' feelings of fear, leading to improved trust and confidence in medical interventions.

Questionnaire structure:

The questionnaire (Table 1.2) is divided into two sections: the first focuses on the demographics of cancer patients, and the second asks about their opinions about the use of artificial intelligence in the healthcare sector.

Table 1.2

Section	Category	
Section One	General	Demographic information like name of the person, age, education
Section Two	Opinions about the use of artificial intelligence in the healthcare sector	Focuses on respondents' views regarding the implementation of AI in healthcare and their concerns or fears related to it.

Interface:

In Table 1.2: Section one collects demographic data, while section two gauges respondents' willingness to see AI used in healthcare, their ability to bear the costs of robotic surgery, and their anxiety or fear regarding AI.

Results and Discussion:

Reliability Measure:

Reliability analysis via Cronbach's coefficient alpha was conducted to assess the consistency of questionnaire statements. The alpha is a figure that ranges between 0 and 1. According to Cohen (2007), Cronbach's alpha value at 0.6 is marginally reliable while 0.91 or above is highly reliable. He also suggested that Cronbach's alpha value which is over 0.89 shows good estimates of internal consistency reliability. Cronbach's alpha value which is over 0.89 shows good estimates of internal consistency reliability. Cronbach's alpha value was calculated as follows:

$$\frac{N^2 \ X \ M(\text{COV})}{\text{SUM (VAR/COV)}}$$

Where N² = is the square of the number of items in the scale m(COV)= is the mean interterm covariance

Sum (VAR/COV) = equals the sum of all the elements in the variance/ covariance matrix Reliability for the questionnaire was calculated through SPSS. The statistics (Table 1.3) came out as:

Table 1.3 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.896	.982	6

It is considered that the reliability value should be more than 0.7, and it can be seen that in statistics, the reliability value was (.896) higher than the standard value, so all items in the questionnaire are reliable for study. Hence no changes were made to the questionnaire and all the items were retained for further analysis.

Taken from: (Impact of Brand Equity on Purchase Intension of Home Appliances, 2017)

Data Analysis:

Due to the limited sample size and data source constraints, the study acknowledges its limitations in generalizing results. The demographic variables considered included gender and age.

Table 1.4 Gender Profile of the Respondent

Gender	Percent
Male	46%
Female	54%
Total	100%

From Table 1.4, we know that out of the total respondents, 50% belonged to the 20-35 years category, followed by 46% belonging to the

35-45 years category, with only 4% belonging to the 45 years and above category.

Table 1.5 Age of the Respondent

Age	Percent	Cumulative percentage
25-35	50%	50%
35-45	46%	96%
45 and above	4%	100%
Total	100%	

Table 1.6 Descriptive Statistics

	Mean	Std. Deviation	N
AI-based device	4.04	1.654	25
AI implementation	2.08	.929	25
Fear of AI in medical treatment	2.38	1.096	25
Willingness for robotic surgery	2.13	1.035	25
Financial capacity	2.04	.908	25
Nervousness about AI in medical treatment	.46	.509	25

From this table, it's apparent that the standard deviation is extremely low, almost approaching zero. This indicates that the data points are clustered closely around the mean.

Table 1.7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.982[a]	.865	.802	.612

a. Predictors: (Constant), Nervousness about AI in medical treatment, the willingness for robotic surgery, financial capacity, Fear of AI in medical treatment, AI implementation

Table 1.8 ANOVA Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	16.012	6	2.668	2.779	.002[b]
	Residual	18.388	19	0.967		
	Total	34.400	25			

a. Dependent Variable: AI-based device

b. Predictors: (Constant), Nervousness about AI in medical treatment, the willingness for robotic surgery, financial capacity, Fear of AI in medical treatment, AI implementation

Table 1.9 Coefficients of the Variables

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.649	2.239		1.630	.020
AI implementation	.506	.520	.684	.974	.043
Fear of AI in medical treatment	-.129	.433	-.385	-.298	.053
Willingness for robotic surgery	.110	.418	.069	.263	.796
Financial capacity	.116	.478	.064	.243	.811
Nervousness about AI in medical treatment	-.787	.811	-.442	-.970	.034

a. Dependent Variable: AI-based device

According to the study (Table 1.9), there exists a negative correlation between nervousness (-.787) and fear (-.129) when receiving medical treatment. This suggests that as the use of artificial intelligence (AI) and robotic surgery continues to grow, fear and anxiety are likely to decrease.

The value of R2 equals 0.865, indicating that 86.5 percent of the variations in AI-based device usage can be explained by factors like the implementation of AI, willingness to accept robotic surgery, fear or nervousness regarding AI in medical treatment, and the ability to bear the associated expenditure. The value of R2 is statistically significant as indicated by the p-value (0.002) in the ANOVA Table. The estimated regression equation as obtained in the table may be written as:

$$Y=3.649+0.506X_1+0.110X_2-0.129X_3-0.787X_4+0.116X_5$$
P value= (.020) (.043) (.796) (.053) (.034) (.811)
Beta coefficient= (.684) (.069) (-.385) (-.442) (.069)

X_1 = AI implementation
X_2 = willingness for robotic surgery
X_3 = fear of AI in medical treatment
X_4 = nervousness about AI in medical treatment
X_5 = financial capacity

In selecting the variables for our regression equation, researchers aimed to capture key dimensions related to patients' perceptions and attitudes towards the use of artificial intelligence (AI) in healthcare. The variables were chosen based on their relevance to understanding the impact of AI on patient fear and nervousness in medical treatment.

Firstly, we included variables related to fear and nervousness about AI in medical treatment (-.129 and -.787) to examine their negative associations with AI-based device usage. These variables are crucial as they reflect the psychological and emotional responses of patients toward the adoption of AI technology in healthcare settings. Understanding the factors contributing to patient apprehension is essential for devising strategies to address and alleviate these concerns, thereby facilitating the acceptance and adoption of AI-driven healthcare solutions.

On the other hand, variables related to AI implementation, willingness to accept robotic surgery, and expenditure (.506, .110, and .116) were included to explore their positive associations with AI-based device usage. These variables are indicative of patients' receptiveness towards embracing AI technologies in healthcare, their readiness to undergo innovative procedures such as robotic surgery, and their financial capacity to bear the costs associated with AI-driven healthcare interventions. By examining these variables, we aim to elucidate the factors that promote the adoption and utilization of AI-based healthcare solutions among patients.

The beta coefficient of 0.684 for the implementation of AI underscores its relative importance in influencing patients' attitudes and behaviors toward AI-based healthcare solutions. This coefficient indicates the magnitude of the impact of AI implementation on patient perceptions, highlighting the significant role of AI technologies in shaping the future of healthcare delivery.

Furthermore, it's crucial to acknowledge the substantial financial implications associated with AI adoption in healthcare, particularly in countries like India with diverse economic backgrounds. The cost of AI implementation and robotic surgeries can be prohibitive, potentially limiting access for those with limited financial means. Beyond financial considerations, our research recognizes several other bottlenecks, including disparities in literacy levels and deeply entrenched sociocultural beliefs prevalent in rural areas. These factors contribute to the complexity of AI adoption in healthcare, necessitating nuanced strategies and awareness campaigns to address them effectively.

By including these variables in our regression equation and providing a comprehensive explanation of their selection, the study aims to offer insights into the multifaceted nature of AI adoption in healthcare and its implications for patient perceptions and behaviors.

Discussion:

Our research uncovers a significant enthusiasm among people for incorporating AI-based technology into healthcare. Nevertheless, we must grapple with the financial hurdles linked to AI adoption, notably in regions like India. The data highlights the urgency of government intervention to ensure that AI-driven healthcare solutions reach all sections of society. Such steps could involve subsidies, financial backing for research and development, and the creation of cost-effective healthcare facilities equipped with AI.

In the realm of AI in healthcare, it's worth noting that the global landscape is showing encouraging signs. The numbers we've presented in this section indicate a remarkable surge in the AI healthcare market, with substantial investments and growing confidence among healthcare professionals in AI technologies. Moreover, AI holds the potential to generate substantial cost savings for the

healthcare sector, supported by estimates that suggest AI applications could dramatically reduce annual healthcare expenditures.

Furthermore, we're witnessing a rising trend in implementing AI for medical diagnosis, offering the prospect of reduced treatment costs and enhanced health outcomes. For example, research from Harvard's School of Public Health indicates that AI-driven diagnoses could lead to cost reductions of up to 50% while concurrently improving health outcomes by 40%. Additionally, AI technologies are being explored to enhance breast cancer risk prediction, offering promising avenues for improved healthcare services.

On the global stage, we're observing rapid AI adoption in healthcare, with significant investments and advancements in various countries. For instance, China's government has set ambitious goals to become a frontrunner in AI innovation by 2030, with a particular focus on medical imaging. In South Korea, AI in the healthcare market is anticipated to experience substantial growth, driven by the utilization of big data and AI in medical device software.

Moreover, the global AI in healthcare market is on a trajectory towards substantial valuations in the forthcoming years. The data indicates substantial growth, with projections indicating a reach of USD 45.2 billion by 2026, reflecting a compound annual growth rate of 44.9% (Mehta, March 2023). These trends signify AI's potential to reshape global healthcare delivery and outcomes.

In conclusion, while the adoption of AI in healthcare offers immense potential, especially in addressing critical challenges such as low doctor-patient ratios, uneven expertise distribution, and affordability, it's imperative to acknowledge the central role of government intervention in guaranteeing accessibility and fairness. The financial challenges linked to AI adoption necessitate a collective effort to bridge the divide and fully leverage AI's potential to enhance healthcare outcomes.

Variables were chosen based on their relevance to the study's focus on AI's impact on patient fear in healthcare. Financial capacity was included due to its significant role in healthcare accessibility. However, the study acknowledges other potential influencing factors, such as literacy levels and sociocultural beliefs, which could be explored in future research to provide a comprehensive understanding of AI adoption in healthcare.

Recommendation:

Based on the study findings, several recommendations are proposed to effectively harness the potential of AI in healthcare:

1. Develop AI-driven educational platforms tailored to patients' needs: To alleviate fears and misconceptions surrounding AI in healthcare, it is imperative to develop educational platforms that cater to the specific needs of patients and caregivers. These platforms should provide clear and accessible information about the role of AI in diagnosis, treatment, and patient care, empowering individuals to make informed decisions about their health. Collaborations with healthcare professionals, patient advocacy groups, and technology experts are essential to ensure the accuracy and relevance of educational content.

2. Allocate resources for the implementation of AI technologies in healthcare facilities: To ensure widespread adoption and integration of AI technologies in healthcare, it is essential to allocate sufficient resources for their implementation, particularly in underserved areas like Kharghar. This includes funding for the procurement of AI-enabled medical devices, infrastructure upgrades to support AI-driven systems, and training programs for healthcare professionals to effectively utilize these technologies. Additionally, government initiatives and public-private partnerships can play a crucial role in facilitating the deployment of AI solutions in healthcare facilities across different regions.

3. Foster collaborations between healthcare providers, technology companies, and policymakers: Ethical and equitable deployment of AI in healthcare requires close collaboration between various stakeholders, including healthcare providers, technology companies, and policymakers. Interdisciplinary collaborations can help ensure that AI-driven solutions are designed and implemented in a manner that prioritizes patient safety, privacy, and equity. Furthermore, policymakers play a critical role in shaping regulatory frameworks and standards for the use of AI in healthcare, and their involvement is essential to addressing legal and ethical considerations associated with AI adoption. By fostering open dialogue and collaboration among these stakeholders, we can create a conducive environment for the responsible and effective integration of AI into the healthcare ecosystem.

Conclusion:

The potential of AI in healthcare is not just a distant dream but a tangible solution for countries like India, struggling with healthcare access. However, to realize this potential, governments must play a pivotal role in making AI technologies affordable and accessible to all. The cost barrier cannot be allowed to stand in the way of saving lives.

In India, the case of Kharghar serves as a microcosm of the broader challenges faced by developing and underdeveloped nations. The urgency lies in recognizing that AI in healthcare is not a luxury but a lifeline. It is the responsibility of governments to pave the way for innovation, foster partnerships, and create policies that ensure AI's reach to the masses.

The time has come for developing nations to unlock the transformative power of AI in healthcare and, in doing so, offer hope, accessibility, and a chance at a healthier life to millions who deserve nothing less. The investment is not just in technology; it's an investment in humanity's well-being.

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IDENTIFYING THE VITAL PARAMETERS INFLUENCING QUALITY OF SLEEP AMIDST MANAGEMENT STUDENTS

Dr. Naveen Pol, Dr. Nila Chotai*

Abstract

Quality sleep is predominantly considered as a significant aspect of our day today activity. Management students are constantly buffeted with challenging tasks as a part of their ongoing pedagogy. Often there are instances wherein the sleep is distorted due to few unprecedented activities. The research work makes an attempt, through in-depth review of literature in understanding the various antecedents that can to be considered as disturbance for quality of sleep. The internal consistency of the questionnaire is assessed through test of reliability. Hypothesis testing is computed in understanding the differences of opinion if any through parametric tests. The dimensions are framed using exploratory and confirmatory factor analysis. The attributes are collapsed into six different constructs through dimension reduction technique using R Programming. The influence of the independent attributes on the aspect of obstructive sleep is assessed through multivariate regression analysis (Structural Equation Model) using AMOS. Off all the antecedents the attributes confining the dimension of lifestyle and health are identified to be of high relevance. The stance is further substantiated through formulation of decision tree model.

Keywords : *Obstructive Sleep, Health Issues, Habits, Sleep Environment, Relationship Issues, Lifestyle, App Usage, Obstructive Sleep.*

Introduction

In recent past it has been a statement heard from the student fraternity, stating they are stifling with poor quality sleep. This ignites a thought to make an empirical study in understanding the key elements that can influence the aspect of quality of sleep. Quality sleep or sleep without obstruction is very essential as it assists the overall development of individuals. It is evident that obstructive sleep leads to several impediments amidst humans leading to multiple distress (Kim et al., 2022). Individuals might be buffeted with issues like; difficulty in concentration, memory issues, mood swings, lack of ability in decision making, increased risk of accidents, health issues, increased stress levels, Impaired communication skills, and the likes. The issues evolved from the chronic sleep deprivation can lead to insomnia (Jesudoss et al., 2023). Insomnia is a sleep disorder that is characterized by struggle falling asleep, staying asleep, or both

(Bard et al., 2023). Ancient Indian Vedic literature states sleep as the temporary death and further permeant sleep as death, for which humans thank the almighty to make understand the humans about the concept of aham (I, me and mine or ego). In connection to the same sleep is fragmented in four stages wherein jagrat is the waking stage of sleep, svapna is the dreaming stage, followed by the shushupti known as deep sleep and finally the turiya recognized as the highest stage only attained by the yogi (divine human who understands self, better than others (Kumar, 2015).

The relevance of quality sleep, if overlooked can impact into distorting results in long run. Sleep apnea (Hong et al., 2023), sexual dysfunction (Morehouse et al., 2011), suicidal behaviors (Romier et al., 2023), ischemic stroke (Hong et al., 2023), Coronary artery disease (Fujiyoshi et al., 2023), and the likes are some of the severe issues of poor quality sleep.

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Obstructive sleep are the outcomes from multiple mis practices. Of late due to the paradigm shift in technological ecosystem, individuals are head winded with electronic devices. Smartphones, laptops, smart televisions and the likes are the items used extensively causing people to sleep for lesser duration of time (Kheirinejad et al., 2022). Moods of humans and their health is influenced by the smart devices and the applications used on the same (Cao & Lin, 2017)(Likamwa et al., n.d.). The eating habits (Tregarthen et al., 2015), work life balance (Daei et al., 2019), sleep environment (Acikgoz et al., 2022), increase in stress levels (Sanusi et al., 2022), imbalance in behaviour (Cho & Lee, 2017), reduction in attention span (Nazime Tuncay, 2016), relationship issues (Ko et al., 2015), depression (Rozgonjuk et al., 2020), anxiety (Yang et al., 2020), time management issues (Maurya et al., 2022), worry than relax (Chen et al., 2022), reduction in physical activities (Dana et al., 2022) and the likes are recently resulting as significant indicators for obstructive sleep resulted from usage of electronic devices.

The average global sleeping duration is less than seven hours and Japan is the country with least sleep duration, being five hours and fifty-five minutes. Indians on an average sleep for six hours and twenty minutes. However, very few countries like Finland, Britain, Netherlands, and New Zealand sleep hours are more than seven hours (Chaput et al., 2018). The sleep duration amidst youth is deteriorating and is associated with multiple development aspect of the nation. For instance, Japan has the least reproduction rate and India has one of the least happiness indexes in the world.

Objective of the Study

1. To identify the various antecedents confining to the aspect of quality sleep amidst management students
2. To find the underlying dimensions that can

well explain the nuances of quality sleep amidst management students
3. To formulate a systematic process and identify the vital parameters distorting quality sleep amidst management students

Research Methodology and Data Analysis

The data is collated through structured questionnaire wherein all the attributes are referred through in-depth review of literature. Twenty-nine elements are identified to be part of independent variable and nine as dependent variable. Responses are collected from google forms wherein the respondents for the study are the management students in their third semesters. Through the assistance from management faculties, 418 responses are collected from five management colleges of which four are from Bangalore (St. Claret, NSB Academy, Padmashree College, and ISBR College) and one from West Bengal (MDI – Murshidabad). The average age of the respondents is 23 years and represent 20 states of India. Due the aspect of non-uniformity in their spread, they are classified into four different geographical regions being north, south, east and west India. The data set has no missing values and consists cent percent valid cases. The attributes of independent variables are added to frame a construct (Vital Parameters) and further the antecedents of dependent variable are added to frame another dimension (Obstructive Sleep). The construct being, Vital Parameters follow normal distribution wherein the value of skewness is identified to be 0.398 and kurtosis as 0.320 - within the permissible limit of +- 1.96. The questionnaire used is internally consistent as the Cronbach's Alpha is observed to be 0.899 being above the permissible limit of 0.70. To assess the uniformity of responses considering the demographic factors on the attributes of vital parameters, one sample t.test and one way analysis of variance is computed. The hypothesis for the same and the results of the analysis are mentioned below.

Hypothesis to assess the difference in the mean scores

Ho1: There is no difference in the mean scores of respondent's gender on the dimension of vital parameters.

Ha1: There is difference in the mean scores of respondent's gender on the dimension of vital parameters.

The p value for levene's test for equality of variance is identified to be 0.768, assisting to refer the value for equal variance assumed. The p value for one sample t.test is 0.012, being less than 0.05 level of significance. Further, it can be stated that the dimensions of vital parameters are of different opinion by the respondents considering their gender as independent factor.

Ho1: There is no difference in the mean scores of respondent's place of residence on the dimension of vital parameters.

Ha1: There is difference in the mean scores of respondent's place of residence on the dimension of vital parameters

Post hoc test for analysis of variance is computed and in the first instance the p value for levene's test is observed to be 0.057. The value for analysis of variance is considered over Welch test and it is identified that responses vary as per the state of residence on the aspect of vital parameters.

The test for mean differences paves way to compute cluster analysis as it can assist if the opinions are dependent of the respondent's segments.

Table 1: Results of Cluster Analysis

Clusters	1	2	3	4	5	Total
Five	44	157	84	80	53	418
Four	97	116	148	57		418
Three	101	143	174			418
Two	155	263				418

Chart 1: Gender and Respondents in each Cluster

The test of cluster analysis assists optimum number of clusters as three, as it can be observed in the above table wherein the uniformity in respondents is rationally split. The test for hierarchical cluster fails in providing enough evidence as the dendrogram depicts cluttered output. Further the kmeans test assists in providing sufficient evidence backed with silhouette score for assessment. The cluster analysis postulates a pattern wherein the both female respondents from cluster three representing south region are having different outlook on the aspect of vital parameters. Hence, creating non uniformity in the responses. This paves way in understanding the responses of these respondents to extract more insights.

The preliminary analysis prior to formulation of structural equation model is the computation of factor and principal component analysis. The figure below represents the appropriate fit of the attributes in the six dimensions framed. Varimax technique is used as the rotation method and the cutoff for factor loadings is considered to be 0.50.

Chart 2: Exploratory Factor Analysis
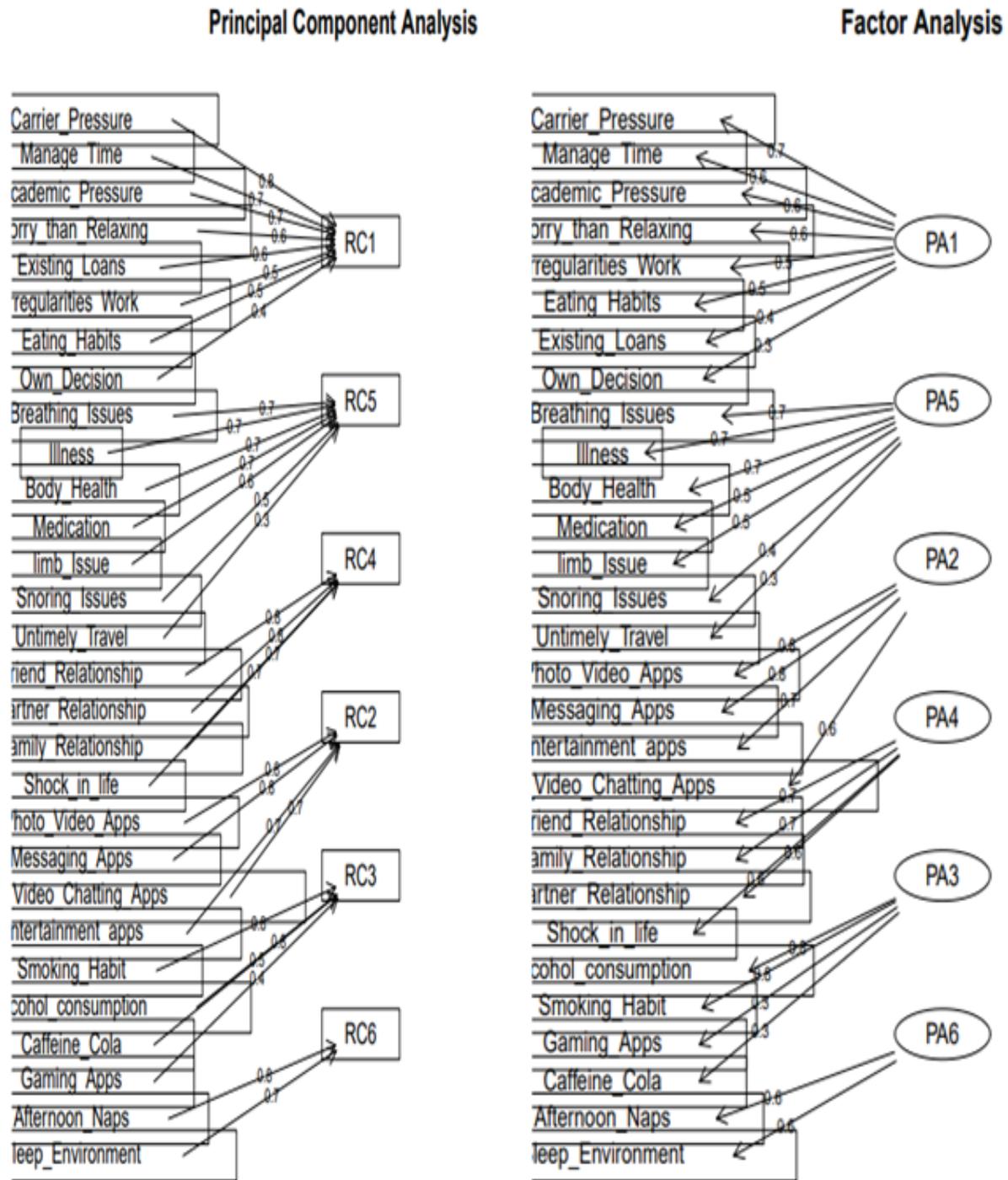
The concern pertaining to multicollinearity is further substituted through confirmatory factor analysis. The key values being CMIN/DF is identified to be 2.749 followed by the RMSEA value as 0.65. All the attributes have significant relationship on their constructs. The model represents appropriate fit, however an attempt was made in removing few items which were high on modification indices. The attributes removal had no much impact on the key indicators, hence retained.

Chart 3: Structural Equation Model
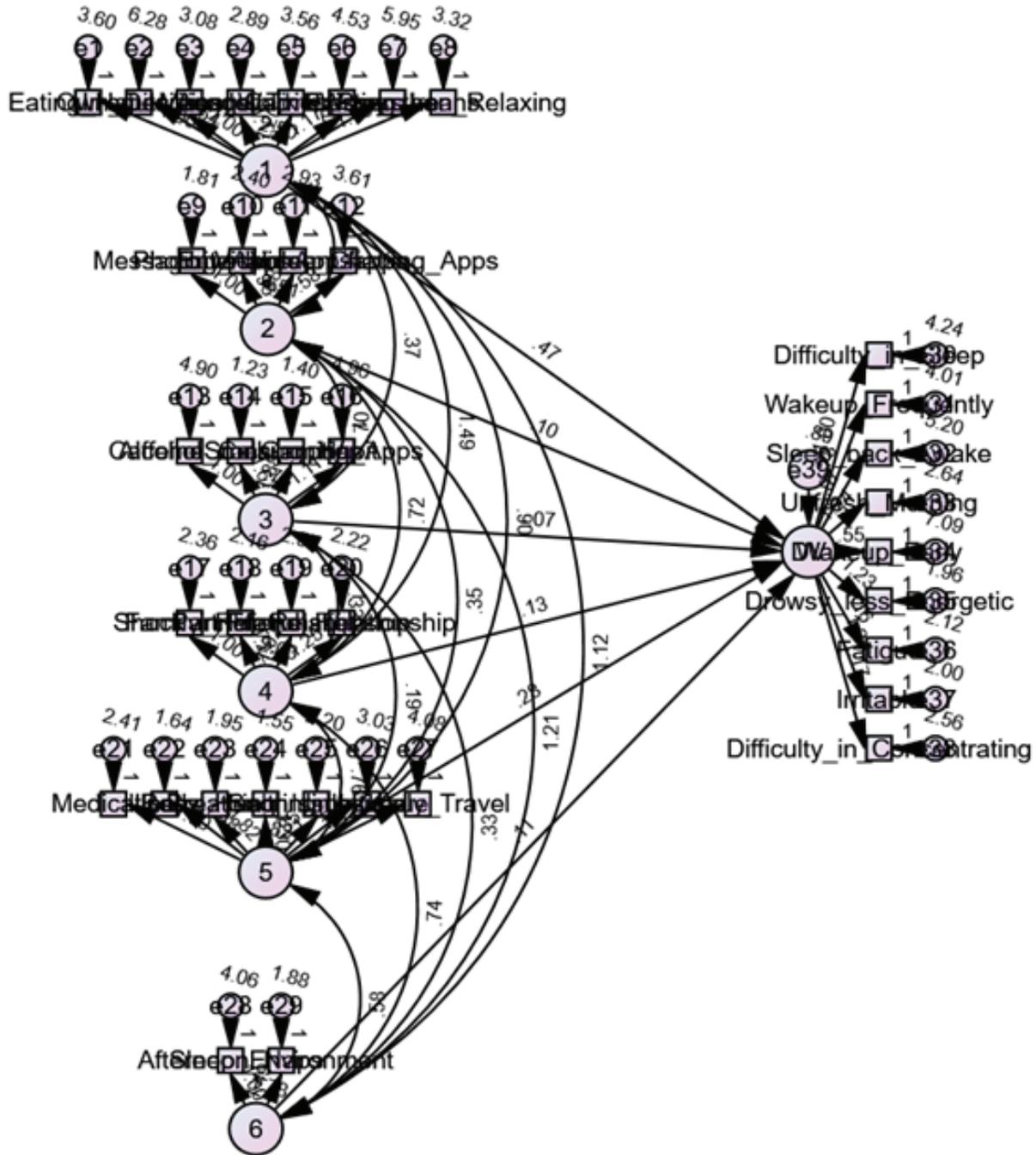
The third (Habits) and sixth (Sleep Environment) dimensions have statistically non-significant relationship on the variable obstructive sleep. Further the value of CMIN/DF is observed to be 2.549 and RMSEA is identified to be 0.60. The other model fit indicators are as follows, Model GFI .833, AGFI .807, PGFI .721, NFI .780, RFI .759, IFI .854, TLI .838, and CFI .853, being satisfactory. The regression weights for the dimensions are, Lifestyle .455, App Usage .092, Relationship .135, and Health .260. Hence, it can be stated that the attributes of lifestyle are of the highest predominance followed by Health, Relationship and App Usage.

Chart 4: Decision Tree Model
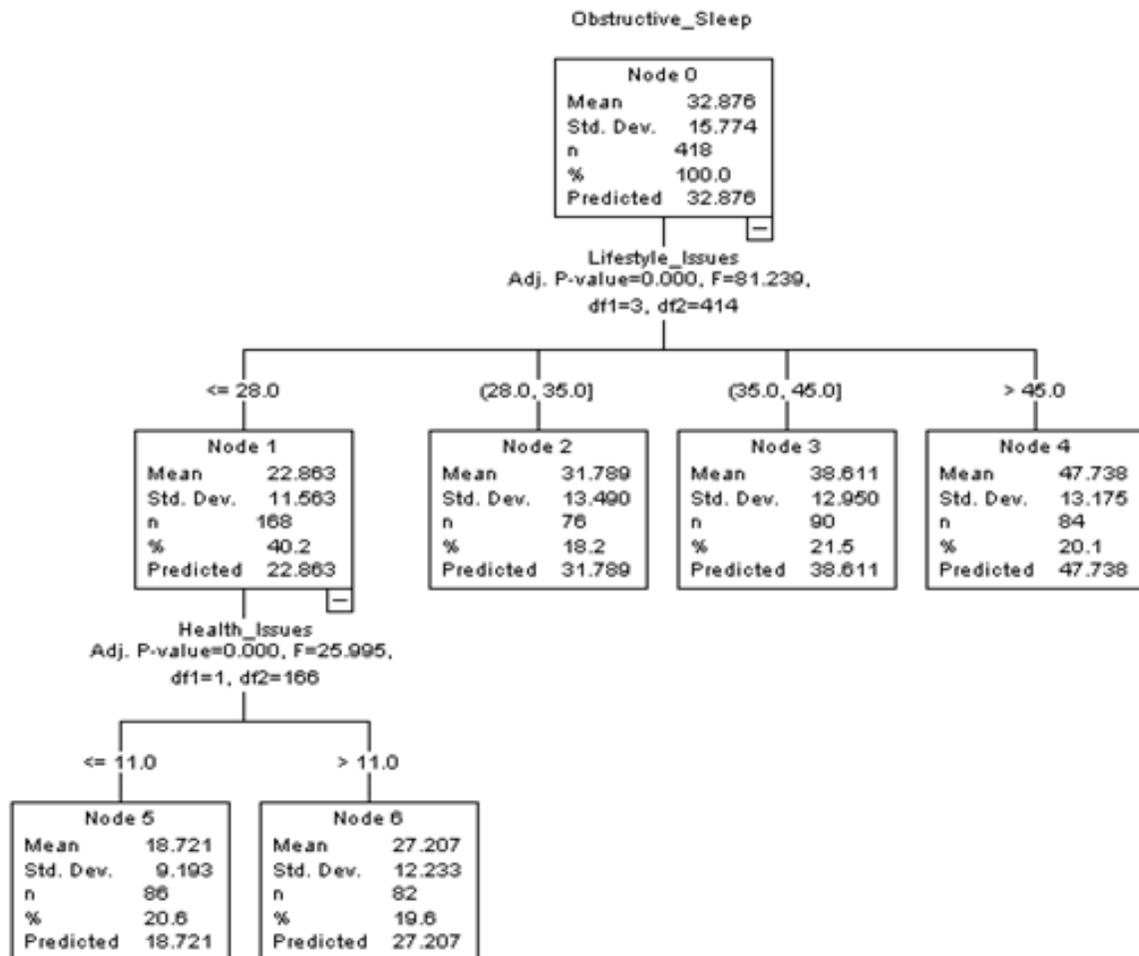
The outputs derived from the structural equation model can be further substantiated with the results obtained from decision tree model. The minimum cases in parent node are considered to be hundred followed by cases in child node as fifty. As depicted in the figure above it can be observed that the attributes of lifestyle are the preliminary influencer for obstructive sleep followed by the health issues. However, the second iteration considering the attributes as independent indicators specify the antecedents being worry more than relaxing, irregularities in work and usage of messaging apps as the vital parameters influencing obstructive sleep.

Findings from the Study

• The analysis considering gender on the dimension of vital parameters repre-

sent p value more than significance level resulting in acceptance of null hypothesis. Hence it is found that there is difference in the opinions considering gender of the respondents.

• The test for post hoc analysis of variance in regards to the geographical region of the respondents represent difference in the opinion towards the aspect of vital parameters. The analysis further provides scope in investigation of the demographic factors creating differences.

• Cluster analysis using kmeans clustering technique reflects segments of respondents from third cluster representing south region as the cluster responsible for change in the responses. This provides scope in assessing these segments in detail for further insights.

- Dimension reduction technique using factor analysis and principal component analysis, appropriately collapse the antecedents in six constructs. Further the indicators for model fit are satisfactory for confirmatory factor analysis. Hence the aspect of multicollinearity is addressed paving way for multivariate analysis.
- Structural equation model suggests the dimension of lifestyle as key influencing variable followed by the attributes of health. The parameters for lifestyle are eating habits, own decision, irregularities work, manage time, academic pressure, carrier pressure, existing loans, and worry than relaxing. The antecedents for health are medications, illness, body health, breathing issues, snoring issues, limb issue, and untimely travel.
- Decision tree analysis also suggest the similar variables as the key influencing factors. However, the predominant attributes identified are respondents worry than relaxing, usage of messaging apps and irregularities in performance of work. The attribute of lack in time management is considered to be the driving parameter for the attributes identified.

Suggestions and Conclusion

The study makes an attempt in identifying the vital parameters causing obstructive sleep amidst management students. Empirical evidence suggests the life style parameters as the key influencers and the students need to be handhold by the concerned stake holders. The role of the faculties and the instructional heads becomes crucial in formulating appropriate structure for the students to overcome the issues of obstructive sleep. Guidance in terms of formulating efficient work plans and in time attainment of the same is to be closely monitored. Sizable workshops of managing lifestyle and health are to be cascaded from experts in the domain. The study makes an attempt to contribute concepts to the existing body of knowledge that will assist the society by large in addressing the issue of obstructive sleep.

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A CRITICAL STUDY TO EVALUATE THE REASONS BEHIND TERMINATION OF M&A DEALS

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Abstract

This study aims to critically evaluate the reasons behind the termination of Mergers and Acquisitions (M&A) deals in India between 2012 and 2022. The study hypothesizes that deal characteristics, such as the size of the deal, nature of the deal, and method of payment, along with firm characteristics, such as the P/E ratio of the acquirer, are significant factors in the success or failure of M&A deals. The study utilizes logistic regression analysis on data obtained from Bloomberg. The results reveal that the size of the deal, nature of the deal, and method of payment have a significant correlation with the likelihood of M&A failure, supporting the first three hypotheses. However, the study fails to find significant evidence supporting the fourth hypothesis that the P/E ratio of the acquirer has a correlation with the likelihood of M&A success. The limitations of the study include a small sample size and the exclusion of private companies. Future research could overcome these limitations by expanding the sample size and including private companies in the analysis. The findings of this study could provide valuable insights for firms considering M&A deals in India.

Keywords : Mergers and Acquisitions (M&A) Termination / Withdrawal of deals Deal Size Mode of payment, Nature of Takeover

Introduction

Mergers and acquisitions (M&A) have become a popular strategy for organisations seeking development and expansion in today's worldwide economic environment. M&A transactions include the merger of two or more firms into one company in order to generate synergies, economies of scale, and a competitive advantage. While many merger and acquisition transactions are successful, a considerable proportion of transactions fail, resulting in withdrawal or cancellation.

This research paper will focus on analysing the reasons behind the withdrawal or termination of M&A deals in India between the years 2012 and 2022. The study will examine the relationship between deal characteristics and firm characteristics, including deal size, nature of takeover, method of payment, price-earnings ratio (P/E ratio. The examination of these variables will provide a thorough knowledge of the elements that hinder M&A transactions in India. The results of this study can help organisations looking to complete profitable M&A deals in India by guiding deal-making and integration planning methods.

India offers a distinctive backdrop for researching M&A transactions due to the country's recent profound political and economic upheavals. Many laws have been put in place by the Indian government to entice

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foreign investment, and many Indian business-es have attempted to grow worldwide. The complicated regulatory framework in the Indian market, however, is also well-known and can provide major difficulties for businesses looking to conduct M&A deals. Overall, this research paper will provide valuable insights into the reasons behind the withdrawal or termination of M&A deals in India between the years 2012 and 2022. The study will contribute to the broader literature on M&A deals and provide guidance for companies seeking to engage in successful M&A transactions in India.

The remainder of the paper is as follows; section two examines the M&A studies literature already in existence. The study's variables and assumptions are described in section three. The research design is described in section four, along with sample selection and model development. The study's results are reported in part five, and a summary of the findings and the study's limitations is given in section six.

Literature Review

Year	Author	Results
2014	Warter & Warter	The authors have noted that performance of the companies have an effect on the outcome of the M&A deal. The study also revealed that importance of due diligence in M&A doesn't have any significant impact on the overall outcome of the deal. The authors argue that future studies must focus on analysing the relationship between cultural and non- cultural determinants.
2014	Feito-Ruiz, Fernández, & Menéndez-Requejo	The authors assert that management opportunism and knowledge asymmetries play a role in the completion rates of M&A negotiations. The need of due diligence and excellent communication between the acquirer and the target firm is highlighted by the role of management opportunism and information asymmetries in order to enhance the chance of a successful M&A deal.
2014	Garzella & Fiorentino	The study's findings indicate that generating synergies is critical for M&A agreements to provide value for shareholders. It emphasis-es the need of successful post- merger integration, as well as strong leadership and communication abilities, in attaining this aim.
2015	Tang et al.	The authors analysed the termination returns of acquirers in failed acquisitions and discovered that the gains for the acquirer varied greatly depending on the type of target firm. Tang discovered that acquirers in private target deals earned much larger profits upon contract termination than acquirers in public target deals. Furthermore, the study discovered that acquirers in deals with targets in the same industry or sector as the acquirer had bigger benefits upon contract termination than acquirers in deals with targets in other industries or sectors.

Year	Author	Results
2015	Junni, , Sarala, Tarba, & Weber	The authors emphasise that the traits of a firm's tangible resources and intangible assets, such as its management qualities, knowledge base, and organisational culture, may be assigned as the major variables influencing the result of acquisitions. The significance of intangible assets like management qualities, knowledge base, and corporate culture is also highlighted by the writers.
2016	Malmendier et al.	The study also revealed that manner of payment in a takeover attempt can have significant ramifications for the target company's valuation, even if the deal fails. The authors examined failed takeover proposals and discovered that the targets of cash offers were revalued by a positive 15% after the deal failed. Targets of stock-funded bids, on the other hand, tended to revert to their pre-announcement levels when the transaction failed.
2017	Halevy et al	According to the author, organizational profitability has a significant role in determining the possibility of mergers. A firm may become more appealing to potential buyers if it has high levels of profitability since it shows that it is well-managed and has great financial performance. managed and has great financial performance.
2017	Alhenawi & Stilwell	The authors identified the acquirer's previous performance lead to value creation after M&A transactions. They discovered that organisations with a successful track record of M&As are more likely to produce value from subsequent M&As. They discovered that targets with high pre-merger valuations are more likely in a successful purchase to produce value for the acquirer.
2018	Faria, Gao, & Günster	The authors used a combination of accounting measures and stock market data to evaluate the performance of acquirers before and after the acquisition, and found that the average performance of acquirers improved in the long term. However, they also found that this improvement was driven by a relatively small number of high-performing deals, and that many deals failed to generate value.
2019	Okafor et al.	The author has mentioned that thorough assessment of due diligence within the target firm must ensure to address areas of concerns regarding successful integration. The paper has concluded that timely and consistent communication is extremely important for the success of M&A deals.
2019	Ding et al.	The author note that businesses employ M&A to accomplish a range of goals, including market expansion, cost reductions, and improved operational efficiency. The study concluded that while M&A can increase operational efficiency, obstacles to its effectiveness include cultural incompatibilities and overvaluation. The study also found a need for more research on standard measures for measuring the success of mergers and acquisitions as well as long-term performance review.

Year	Author	Results
2020	Shetty & Hegde	The authors discovered that M&A is frequently employed to accomplish strategic goals including market growth and synergy development. In order to achieve M&A success, the research emphasised the significance of adequate due diligence and post-merger integration. The study also found gaps in the body of knowledge about how mergers and acquisitions affect personnel and corporate culture.
2021	Hiebl & Gartner	The authors indicated that an approach to M&A performance evaluation which is more dynamic and adaptable and that takes into consideration the changing business environment and the changing M&A objectives is necessary. The study also stressed the significance of taking into account non-financial elements in M&A performance evaluation, such as corporate culture and leadership.
2021	Tanna, Yousef, & Nnadi, M	The paper investigated whether likelihood of deal success is influenced by variables like method of payment, diversification, target status and acquirers 'prior bidding experience. The authors concluded that probability of deal failure must factor in market reaction at the time of deal announcements.
2021	Kang & Park	The industry type, deal size, and acquisition technique were among the contextual variables that the authors identified as having an influence on the success of M&A transactions. According to the report, industry-specific measures like market share and customer satisfaction are crucial for assessing the effectiveness of M&A deals. The research also stressed the requirement for uniform criteria that account for the intricacies of every M&A deal.
2021	Attah-Boakye, Guney, Hernandez-Perdomo, & Mun	The authors reveal that the likelihood of M&A withdrawal is strongly correlated with the economic freedom score of the target nation. The study also revealed that deals involving M&As are less likely to fall through if the target company is more profitable. Futhermore the likelihood of failure decreases as size of the acquiring firm gets larger but it increases when the size of the target firm gets larger.

Variables Discussion And Hypothesis Development

Previous studies have highlighted that deal parameters such as deal size, nature of deal, and mode of payment may have an effect on the success or failure of M&A transactions. Acquirers may make educated judgements about which acquisitions to seek and how to structure the deal by examining these features.

Deal Characteristics: Mergers and acquisitions (M&A) transactions can succeed or fail depending on the deal's specific qualities. Deal characteristics in the context of M&A relate to the particular features of the deal that might affect its conclusion. These characteristics include the amount, type, and payment mechanism of the agreement.

Size of deal : One of the most important deal characteristics in M&A is deal size. Due to their complexity and integration difficulties, bigger agreements are seen to have a higher failure

probability than smaller ones. For instance, merging two sizable businesses that have dissimilar organisational structures, cultures, and operating systems can be extremely difficult and may result in the acquisition falling through. On the other hand, due to their simplicity and ease of integration, smaller agreements can have a better probability of success. A study by Veliyath and Suresh (2016) have revealed that the size of the deal, has a major influence on the success of M&A deals. The authors discovered that larger acquisitions are more likely to fail due to their complexity and integration issues. As a result, the following hypothesis can be proposed:

Hypothesis 1: There is a significant relationship be between deal size and M&A deal failure

Nature of deal: Another important variable that determines whether an M&A transaction succeeds or fails is the type of the deal. In terms of the nature of the deal, hostile takeovers have been linked to a higher chance of failure than friendly or neutral transactions. Naldi et al. (2013) argues that hostile transactions are more likely to fail owing to resistance from the target firm's management and employees. The management and staff of the target company frequently oppose hostile takeovers, creating integration problems, cultural conflicts, and possibly legal complications. A successful integration is more likely to occur in amicable transactions, when the target firm and the acquiring company have a shared understanding and agreement. Therefore, the following hypothesis can be proposed:

Hypothesis 2 : There is a significant relationship nature of deal and M&A deal termination

Mode of Payment: The mode of payment, whether in cash, stock, or a combination of the two, can significantly influence the success or failure of an M&A transaction. Li and Li (2020) have found that cash transactions have a greater success rate than stock transactions. This, as stated by the authors, is due to the fact that cash transactions are easier to fund, have less regulatory impediments, and are less prone to value concerns. In contrast, the value of the target company's shares, legal restrictions, and the requirement for shareholder approval may provide difficulties for stock transactions. Therefore, the following hypothesis can be proposed:

Hypothesis 3: There is a significant relationship be between method of payment and M&A deal termination

Firm Characteristics: Firm characteristics refer to the characteristics of the firms engaged in the transaction, such as their financial health, industry position, and potential for development.

Price to earnings (P/E) ratio: The acquiring company's price-to-earnings (P/E) ratio is one specific business attribute that has been demonstrated to affect the success of M&A negotiations. The P/E ratio is a financial indicator that compares a company's stock price to its earnings per share.

The success or failure of an M&A deal can also be influenced by firm characteristics, such as the acquirer's P/E ratio. According to a study by Huang et al. (2018) have noted P/E ratio might have an effect on the success or failure of M&A The authors have stated that this is because companies with high P/E ratios are more likely to be in better financial shape and have greater growth potential. As a result, the following assertion may be made:

Hypothesis 4: There is a significant relationship be between acquirer's P/E ratio and M&A deal termination

Research Methodology

To carry out the study the analysis was limited to the Indian region and the time period of 2012-2022. The data source for this study was Bloomberg, which provided the necessary

financial data and information on M&A deals in India. The dataset included information on deal size, nature of the deal, method of payment, P/E ratio of the acquirer, and whether the deal was terminated or completed.

The logistic regression model was built using R, a statistical software program. The model was designed to test the four hypotheses identified in the study. The dependent variable in the model was the success or failure of the M&A deal, while the independent variables were the deal characteristics and firm characteristics.

The model was tested using a sample of 106 M&A deals that took place in India during the study period. The sample was selected using a random sampling technique to ensure that it was representative of the population of M&A deals in India during the study period.
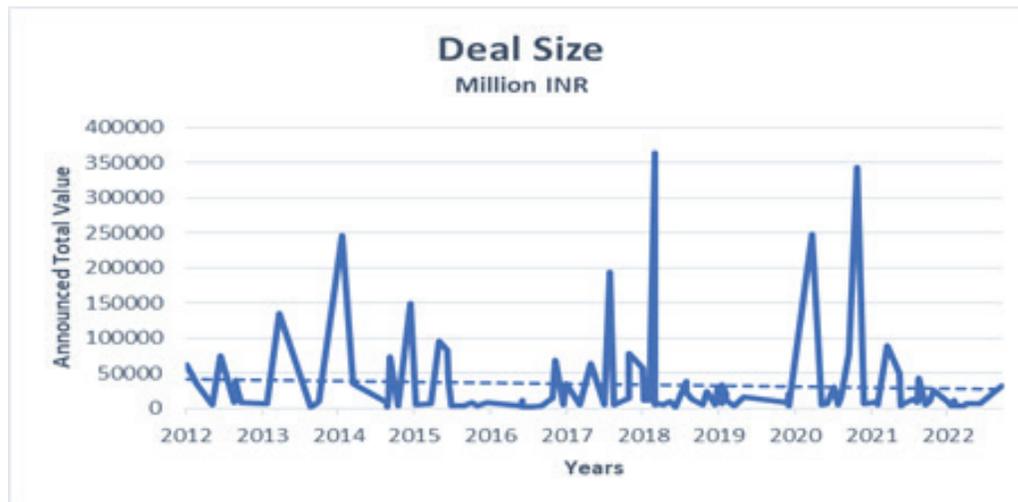
Fig : 1

Figure 1 shows the deal size of M&As activities in India during the study period 2012-2022.

Data Description:

Fig : 2

The aforementioned figure depicts the data that was used as input to conduct a logistic regression analysis in the R programming language.

Results Discussions
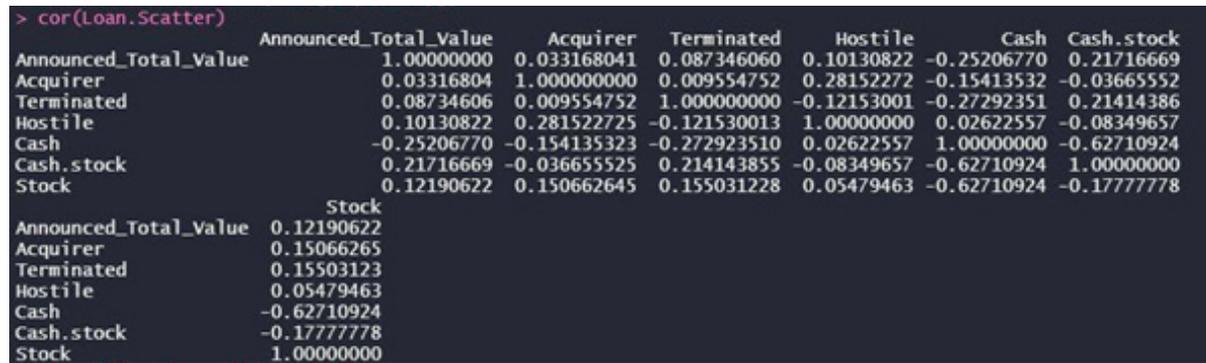
Fig : 3

Figure 3 shows the output from the R program correlation analysis which shows the correlation coefficients between the variables in the aforementioned dataset.

The correlation matrix provided shows the correlation coefficients between the dependent variable (Terminated) and the independent variables (Announced Total value, Acquirer P/E, Hostile, Cash, Cash and Stock). Here is a technical interpretation of each coefficient:

- Terminated and Announced Total value: The correlation coefficient between Terminated and Announced Total value is 0.087, indicating a weak positive correlation. This suggests that as the value of announced deals increases, there is a tendency for more deals to be terminated.

- Terminated and Acquirer P/E: The correlation coefficient between Terminated and Acquirer P/E is 0.033, indicating a weak positive correlation. This suggests that there is no significant relationship between the identity of the acquirer and the likelihood of a deal being terminated.

- Terminated and Hostile: The correlation coefficient between Terminated and Hostile is -0.12, indicating a weak negative correlation. This suggests hostile deals are slightly less likely to be terminated.

- Terminated and Cash: The correlation coefficient between Terminated and Cash is

- 0.27, indicating a moderate negative correlation. This suggests that as the proportion of cash payments in a deal increases, there is a lower likelihood that deals will be terminated.

- Terminated and Cash & stock: The correlation coefficient between Terminated and Cash and stock is 0.217, indicating a weak positive correlation. This suggests that as the proportion of cash and stock payments in a deal increases, there is a slightly higher likelihood that deals will be terminated.

- Terminated and Stock: the coefficient between Terminated and Stock is 0.155, indicating a positive but weak correlation between the two variables. This suggests that as the proportion stock payments in a deal increases, there is a slightly higher likelihood that deals will be terminated.

From the correlation analysis it can be concluded that size of deal (announced total value), friendly takeover, stock and hybrid payment will have a significant impact on the likelihood of deal being terminated. In contrast, hostile takeover and cash payment leads to lower likelihood of deal being terminated. However, acquirer P/E does not have any effect on termination of deals.
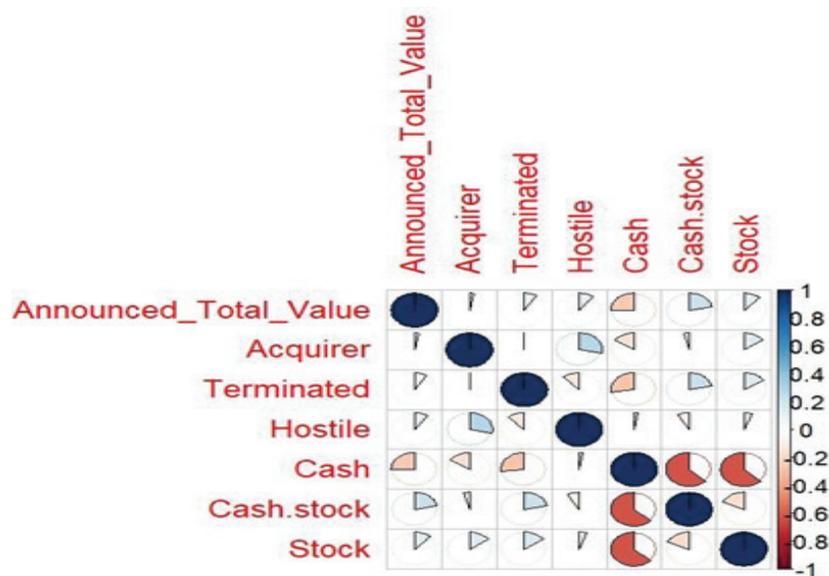
Fig : 4

Fig 4 is a correlation plot which shows the graphical representation of correlation matrix and the analysis from the plot is explained below

- Cash mode of payment leads to lower likelihood of deals being terminated. This means that cash as a method of payment can lead to completion of M&A deals.

- Hybrid mode of payment and Hostile takeover has a significant lower likelihood of deals being terminated. This means that hybrid mode of payment can lead to completion of M&A deals.

- Deal size, Stock mode of payment and Friendly takeover has higher lower likelihood of deals being terminated, which means these variables can be a potential reason for withdrawal of M&A deals.

- Acquirer's P/E ratio does not have any significant effect on the termination of M&A deals.

Fig : 5

Figure 5 shows the results of a logistic regression analysis with "Terminated" as the

dependent variable and "Announced Total Value," "Acquirer P/E," "Hostile," "Cash," "Stock", "Cash and Stock" as the independent variables. The estimates column shows the coefficients for each independent variable.

- A p-value of 0.646 indicates that the coefficient for Announced Total Value is not statistically significant. This means that there is not enough evidence to suggest that there is a relationship between the Announced Total Value and deal termination in the logistic regression model. Therefore, the null hypothesis is accepted.

- The independent variable "Hostile" has a p-value of -0.008, which is less than 0.05, indicating that it is statistically significant in predicting the dependent variable. Therefore, the null hypothesis is accepted.

- The independent variables "Cash", "Cash and Stock", and "Stock" all have p-values of 0.004, which are less than 0.05, indicating that they are statistically significant in predicting the dependent variable. Therefore, null hypotheses are rejected.

The Null deviance and residual deviance are measures of the model's goodness of fit. The null deviance represents the deviance of a model with only an intercept term, while the residual deviance represents the deviance of the model with the independent variables included. The difference between the two measures shows the reduction in deviance due to the inclusion of the independent variables. In this case, the residual deviance is lower than the null deviance, indicating that the model is a good fit for the data.

```
#All Variables
Logit.eq<-Terminated ~Announced_Total_Value+Acquirer+Cash+Cash.stock+Stock+Hostile

Logit <- glm(Logit.eq,train.logit, family = binomial)

# Extract the p-values from the summary table
p_values <- summary(Logit)$coefficients[,4]

summary(Logit)
car::vif(Logit)

pred.logit.final <- predict.glm(Logit, newdata=val.logit, type="response")

View(pred.logit.final)
```

Fig : 6

Figure 6 shows first line of code specifies a logistic regression model using the formula

Terminated ~ Announced_Total_Value + Acquirer + Cash + Cash.stock + Stock + Hostile.

Terminated is the dependent variable, and *Announced_Total_Value, Acquirer, Cash, Cash. stock, Stock, and Hostile* are the independent variables used to predict *Terminated.*

train.logit is the dataset used to train the model.

The output of 56% is the predicted probability of the dependent variable (Terminated) being true (i.e., equal to 1) for each observation in the

validation dataset based on the logistic regression model that was fitted using the training dataset.

This means that means that the logistic regression model was able to accurately predict the outcome (termination of deals) using the independent variables in 56% of the cases.

Discussion And Conclusion

This report demonstrated an alternate treatment framework to analyse the reasons influencing the withdrawal of transactions from 2012 to 2022 in

India with an effort to provide new perspectives to the M&As studies. The results revealed that deal characteristics such modes of payment (i.e., cash, stock, hybrid), size of deal and nature of takeover (friendly and hostile) have an impact on the termination of M&A deals. However firm characteristics (i.e., acquirer's P/E) did not have any impact on termination of M&A deals.

We find that different modes of payment have an impact on deal completion/ termination in significant manner. It was found that as the proportion of cash payments in a deal increases, there is a lower likelihood that deals will be terminated. This may be because cash offers are seen as more certain and less risky than stock offers (Aggarwal and Jiang, 2014). Also as the proportion of cash and stock payments in a deal increases, there is a slightly higher likelihood that deals will be terminated. The proportion stock payments in a deal increases leads to higher likelihood of deals being terminated. This may be because stock offers are seen as more uncertain and riskier, and therefore, may be more likely to be affected by changes in market conditions (Andrade, Mitchell, and Stafford, 2001).

Our results also revealed that friendly takeover has the higher likelihood of leading to deal termination. This meant that hostile takeovers lead to lower termination which aligns with the study by (Gunay, Ozkan, and Ozkan 2015) found that hostile deals are more likely to be completed than friendly deals, as the target company is less likely to resist the acquisition. Friendly deals involve more negotiation and agreement between the parties, which can increase the likelihood of disagreements and changes in the deal terms (Song and Walkling 2015).

Our results further suggest that firm characteristics (i.e., acquirer' P/E) does not have any significant impact of termination of deals. The finding is in line with a study (Schwienbacher and Stiefel 2014), which suggests that the financial features of the acquirer, such as cash holdings, debt levels, and profitability, have a small influence on the likelihood of M&A agreements being completed. This might be because M&A transactions are driven more by strategic concerns than by financial considerations.

Furthermore, it was also found that size of deal (i.e., announced total value) have an impact on deal termination. M&A deals are less prone to fail if size of deal is lower. This finding is consistent with the results of previous study by (Betton, Eckbo, and Thorburn 2015) found that larger deals are more likely to be terminated due to regulatory or antitrust concerns, financing difficulties, and other factors.

The main implication of our study for decision makers is that deal characteristics like mode of payment, size of deal and nature of takeover affect the termination/ completion of M&A deals.

As with any research, this study also has some limitations. Firstly, the study is limited to the Indian market, which may limit the generalizability of the findings to other markets. Therefore, caution should be exercised when attempting to extrapolate the results to other contexts. Additionally, the study only considers M&A deals that have been terminated, which may not provide a complete picture of the factors that contribute to the success or failure of M&A deals. Furthermore, the study relies on data sourced from Bloomberg, which may not be comprehensive or entirely accurate. It is also possible that there may be other unobserved factors that influence the success or failure of M&A deals, which are not included in the analysis. Lastly, the study uses logistic regression as its main analytical tool, which may have limitations in capturing the full complexity of the relationships between the variables. Despite these limitations, this study provides valuable insights into the factors that contribute to the termination of M&A deals, which can inform future research and practice in the field.

Suggestions for future study could include expanding the analysis to other regions or countries to assess if the findings are consistent.

Additionally, including more variables such as cultural differences or industry-specific factors could provide a more comprehensive understanding of M&A deal terminations. Using different statistical models or methods could also provide additional insights into the relationships between the variables and the likelihood of M&A deal failure. Finally, conducting qualitative research such as interviews with industry experts could provide a deeper understanding of the factors influencing M&A deal termination.

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THE RISE OF THE DIGITAL MARKETING ECOSYSTEM

Mr. Fathima Raj Kilimas, Dr. D Narasimha Murthy*

Abstract

This article provides a comprehensive overview of the evolution of industrial revolutions and their impact on the global landscape, culminating in the digital transformation seen in the 21st century. It chronicles the progression from mechanization to the advent of Cyber Physical Systems (CPS) in the fourth industrial revolution, highlighting the intertwined nature of the digital and physical worlds and the resultant VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) environment. It emphasizes the unparalleled global connectivity and digital engagement driven by the widespread accessibility of the internet and mobile phones, with a focus on the significant role of social media platforms.

It delves into the paradigm shifts in digital marketing, such as the 'Zero Moment of Truth' (ZMOT), and the importance of engaging with customers in the digital space through various forms of content. It examines the intricacies of digital marketing, including Search Engine Optimization (SEO), Search Engine Marketing (SEM), and Social Media Marketing (SMM), and the strategic importance of content optimization for enhancing visibility on search engines and social media. It also highlights innovations in the digital marketing arena, driven by technologies like AI, IoT, Blockchain, and Big Data. It points out the challenges and responsibilities faced by Chief Marketing Officers (CMOs) in navigating these advancements and adapting to rapidly changing digital landscapes. It also discusses the growing significance of the Metaverse and the advancements in advertising technology (Ad Tech), emphasizing their potential to open new opportunities in digital marketing.

Keywords : Digital Marketing, Social Media, Search Engine Optimization, Paid Ads, Technology

Introduction

The journey through industrial revolutions recounts a transformative global landscape. The inaugural industrial revolution, emerging in the late 18th century, was primarily driven by the advent of mechanization, a pivotal shift from manual to machine-led production. Progressing into the mid-19th century, the world witnessed the second industrial revolution, hallmarked by a leap towards mass production, underpinned again by advanced mechanization (Park, 2005). These were epochs of profound change, setting the stage for the third industrial revolution in the mid-20th century. This era was distinguished by the introduction of automation, the burgeoning internet, and the integration of electronic and information technology (IT) systems, reshaping industries, and lifestyles alike.

The dawn of the 21st century marked the onset of the fourth industrial revolution, unique in its premeditated nature and driven by the innovation of Cyber Physical Systems (CPS). Unlike its predecessors, this revolution was envisioned and orchestrated, leveraging the synergy between the digital and physical realms. The resultant world, characterized by its Volatility, Uncertainty, Complexity, and Ambiguity (VUCA), reflects the intricate and interwoven nature of a globally connected society. This newfound connectedness transcends geographical boundaries, enabling unparalleled access and interaction with users worldwide. It has fostered an environment where

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understanding and catering to customer desires and needs is not just possible but essential. The expansive reach provided by these technological advancements has created a landscape where businesses can more effectively understand and respond to the diverse and evolving desires of a global customer base (Ostrom et. al., 2015). This ability to engage with customers across continents has not only redefined the parameters of customer service and experience but has also necessitated an adaptive, insightful approach to global market dynamics, consumer behaviour, and preferences.

In the contemporary era, our global community experiences an unprecedented level of connectivity, largely fuelled by the declining costs of data and the widespread accessibility of mobile phones. This digital era is characterized by an astonishing number of internet users worldwide, with statistics indicating that out of the 5.18 billion individuals connected to the internet, a staggering 4.95 billion are engaged with social media platforms (Penchev, 2023). Further highlighting this digital penetration, approximately 5.3 billion people have access to mobile phones, with over half of these users owning smartphones.

The influence of this digital expansion is exemplified by Meta's revelation that their Family Daily Active People (FDAP) count - a metric representing the daily users of at least one of their core products, such as Facebook, WhatsApp, Instagram, or Messenger - stands at 2.81 billion. This figure underscores the vast digital reach of these platforms. In a year, from 2023 to 2024, the number of social media users escalated to over 4.95 billion, illustrating a rapid and continuing growth in digital engagement.

This trend is not only reflected in user numbers but also in the commercial sphere. Facebook has reported an uptick in its FDAP, while Google has observed an increased willingness among advertisers to invest in digital marketing (Khoa, 2023). These trends are supported by research indicating that individuals aged between 16 to 64

spend an average of nearly 7 hours daily on the internet. This extensive engagement signifies a pivotal shift in the internet's role – from a mere communication tool to a central driver transforming various industries. The digital landscape has become a powerful force, influencing everything from consumer behaviour to business operations, and reshaping industry dynamics on a global scale (Basu et. al., 2023).

In 2011, a significant paradigm shift occurred in the digital marketing sphere when Google introduced the concept of the 'Zero Moment of Truth' (ZMOT) (Lecinski, 2011). This term refers to the critical decision-making moment that occurs before a customer interacts with a product either online or offline - a phase coined as the 'First Moment of Truth' by Procter & Gamble. ZMOT represents the instant when a potential buyer starts seeking information about a product, marking a pivotal point in the consumer's journey.

This concept revolutionized the way companies approach their digital presence, underscoring the necessity of being not just visible, but compellingly present in the digital domain. It emphasizes the importance of engaging with customers at this crucial juncture, where information is sought, and decisions begin to take shape. The imperative for firms is clear: to articulate the benefits of their products effectively and persuasively, particularly in the spaces where potential customers are conducting their pre-purchase research.

Search engines have emerged as central players in this information-rich world, serving as gateways to the vast reservoirs of data that shape consumer decisions (Nicholas & Herman, 2010). Their fundamental operations – crawling web content, indexing it, and then ranking it on Search Engine Results Pages (SERP) – have become critical factors in how companies strategize their online presence. It is crucial for businesses to understand and master the art of optimizing their

content to rank higher on SERPs, thereby increasing their visibility to potential customers (Kumar & Paul, 2020).

As of December 2021, Google dominated the search engine market with over 90% of the global market share, and even higher in some countries. While optimizing content for Google is often sufficient due to its widespread use, companies should not overlook other search engines that potential customers might use. Understanding and harnessing the specific algorithms and preferences of various search engines is essential for businesses to effectively capture and display their content to a targeted audience (Papagiannis, 2020).

Beyond just search engines, online advertising plays a significant role in reaching potential customers. Ads, strategically placed across various digital platforms, can complement organic search strategies and enhance a company's visibility and engagement with its audience (Juska, 2021). The integration of both search engine optimization and targeted advertising forms a comprehensive approach to digital marketing, enabling businesses to effectively interact with and influence potential customers at the critical Zero Moment of Truth.

In 2024, global advertising expenditure is expected to grow by 4.6%, reaching $752.8 billion. This growth is driven by media inflation and significant events like the UEFA EURO2024 and the US presidential election. Digital ad spending is forecasted to reach $442.6 billion, accounting for 58.8% of the total ad spend. Connected TV ad spending is also predicted to see a substantial increase of 30.8%. The Americas are expected to experience the most dynamic growth in advertising spend, surpassing Asia-Pacific. This information highlights the continued shift towards digital advertising and the importance of major political and sporting events in driving ad investments (Dentsu, 2023).

Another forecast suggests that the global ad spend might rise by 8.2% to reach around $1 trillion in 2024. Social media is projected to be the fastest-growing channel for ad spend in the upcoming years, with it absorbing over a fifth of the total ad spend, worth about $227.2 billion. Retail media is also expected to experience notable growth, projected to rise 10.2% this year and 10.5% the next year to a total of around $141.7 billion. The financial services sector is anticipated to be the fastest-growing in terms of ad spend in 2024, projected to grow by 11.5% (Carroll, 2023).

Review of Literature

The landscape of digital marketing is multifaceted, incorporating a broad spectrum of strategies aimed at engaging and interacting with customers in the online space through both organic and paid avenues. The essence of digital outreach lies in leveraging a variety of content forms, including text, images, videos, sound, and more recently, immersive experiences through augmented and virtual reality, to captivate the digital consumer. Content within digital marketing is classified into owned, paid, and earned categories, each serving distinct roles from company-produced materials to customer-generated endorsements

The effectiveness of digital content is largely dependent on its alignment with the digital personas of target customers, necessitating a deep understanding of consumer behaviours and preferences. Innovations such as mobile marketing, email marketing, and the strategic use of search engines and social media platforms underscore the dynamic nature of digital marketing strategies. These approaches are continuously refined to address the changing digital landscape, influenced by technological advancements and evolving consumer behaviours. Digital marketing's complexity is further highlighted through the exploration of SEO, SEM, and SMM, illustrating the necessity for brands to adapt and innovate to maintain relevance and effectiveness in their marketing endeavors.

Digital Marketing Elements

Digital Marketing encompasses strategies aimed at engaging and interacting with customers online, employing both unpaid (organic) and paid (inorganic) methods. The essence of reaching out to customers in the digital space involves utilizing a diverse array of content forms such as text, images, videos, sound, and, more recently, augmented and virtual reality experiences (Dwivedi et.al., 2022). This content is broadly classified into three categories: owned, paid, and earned. Owned content is that which a company produces and disseminates on its own channels like websites, social media, and blogs. Paid content, in contrast, encompasses materials companies create for advertising or sponsorship purposes. Earned content arises when others produce or reference a company's content, a desirable outcome reflecting customer engagement and endorsement (Kapitan et.al., 2022).

Effectiveness in digital content hinges on its appeal to online users, prompting companies to construct digital personas that mirror the characteristics of their target customers. The closer a company's understanding and content align with the customer's interests and behavioural patterns, the more relevant and effective the content becomes. Changing consumer behaviours, such as showrooming and webrooming, have necessitated diverse and innovative approaches for companies to engage with potential consumers in the digital realm (Fernández, Pérez, & Vázquez-Casielles, 2018).

The type of device used by customers also influences the presentation and placement of content. With the increasing adoption of smartphones, mobile marketing campaigns have become both widespread and effective. App developers gain insights into user behaviour through analysis of app usage, which in turn informs enhancements in user experience. Techniques like in-app and in-game notifications, SMS, and Quick Response (QR) codes are employed for effective mobile engagement. Additionally, ensuring that websites are mobile- friendly enhances the user experience for mobile users, incorporating features like tap-to-call and easy navigation (Ring, 2013).

Another widely adopted technique is email marketing, favoured for its cost-effectiveness. The success of email marketing is measured by various metrics such as data quality, bounce rates, open rates, click-through rates, and cost per acquisition. Methods like A/B testing and multivariate techniques are used to fine-tune campaigns to align with user preferences, and email marketing tools offer features like automated testing and spam filtering to enhance campaign efficacy (Ma et. al., 2022). Email campaigns often run alongside search engine marketing (SEM) and social media marketing (SMM) to broaden reach and impact.

Digital Marketing is about enhancing the visibility and effectiveness of content on search engines and social media platforms, through organic and inorganic strategies. This includes optimizing content to meet the criteria of search engines and social media, as well as running ads on these platforms. For simplicity, Digital Marketing is divided into three key areas: Search Engine Optimization (SEO), Search Engine Marketing (SEM), and Social Media Marketing (SMM) (Kilimas, Chandra, & Rustagi, 2022). An exploration into each of these areas offers a deeper understanding of their unique contributions to a firm's overall digital marketing strategy.

Search Engine Optimization (SEO)

As previously mentioned, search engines perform three essential functions: Crawling, Indexing, and Ranking. For instance, when a search for "best shoes" is conducted on Google, the search engine initially crawls through countless web pages, gathering and cataloguing information which it then stores in its index. Following this, Google ranks these pages in its search results based on a variety of factors relevant to the user's query. For new websites or pages to appear in search results, they must be submitted to the search engine, such as adhering to Google's Webmaster Guidelines (Moran & Hunt, 2014).

When optimizing for search engines, selecting the right keywords is crucial. These keywords, depending on their length, are classified as either short tail (one or two words) or long tail (more than two words). Short tail keywords are typically more common and thus more competitive, making it challenging to rank higher on the Search Engine Results Page (SERP). In contrast, long tail keywords often indicate a more specific search intent and face less competition. Tools like Google's Keyword Planner can be utilized to identify and select appropriate keywords, especially by analyzing those used by competitor websites (Geddes, 2014).

Search Engine Optimization (SEO) is divided into two main categories: On-Page SEO and Off-Page SEO. On-Page SEO encompasses all the optimizations done directly on the website to enhance its SERP ranking. This includes selecting a suitable domain name, addressing 404/500 errors, optimizing HTML tags and images/videos, improving site performance factors like page speed and compression, and ensuring keyword density and appropriate page segmentation. Additionally, the site's structure should include elements like breadcrumbs, internal linking, and optimized URLs (Roumeliotis & Tselikas, 2022).

Off-Page SEO, on the other hand, involves activities conducted outside the website to improve its ranking. This includes acquiring backlinks from various independent sources, issuing press releases, promoting articles, syndicating content, and registering in directories and classifieds to create external links leading back to the main site (Brown, 2007).

Search Engine Land categorizes the factors influencing SEO into six key areas: Content, Architecture, HTML, Reputation, Links, and User. High-quality, well-written content that incorporates relevant keywords and can provide answers in SERPs is essential. This content should also be deep, multimedia-rich, and fresh. The site's architecture needs to be easily crawlable by search engines, optimized for mobile devices, have a user- and bot-friendly page structure, incorporate keywords into page addresses, load quickly, and be secure (https). Improving HTML quality involves embedding keywords into titles and descriptions, integrating structured data and schema for enhanced listings, and using alt text for images. Google evaluates content based on expertise, authoritativeness, and trustworthiness. The quality and relevance of sites linking to the website are crucial for SEO. Factors like user experience, locality, language, and engagement also play a role in enhancing SEO (Duong, 2019).

Local SEO becomes particularly important for businesses relying on local customer proximity. Using keywords like 'near me' can direct users to listings on Google My Business (GMB), which provides reviews and user experiences. GMB acts as a digital storefront and offers insights into how customers interact with the various options available (Rangaswamy, 2020).

Search Engine Marketing

Given that a significant portion of web traffic flows through Google's Search Engine, it is pertinent to delve into the specifics of Google's Search Engine Marketing (SEM) techniques. Google offers two distinct types of accounts: AdWords, for those who wish to run advertisements, and AdSense, for individuals or entities willing to host ads on their platforms (Srinivasan, 2020). For example, if you own a travel blog and aim to generate revenue, you can opt for web monetization through Google, integrating your site into the network of Google's ad-hosting platforms. However, it is worth noting that this strategy might impact your site's Search Engine Optimization (SEO) ranking, as visitors may be diverted by clicking on these ads, potentially leading to lower conversion rates and higher bounce rates.

For advertisers, Google provides two primary advertising networks: the Google Search Network

and the Google Display Network. Video advertisements on Google are typically displayed on YouTube and are categorized under social media marketing. Ads appearing in the Search Engine Results Page (SERP) when users search for specific content are part of the Google Search Network. Over time, the presentation of these ads has evolved to closely resemble organic search results, distinguished only by the label 'Ads' in the top left corner. Additionally, you may have noticed banner ads appearing in various locations on a website; these are typically hosted by sites enrolled in the AdSense program, forming part of Google's Display Network. These ads are designed to be engaging and relevant to the content that users are seeking on the website. The Click Through Rate (CTR), a metric indicating the percentage of users who click on an ad relative to those who view it, averages above 5% for the Search Network and around 0.5% for the Display Network, although these figures can vary across different industries.

Furthermore, Google employs a system for determining ad placement, which is based on a combination of the advertiser's maximum bid and the ad's quality score. The quality score itself is derived from several factors, including past performance, keyword relevance, the quality of the landing page, and the CTR. Depending on their advertising objectives, advertisers have a variety of options when running ads on Google. Understanding Keyword Match Types is crucial for effective advertising. There are three match types: Broad Match, which shows ads for related keywords; Phrase Match, which targets ads for searches with a more specific meaning; and Exact Match, which displays ads for searches matching the exact keyword phrase. Advertisers can also use negative keywords to exclude certain words from triggering their ads, applying the same three categories for specificity (Broder, 2007).

Social Media Marketing

Social media platforms serve as digital spaces for the creation, sharing, and exchange of informa-tion, interests, and ideas within virtual communities. On average, individuals globally dedicate approximately two and a half hours daily to social media use (Tuten, 2023). Moreover, it is common for users to engage with six to seven different social media platforms each month. With increasing time spent on these platforms, they have become vital channels for brands to connect meaningfully with their audience. Merely using social media for promotional purposes is no longer sufficient in the current digital landscape. Each platform possesses distinct methods of identifying and showcasing content that resonates with its users, necessitating a tailored approach for content creation and distribution across different platforms.

Key activities for brands on social media include social listening, social influencing, social networking, and social selling (Ancillai et. al., 2019). Social listening involves engaging with customers on these platforms to manage a brand's reputation. Social influencing aims at establishing brand authority through the creation and sharing of content that appeals to the target audience. Social networking involves collaboration with influencers and leaders within the same industry or interest areas. Social selling leverages these activities to generate leads and sell products to both existing and potential customers. Brands must also monitor metrics such as share of voice, reaction checks, amplification rate, applause rate, engagement rate, and continuously review customer feedback. Social Customer Relationship Management (CRM), which is managing customer relationships on social media, is so pivotal that Philip Kotler highlighted its importance in his book "Marketing 4.0."

Mark Zuckerberg of Meta has noted that video content is emerging as the next significant trend in digital media. Consequently, social media platforms are increasingly integrating video features into their services. They employ machine learning algorithms to optimize and present content that is relevant to user preferences. YouTube stands as a leading platform in video-based content, offering

a wide array of advertising options (Arantes, Figueiredo, & Almeida, 2018). In response to the growing trend for short-form videos, YouTube introduced "YouTube Shorts," competing with similar formats like Instagram Reels and TikTok. These platforms are also enhancing ways to engage customers by integrating user behaviour analytics from company websites using tracking pixels.

In the realm of advertising, social media platforms typically align their campaign objectives with awareness, consideration, and conversion (Keegan & Rowley, 2017). The types of ads deployed vary based on the platform and user interests. For instance, Facebook utilizes Collection Ads, Pinterest features Rich Pins, Snapchat offers Commercials, Twitter uses Follower Targeting, and LinkedIn employs Sponsored InMail. Each platform has specific criteria for calculating an affinity score, assigning different weights based on user reactions. However, one common factor across these platforms is the emphasis on the freshness of content (time decay), indicating that regular posting of content and engagement with trending topics significantly boosts visibility on these platforms. Practices like clickbaiting and content duplication can adversely affect a page's growth on social media. Hence, these platforms recommend maintaining originality and authenticity in content creation.

Breadcrumbs in the Digital Space

Historically, the customer journey was perceived as a linear progression through stages of awareness, interest, desire, and action, leading to specific customer actions such as subscriptions, purchases, or registrations. However, Philip Kotler introduces a revamped framework in "Marketing 4.0," proposing a non-linear and more dynamic customer path comprising awareness, appeal, ask, act, and advocate stages. Kotler emphasizes that this journey doesn't adhere to a set sequence, underscoring the fluid nature of modern consumer engagement.

This contemporary customer journey, covering awareness, appeal, ask, act, and advocate, serves as a foundation for identifying various industry archetypes, each reflecting unique customer behaviours in specific sectors (Kotler, Kartajaya, & Setiawan, 2016). These archetypes are categorized into four distinct patterns: doorknob, goldfish, trumpet, and funnel, metaphorically representing the customer distribution and engagement at each stage of their journey. The marketing strategies deployed vary significantly across these archetypes, tailored to their specific consumer behaviour patterns (Murthy & Kilimas, 2023).

In today's digital landscape, particularly among younger generations, there is a growing trend towards vertical emulation, where aspirations are shaped by celebrities and influencers. This shift has bolstered the effectiveness of affiliate and influencer marketing. For instance, a podcaster collaborating with a brand for affiliate marketing or a celebrity endorsing products are instances of these strategies. These approaches are gaining trust and credibility, thanks in part to advancements in digital tracking and analytics. Additionally, consumer behaviour is evolving from using a single platform or application for specific needs to "multihoming" – using multiple platforms like Netflix and Amazon Prime simultaneously for similar purposes (Bravo & Farro-Mejía, 2023).

This behavioural shift has prompted marketing experts to transition from the traditional 4Ps (Price, Place, Product, and Promotion) to the 4Cs of Marketing: Cocreation (involving customers in innovation), Currency (dynamic pricing based on market demand and buying behaviours), Communal Activation (leveraging peer-to-peer distribution and the sharing economy), and Conversation (engaging in two-way interactions between firms and customers) (Yuridis & Dewi, 2023). It is increasingly recognized that merely presenting content at the initial brand interaction is insufficient; the entire user experience along the decision-making journey is crucial. Consequently,

firms are focusing on metrics like the Purchase Action Ratio (PAR) and Brand Advocacy Ratio (BAR) to gauge the influence they wield over potential customers who are aware of their products. These metrics help in understanding the impact of their strategies and in fostering deeper customer relationships.

Innovations in the Digital Marketing Arena

Data has emerged as the cornerstone of rapid technological advancements, paving the way for innovations in Artificial Intelligence (AI), the Internet of Things (IoT), Blockchain, and Big Data. These technologies, designed to build trust, spur growth, and drive transformation, have significantly reshaped the landscape of online marketing. In pursuit of a deeper understanding of consumer behaviour, companies are increasingly investing in Research & Development, utilizing netnography to gain insights into the unguarded social behaviours of customers, thereby unlocking a more profound comprehension of their preferences. The integration of machine learning and human analysis has revolutionized how businesses connect with and understand their customers (Allioui & Mourdi, 2023).

AI-powered tools like Voice Search (using assistants and smart speakers) and Image Search are altering the way users interact with digital content. These advancements are made possible by progress in Natural Language Processing (NLP) and Computer Vision. Google, for instance, has adapted its algorithm to accommodate these types of content searches. While some concepts, such as Influencing Engineering, which aims to automate aspects of the digital experience to influence consumer choices, may take over a decade to reach their full potential, others like Identity Resolution, Multitouch Attribution, and Account-Based Marketing (ABM) platforms are expected to realize their peak effectiveness much sooner.

For Chief Marketing Officers (CMOs), the challenge lies in selecting technologies that align with their company's needs and guide their

strategies effectively. While AI and Blockchain in marketing may take time to fully mature, numerous other technologies are emerging to support their endeavours (Kumar, Ramachandran, & Kumar, 2021). The adage "with great power comes great responsibility" aptly describes the role of marketing leaders in this rapidly evolving digital landscape. The COVID-19 pandemic has significantly accelerated the adoption and digitalization of products and services, pushing digital marketing into new territories.

In a notable development, Facebook rebranded as Meta in October 2021, signaling its focus on the emerging 3D virtual world, often referred to as the Metaverse. While opinions vary on the potential impact of this shift, industry leaders like Meta and Microsoft are heavily invested in exploring this new frontier. The Metaverse, anticipated as the next evolution in social connectivity, promises to integrate various technologies, including blockchain and mixed reality, potentially opening new opportunities in digital marketing. This evolution is already evident in areas like live streaming, advergames, and Over-The-Top (OTT) social entertainment (Hardy, 2021).

In addition to these developments, the advertising technology (Ad Tech) sector is also experiencing rapid growth, with tools like Customer Data Platforms (CDP), Demand-Side Platforms (DSP), and other innovative solutions playing a pivotal role (Murthy & Kilimas, 2023). These technologies are crucial in enabling more targeted, efficient, and effective advertising strategies, leveraging data-driven insights to optimize marketing campaigns and enhance user engagement across digital platforms.

Research Gap

The examination of the current landscape in digital marketing, particularly within the context of the fourth industrial revolution, reveals several notable research gaps. Firstly, there is a pronounced need for an in-depth understanding of

consumer privacy concerns and the implementation of ethical marketing practices, highlighting the necessity for businesses to align their strategies with evolving consumer expectations and regulatory landscapes. Additionally, the long-term impacts of emerging technologies such as AI, blockchain, and VR/AR on digital marketing effectiveness and consumer behaviour remain underexplored, specifically in the field of digital consumer behaviour, which could have a significant influence.

Furthermore, research on digital marketing strategies across different cultural and economic contexts is lacking, indicating a need for comprehensive studies on how global brands can effectively engage with diverse consumer bases. There is also a gap in understanding how digital marketing integrates with traditional marketing approaches in today's digital age, as well as a need for developing quantitative measures that can accurately assess digital marketing strategies' effectiveness across various platforms. Addressing these gaps could offer significant advancements in digital marketing knowledge, equipping practitioners with the insights needed to navigate the digital landscape more effectively.

Research Methodology

This section outlines the comprehensive approach used to investigate the evolving landscape of digital marketing strategies in the context of the fourth industrial revolution. It delves into the integration of emerging technologies, shifting consumer behaviours, and the ethical considerations pivotal to modern marketing practices.

Objectives

1. To analyze the evolution and impact of digital marketing strategies across the different industrial revolutions, with a focus on the fourth industrial revolution.

2. To investigate how digital marketing tools and platforms (SEO, SEM, SMM) have transformed business engagement with consumers in a digitalized global market.

3. To evaluate the effectiveness of current digital marketing practices in influencing consumer behaviour, considering factors like the Zero Moment of Truth (ZMOT), search engine algorithms, and social media marketing strategies.

4. To explore the role of emerging technologies (AI, IoT, Blockchain, Big Data) in shaping future digital marketing trends and consumer interactions.

5. To assess the impact of the digital era on traditional marketing models and the transition towards more interactive, consumer-centric approaches

Scope

The transition from the first to the fourth industrial revolution marks a significant evolution in industrial and technological capabilities, profoundly influencing marketing strategies over time. Initially, marketing strategies were influenced by the industrial environment, focusing on mass production and broad-based advertising strategies. As we moved through the second and third industrial revolutions, the emergence of digital technologies began to reshape the marketing landscape, leading to the fourth industrial revolution's focus on digital connectivity, AI, and automation. This shift has necessitated an in-depth analysis of digital marketing strategies such as SEO (Search Engine Optimization), SEM (Search Engine Marketing), and SMM (Social Media Marketing). These strategies emphasize the role of content creation, the strategic use of search engines, and the power of social media platforms in engaging with a digitally savvy consumer base.

Technological advances like AI, the Internet of

Things (IoT), blockchain, and big data analytics have further innovated digital marketing tactics, enabling more personalized consumer interactions and more efficient marketing processes. These technologies have allowed marketers to analyze vast amounts of data, predict consumer behaviour, and deliver targeted content, transforming the way brands connect with their audiences.

Understanding changing consumer behaviours has become crucial in this era, particularly how digital platforms influence these behaviours. The rise of affiliate marketing, influencer marketing, and the recognition of the non-linear customer journey have highlighted the need for marketers to adopt more agile, consumer-centric strategies.

The future digital marketing trends focuses on immersive technologies like the Metaverse, virtual and augmented reality, and the continuous evolution of advertising technology. These developments are expected to offer new realms for consumer engagement, providing more interactive and immersive experiences. As the digital landscape evolves, so too will the strategies marketers employ to connect with their audience, emphasizing the importance of staying ahead in a rapidly changing digital marketing environment.

Sources of Data

1. Secondary Data: Review of existing literature, including academic journals, industry reports and publications by marketing thought leaders.

2. Digital Platform Analytics: Analysis of user engagement data from major social media platforms, search engine trends, and digital marketing campaign metrics.

3. Case Studies: Examination of successful digital marketing strategies employed by leading companies in various sectors.

4. Expert Unstructured Interviews: Insights from digital marketing professionals, technology experts, and academics specializing in marketing and consumer behaviour.

Limitations

The rapid pace of technological innovation presents a significant challenge in digital marketing research, as findings may become outdated by the time they are published, reflecting the difficulty of keeping pace with the fast-evolving digital landscape. Additionally, data privacy regulations and the varying global data protection laws introduce further complications by limiting access to or the use of certain types of consumer data, thereby affecting the scope and applicability of digital marketing studies. The potential biases in secondary sources, such as industry reports and publications, can also skew research outcomes, as these sources may reflect the interests of specific companies or sectors rather than providing an unbiased overview of digital marketing trends. Another challenge lies in the generalization of findings across different industries, cultures, and consumer demographics. The diverse nature of digital marketing practices and consumer behaviours makes it difficult to apply research findings universally. Lastly, the impact of external factors on digital marketing effectiveness is hard to isolate, as consumer behaviour is influenced by a myriad of factors including economic changes, societal trends, and political events, which can overshadow the direct impact of digital marketing strategies.

Findings

The below given findings encapsulate the transformative impact of digital marketing strategies within the context of the fourth industrial revolution, highlighting the evolution from traditional to digital methods, the role of technology in shaping consumer interactions, and the future trajectory of marketing practices in an increasingly digital world.

1. **Evolution of Digital Marketing:** Digital marketing has evolved significantly from basic online presence to sophisticated strategies involving SEO, SEM, and SMM, driven by advancements in technology and shifts in consumer behaviour. The transition from traditional to digital marketing reflects broader changes in society and technology, mirroring the progression through the industrial revolutions.

2. **Impact of the Fourth Industrial Revolution:** The fourth industrial revolution has amplified the importance of integrating digital and physical realms, leading to more personalized and interactive marketing strategies. Cyber-Physical Systems (CPS), IoT, and AI have enabled businesses to gather deep insights into consumer behaviours, preferences, and needs, facilitating more targeted and effective marketing efforts.

3. **Changing Consumer Behaviour:** The digital era has transformed consumer behaviour, with more informed and connected customers expecting personalized and seamless experiences across channels. The role of social media and search engines in shaping consumer decisions, particularly at the Zero Moment of Truth (ZMOT), underscores the shift towards proactive information seeking and the influence of digital content on purchasing decisions.

4. **Technological Innovations and Marketing Strategies:** Emerging technologies like AI, big data analytics, and blockchain are reshaping marketing strategies, offering new ways to engage consumers, optimize marketing campaigns, and enhance customer experience. These technologies facilitate a deeper understanding of consumer behaviours and enable predictive marketing, creating opportunities for more personalized and engaging interactions.

5. **Challenges and Limitations:** Despite the opportunities presented by digital marketing, businesses face challenges such as rapidly changing technology landscapes, data privacy concerns, and the need for continuous adaptation to new platforms and consumer expectations. Additionally, the digital divide and varying global internet access levels pose challenges in reaching and engaging with a broader audience.

6. **Future Directions:** Digital marketing is expected to continue evolving, with increased focus on immersive experiences through technologies like virtual and augmented reality, further integration of AI for personalized marketing, and ethical considerations around data use and consumer privacy. The growing importance of social media platforms and influencer marketing highlights the need for authentic and engaging content that resonates with target audiences.

Suggestions

Based on the research conducted on how digital marketing has changed through the industrial revolutions, focusing especially on the latest changes, this paper suggests several important areas for future work and practical use. Firstly, exploring new technologies like Artificial Intelligence (AI), blockchain, and virtual reality can make a big difference in marketing. These technologies can help us understand what customers want, make ads and content more trustworthy, and create more exciting and engaging experiences for customers. Secondly, as people are becoming more concerned about their privacy online, it is important for marketers to use consumer data carefully and ethically. This means making sure customers know what data is being collected and how it is used, and making sure their information is safe. Also, the way people shop and what they expect from brands is changing quickly, so marketers need to keep studying these trends. This could involve looking at how social media and online shopping are evolving and how these changes affect what customers want from brands.

Moreover, social media platforms are constantly changing, and there are always new ones popping up. It is important for marketers to understand how to use these platforms effectively to reach their audience, especially as video content and influencers become more important. Looking ahead, it is also important for marketers to stay on top of new trends and technologies, like the Metaverse and the Internet of Things (IoT), which could change the game for digital marketing. Lastly, it is crucial for marketers to find better ways to measure how effective their digital marketing strategies are. This means figuring out if the money spent on digital ads and campaigns is really leading to more sales and interest in their products.

Conclusion

The journey through the industrial revolutions, culminating in the digital era of the 21st century, represents a remarkable transformation in global industry, commerce, and consumer engagement. The fourth industrial revolution, characterized by the advent of Cyber Physical Systems (CPS) and a VUCA world, has ushered in an age of unparalleled connectivity and digital integration. This era's hallmark is the profound impact of digital technology on every aspect of business and consumer interaction, reshaping the dynamics of global markets and customer experiences.

In this digital landscape, the proliferation of internet and social media usage has revolutionized communication and commerce. The staggering number of individuals engaged in digital platforms like Facebook, WhatsApp, Instagram, and others highlights the extensive reach and influence of these mediums. Businesses have adapted by embracing digital marketing strategies that leverage the power of the internet and social media to engage with a diverse and global customer base effectively. The concept of the 'Zero Moment of Truth' (ZMOT) has shifted the focus to pre-purchase interactions, emphasizing the importance of a compelling online presence in influencing consumer decisions.

Digital marketing has evolved to include a variety of strategies and tools, encompassing Search Engine Optimization (SEO), Search Engine Marketing (SEM), and Social Media Marketing (SMM). These strategies aim to enhance visibility, engage potential customers, and foster meaningful interactions across various digital platforms. The importance of adapting content to the preferences of target audiences and the evolving landscape of digital consumption cannot be overstated. The integration of technologies like AI, IoT, and big data analytics has further transformed digital marketing, offering deeper insights into consumer behaviour, and enabling more targeted and effective campaigns.

The advertising landscape is also witnessing a shift, with digital ad spending dominating and platforms like social media emerging as powerful channels for advertising. The rise of affiliate and influencer marketing reflects changing consumer behaviours and the growing influence of digital platforms on purchasing decisions. The transition from traditional marketing models to more dynamic and consumer-centric approaches underscore the need for businesses to be agile and responsive to the changing digital landscape.

Innovation continues to be a driving force in digital marketing, with emerging technologies like the Metaverse, AI, and blockchain poised to create new opportunities and challenges. The rebranding of Facebook as Meta and the growing focus on virtual and augmented reality indicate the potential for even more immersive and interactive digital experiences in the future.

The digital era has fundamentally transformed the way businesses interact with consumers, requiring a nuanced understanding of digital platforms, consumer behaviour, and technological advancements. As we move forward, the ability of businesses to adapt, innovate, and effectively leverage digital marketing tools and strategies will be crucial in navigating the complexities of this ever-evolving landscape.

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RESEARCH

A STUDY TO UNDERSTAND THE AWARENESS OF TECHNOLOGICAL INTERVENTION IN INDIAN HEALTHCARE SECTOR AMONGST CONSUMERS

Dr. Anjali Chandra Kumar, Mohammed Kasim Khan*

Abstract

Background: *The delivery of healthcare services has changed significantly as a result of the rapid development of technology in the healthcare sector. An innovative strategy that uses technological intervention systems to boost patients' physical and mental health is called the Development and Application of a Service Model for Health.*

Objectives: *1. Awareness about the current and upcoming technology becomes critical in the healthcare sector, especially in Indian scenarios hence understanding awareness of technology or tools used for monitoring health among respondents was one of the objectives. 2. The challenges faced by the patients and their criteria for healthcare provider/service selection. 3. Awareness about the government initiatives for technological interventions in the Indian healthcare sector.*

Method: *This study comprises primary and secondary research on the development and use of a service model for health in Indian scenarios; setting up technological intervention systems to support patients' psychological and physical health. A questionnaire that was created by the researcher was used for primary research. The questionnaire was created following an extensive secondary study on the subject.*

The study's sample size is 218 people. Newspapers, research papers, and articles were consulted online for secondary research data sources. Excel and Power BI were used to undertake data analysis using descriptive statistics.

Results: *Technology interventions can help to improve the quality of patient care by providing accurate diagnoses, personalized treatment plans, real-time monitoring of progress, and streamlined communication between medical professionals and patients. From the primary research wearable devices, self-monitoring apps and telemedicine have the potential to solve all problems. These technologies can help handle data and provide personalized care. There is a positive response to the adaptability of technology in the Indian healthcare system which should attract investors and innovators.*

Conclusion: *It is possible to enhance patient outcomes, lower healthcare costs, and give patients individualized and efficient care by creating and implementing a service model for health that combines technological intervention systems.*

Keywords : *Self-monitoring, Wearable devices, Telemedicine, Personalized care.*

Introduction

The fast growth of technology in the healthcare industry has had a substantial impact on how healthcare services are delivered. The Development and Application of a Service Model for Health is a cutting-edge method that improves patients' physical and mental health by utilising technological intervention methods. This service model's goals are to make it easier for patients to access healthcare services and information, promote healthy lifestyle choices, and enhance patient outcomes.

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When looking to better their health and well-being, more people are turning to wearable technology, mobile apps, telemedicine services, and other technologies. By enabling patients to track their progress, monitor their health, and receive real-time feedback, these technological intervention systems give patients the tools they need to make educated decisions about their health. These innovations can also give medical professionals useful information they can use to personalize patient care and enhance patient outcomes.

In this paper, we will explore the development and application of a service model for health that incorporates technological intervention systems to promote well-being and physical health in patients. We will discuss the benefits and challenges associated with this model, as well as patient's preferences and concerns regarding the use of technology in healthcare services. Through primary research, we will gain insight into patients' experiences with technological intervention systems and their perspectives on the development and application of a service model for health. By doing so, we hope to provide valuable information that can guide the design and implementation of this service model and contribute to the enhancement of patient outcomes.

The technologies currently used few of them are listed below:

Virtual visits:

To provide care remotely, several clinics turn to telemedicine. Clinics might provide virtual visits, for instance. These enable you to speak with a nurse, mental health counsellor, or healthcare professional via phone or video chat. Before your appointment, the medical staff can email you the necessary documentation, which you can fill online and submit to them. Additionally, they might make sure you have the necessary technology. They'll also see if you need to install any new apps or upgrade your

software. Additionally, they can show you during your visit how to sign in and join the video chat. The medical professionals can also give usage instructions for the camera, microphone, and text chat. If necessary, get in touch with a relative for help setting up the required technologies.

Source: Roswell Park

Patient Portal

The primary care provider's office may have an online patient portal. These portals allow a more secure means of communication with the provider compared to email. For the following tasks, a portal provides a secure online tool:

- Send a nurse or your doctor a message.
- Request prescription renewals.
- Examine test outcomes and summaries of prior visits.
- To receive preventive care, schedule appointments or request appointment reminders.
- The portal might serve as a single point of contact for any experts you might consult if your physician is part of a sizable healthcare system.

Health History Records

An electronic personal health record system is a set of health-related data that you maintain and control (PHR system). Any time, from any web-enabled device, including your PC, laptop, tablet, or smartphone, you may effortlessly

access a PHR app. A PHR also allows you to view your test results, X-rays, and doctor's notes. Your provider may disclose this to other providers with your permission.

In an emergency, a person's health record can rapidly give emergency services vital information. For example, it can include a description of your current health problems, prescriptions, drug sensitivities, and provider details.

Source: emrsystems.net

Wearable Devices

The popular usage of wearable technology for health monitoring. These gadgets make it simple to monitor your heart rate, calories burnt, steps taken, blood pressure, biochemical release, exercise duration, and physical effort. The development of smart shoes and socks, as well as the ability to implant breasts and monitor infants, are all made possible by a wide range of artificial intelligence and internet of things technology. Wearable technology provides important insights that help us live comfortably. They are valuable to monitor physical health and physical training along with alerting to severe medical issues. Soon, wearable technology is anticipated to assess blood alcohol content, sports performance, cardiac condition, and age-related disorders in addition to predicting changes in health, mood, and stress
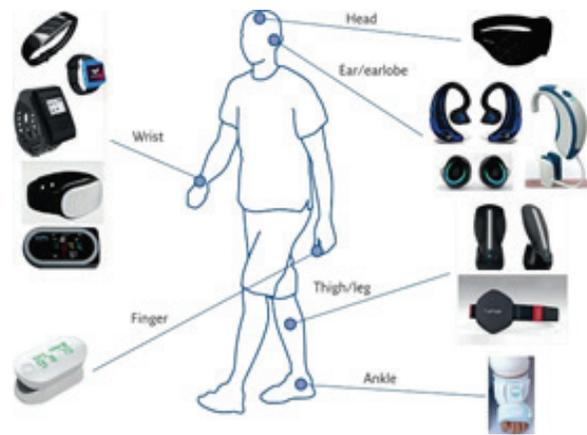
Source: wandam-enemy.blogspot.com

Literature Review:

"Using technology to promote health and well-being in older adults: a narrative review" by Naslund JA et al. (2017): The potential of technology to improve older individuals' health and wellbeing is discussed in this article. The authors examine various technology-based interventions and their potential to enhance older individuals' health outcomes, including telemedicine, smartphone apps, and social media.

A systematic review on the use of mHealth to increase physical activity in older people by Sanne van Luenen (2020). The author suggests that mHealth may be effective to improve PA and show an increase in exercise behavior in older people. Motivational reminders may be an important aspect of a good PA intervention. In the future, mHealth may add to or replace traditional methods of improving PA and it is necessary to tailor interventions with the needs of older people.

The article by Wicks et al. (2018) presents an example of developing an implementation strategy for a digital health intervention in routine healthcare. The authors suggest that while digital health interventions have the potential to revolutionize healthcare, their successful implementation requires careful planning and execution. The article presents a step-by-step approach for developing an implementation strategy, including identifying stakeholders,

understanding the intervention's impact, addressing barriers and facilitators, and monitoring and evaluating the intervention's success. The authors also discuss the importance of stakeholder engagement, effective communication, and the need for continuous quality improvement. Overall, the article provides valuable insights into the complex process of implementing digital health interventions in routine healthcare settings.

Service improvement in health care: a literature review by Lynn (2018). The literature review in this article focuses on the concept of quality improvement in healthcare. The authors define quality improvement as a systematic approach to evaluating and improving the processes and outcomes of healthcare delivery.

Healthcare Technology Adoption in India: Opportunities and Challenges by Sharma, S., & Adhikary, A. (2019). Healthcare Technology Adoption in India: Opportunities and Challenges. International Journal of Computer Applications, 180(2), 31-36. This study explores the landscape of healthcare technology adoption in India, emphasizing opportunities and challenges. It discusses factors such as infrastructure, policy framework, and consumer awareness influencing the adoption of healthcare technology.

Consumer Awareness and Acceptance of Telemedicine in India by Sudhamony, S., Nandakumar, A., & Anish, T. (2020) focuses on consumer awareness and acceptance of telemedicine, an emerging technology in Indian healthcare. It analyzes factors driving consumer acceptance, such as convenience, cost-effectiveness, and perceived quality of care.

Role of Mobile Health (mHealth) Applications in Indian Healthcare by Gopalan, H. S., & Misra, A. (2018). This review discusses the role of mobile health applications in transforming healthcare delivery in India. It highlights the impact of mHealth apps on improving access to healthcare services, patient engagement, and disease management.

Awareness and Adoption of Wearable Health Devices among Indian Consumers by Shrivastava, A., & Sharma, R. (2017) investigates the awareness and adoption of wearable health devices among Indian consumers. It examines factors influencing adoption decisions, such as perceived usefulness, ease of use, and privacy concerns.

Impact of Artificial Intelligence (AI) in Indian Healthcare by Patel, V., & Nair, S. (2021) review explores the impact of artificial intelligence in Indian healthcare, including applications in diagnostics, personalized medicine, and predictive analytics. It discusses the potential benefits and challenges of AI adoption.

Government Initiatives for Promoting Healthcare Technology in India by Singh, A., & Mehta, S. (2020) examines government initiatives aimed at promoting healthcare technology adoption in India, such as the National Digital Health Mission and Ayushman Bharat. It evaluates the effectiveness of these initiatives in driving technological interventions in healthcare.

Research Methodology:

In order to understand the creation and use of a service model for health; setting up technological intervention systems to support patients' psychological and physical health with Age Groups Ranging from 15 to 60 Years of Age, a Cross-Sectional Exploratory Study was conducted, and a Non-Probability Convenience Sampling Technique was Used. The study was only conducted in Maharashtra and Uttar Pradesh. The trial period lasted for two months.

Primary research has been done with a quantitative analysis method to get answers to the research questionnaire. In order to understand the technologies being used in the healthcare sector by patients, their families, and healthcare providers, an analysis feedback form consisting of 18 numbers of questions was developed, validated, and distributed among the 218 people, through random sampling, using an online platform of Google forms, sent by WhatsApp, and e-mail.

Data analysis was done using Microsoft Excel and Data visualization done using Microsoft PowerBI.

Data Collection and Data Analysis:

The questionnaire was designed to answer three objectives of the research paper few of which are mentioned in the abstract. The questionnaire was sent to more than 2000 people out of which 218 people responded.

1. Demographic profile of the respondents:

To assess whether the participants in a research study are a representative sample of the target population for generalisation purposes, demographic information is crucial in research. We can better comprehend the group we are studying thanks to demographic data.
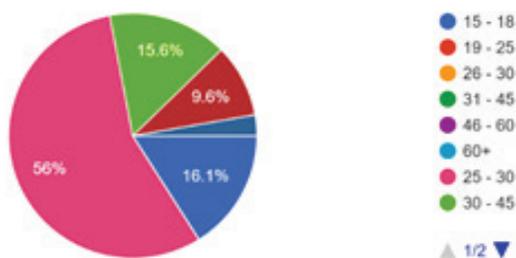
Fig. 1: Demography – Age

The poll asked each age group to understand how they were represented in the sample of the questionnaire in order to take into consideration their opinions and thoughts. The age range of 25 to 30 years old made up 56% of the sample, as shown by the pie chart. Other age groups, like those between 15 and 18 and between 31 and 45, had a sample representation of 16 and 15%, respectively. The sample included individuals from each of the targeted age groups.
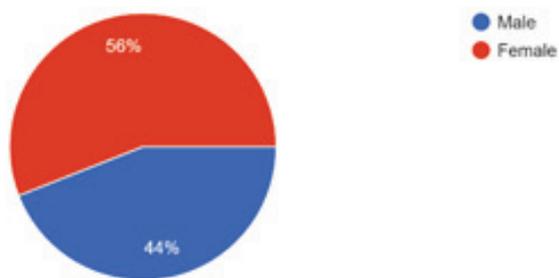
Fig. 2 Demography – Gender

Because of the same motives, which are to learn from both genders, the general public was also asked about their gender. It is crucial that the survey be extensively disseminated across the area's demographics in order to collect accurate data. The pie chart showed that 44% of respondents were men and 56% were women. This shows how broadly the survey was distributed.
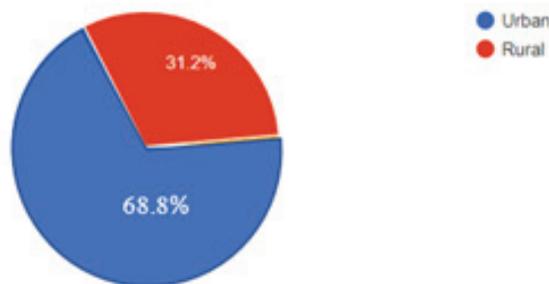

Fig. 3: Demography – Region

Both urban and rural people should be taken into account because modern technology is advancing not just in cities but also in rural areas. Urban residents made up 69 percent of respondents, while rural residents made up 31%. There is a substantial quantity of participation from both urban and rural areas.

**2. Awareness of technology or tools for monitoring health among respondents**
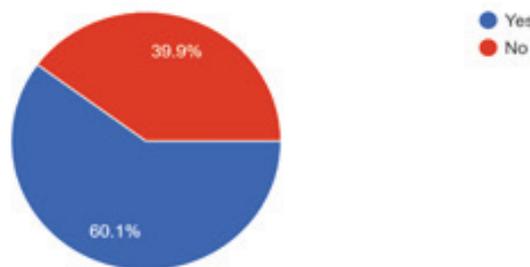
Fig.4: Whether used any technology or not

When asked if they had utilised technology to keep track of their health, 60% of respondents replied yes, while 40% said no. This demonstrates how important technology flexibility is and how it may be raised even further by combining the appropriate service model with related, more sophisticated technologies.
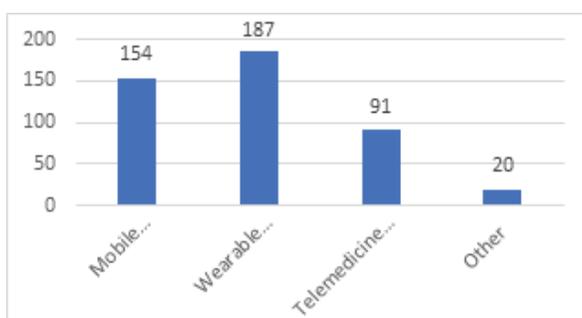
Fig.5: Technologies to monitor their health goals

With 86 percent of replies, wearable technology is the most popular device for tracking one's health. 70.6 percent of respondents ranked mobile applications second. Nearly 42% of respondents also said they used telemedicine. This suggests that these technologies can help patients keep track of their health and give medical professionals useful information about patients' health state, enabling more individualised and efficient treatment.

3. Ways of managing health Goals and challenges faced to achieve those health goals
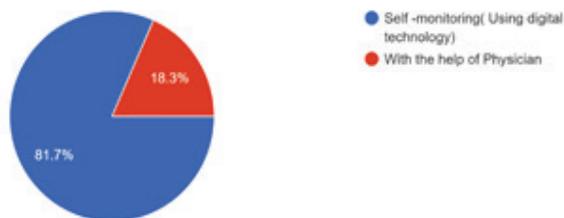
Fig. 6: Ways of monitoring and managing health goal

Digital technologies are used by almost 82% of the respondents to monitor their health goals and keep track on their day-to-day exercises. This shows that self-monitoring technologies have a bright future in the coming years and their adaptability is quite high as they provide home monitoring with reduced time to visit for check-ups and consultation.
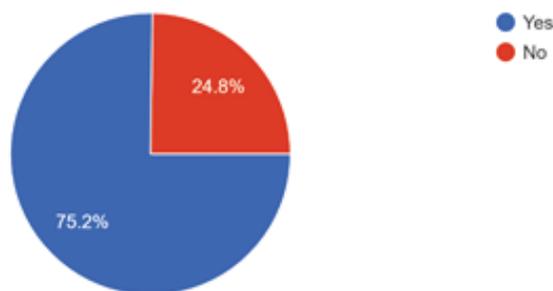

Fig. 7: Whether people have faced challenges to achieve health goals

When asked if they had any obstacles or challenges when keeping track of their health and achieving their exercise goals, 75,2 percent of respondents replied "Yes," while 24,8 percent of respondents said "No," they had no such problems. This shows that the current healthcare system, whether it uses digital technology or not, has a flaw. To create a successful digitally connected healthcare system that is patient-centric, more advancements are required.

4. Satisfaction from healthcare services
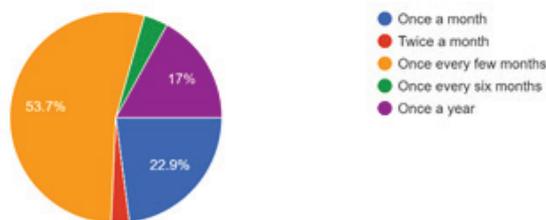

Fig. 8: Visit to the healthcare provider
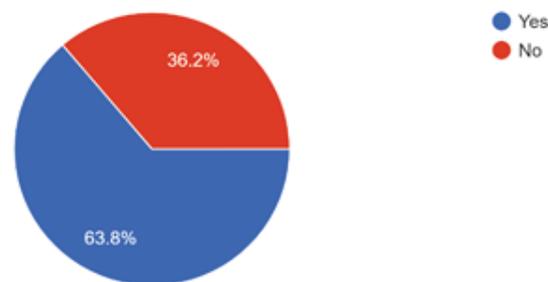
Fig. 9: Satisfaction from healthcare services or providers

In the poll, 63.8 percent of respondents said they were satisfied with their healthcare professionals, while 36.2% said they were dissatisfied, showing that healthcare professionals should work more to comprehend patients' requirements and adopt a patient-centric approach.

5. Current methods to manage health and health-related information
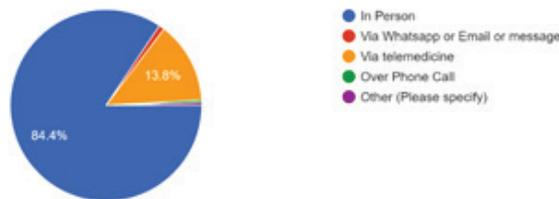

Fig. 10: Methods used to communicate with providers.

The most crucial stage of a patient's journey through the healthcare system is when they visit or communicate with healthcare providers. Eighty-four percent of poll participants preferred in-person visits to healthcare providers, while just thirteen percent preferred telemedicine for communicating with their medical specialists. Only a small percentage of respondents expressed interest in corresponding with their healthcare providers by Whatsapp, email, or message.
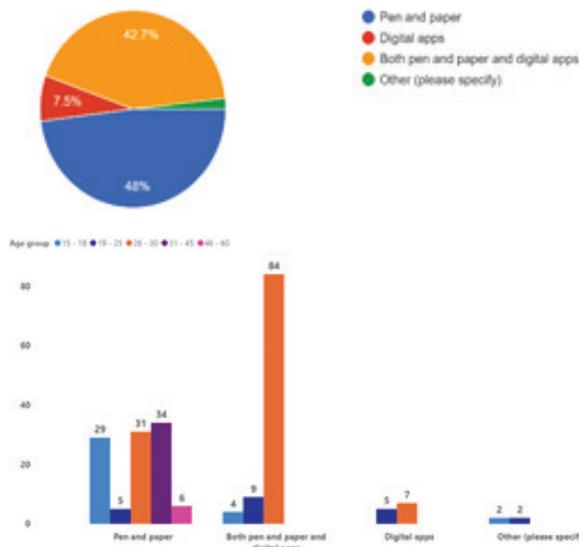

Fig. 11: handle healthcare data or records

The management of healthcare data is crucial to patient care because future therapies will often refer to a patient's past medical history. Out of 218 respondents, 109 (48%) prefer pen and paper, and 97 (42.7%) prefer both pen and paper when handling health-related information or records. Out of the 97 respondents, 84 (86.6 percent) are between the ages of 26 and 30 and like both paper and pen and digital apps.

6. Factors that matter the most while selecting a healthcare professional or service
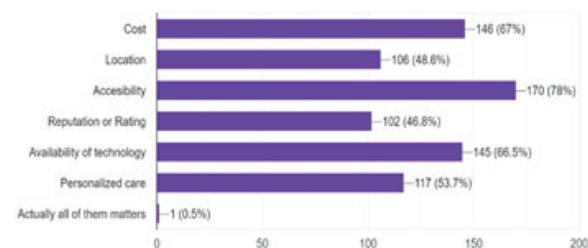

Fig. 12: Aspects considered for providers or service selection.

Patients assess and evaluate a wide range of factors before choosing a doctor or course of therapy. The availability of technology and affordability were the next two most crucial factors in this study, after accessibility. Personalized care, location, and healthcare provider ratings were also mentioned by respondents as critical factors. As a result, we might infer an interdependence between technology, tailored treatment, and cost. With the help of technology, more affordable, individualised care will be possible.

## 7. Willingness to manage health and health related data through technology.
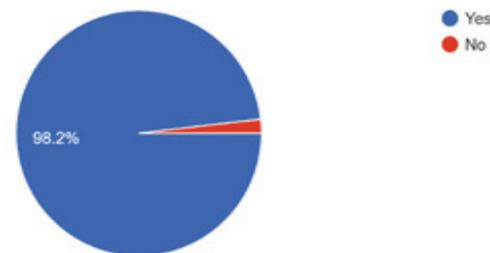
Fig. 13: Technological intervention strategies can effectively promote physical and mental health.

Any technological development must be embraced and supported by the user before it is worthwhile to invest in. 98.2% of those surveyed in this case expressed interest in employing technological treatments to track health and wellbeing.

8. Awareness of Government initiative ABDM
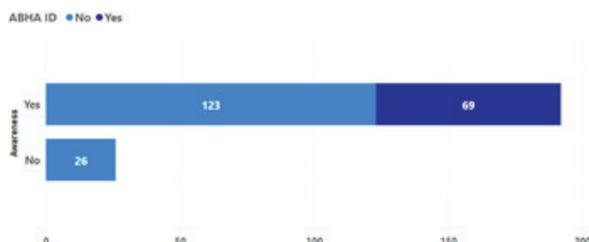
Fig. 14: Awareness of Ayushman Bharat Digital Mission (ABDM)

One of the objectives of the survey was to understand the awareness of the Ayushman Bharat Digital Mission (ABDM), it is found that 86.7% of the respondents are aware of ABDM. But Out of all the respondents, only 29.2% of people had their ABHA ID and out of those aware of ABDM just 36% respondents had ABHA ID.

Recommendations:

Some of the recommendations are listed below to improve healthcare services through technological interventions.

- Develop a comprehensive service model that integrates technological intervention systems into healthcare delivery to promote well-being and physical health.
- Ensure that the technological intervention systems are user-friendly and accessible to patients, with adequate support and training provided as needed.

- Monitor and evaluate the effectiveness of the service model, including the impact on patient outcomes, patient satisfaction, and healthcare costs.
- Continuously improve and update the service model to incorporate new technologies and meet evolving patient needs.
- Ensure that patient data is managed securely and in accordance with relevant privacy regulations.

Conclusion:

Patients can monitor their levels of physical activity, heart rate, sleep patterns, and other data with the aid of wearable technologies, such as fitness trackers and smartwatches. Patients may need to adjust certain aspects of their lifestyle to enhance their health, and this information can help identify those areas. Patients can track their health and wellness objectives with the aid of mobile health applications, such as tracking their dietary consumption, physical activity levels, or medication schedules. Additionally, these apps can offer patients individualized health advice and alerts, assisting them in staying on top of their health.

Technology may significantly improve patient health and well-being by providing patients with access to remote healthcare services, tracking their health and wellness goals, and assisting healthcare personnel in making more knowledgeable decisions about patient care. As a result of technology's integration into daily life, the healthcare system will benefit from its use by making it easier for healthcare providers to perform services while also giving patients access to newer technologies and higher-quality services. More technologies are required to address the shortcomings of current technology.

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IS PRODUCT LIFE CYCLE A CAUSE OR A RESULT?

Dr. Ragini Jadhav, Dr. Kiran G. and Prof. Prakash Unakal*

Abstract

Product Life Cycle (PLC) theory, a strategic marketing concept developed in the 1950s, has been criticized for its conceptual deficiencies and strategic shortcomings. This paper aims to answer whether the PLC curve acts as a guideline for companies in making appropriate strategies or a result of collective strategic efforts of competing firms. The theory prescribes generic strategies at different phases of product life, as market conditions vary across phases. Key strategies include market segmentation, product mix broadening, and improved services.

However, the PLC theory has faced criticism from researchers like Dhalla and Yuseph (1976), who questioned the concept's assumptions and empirical evidence that life cycle patterns of all products do not follow the classic PLC curve. Further research identified eleven unique curve patterns, including cycle-recycle patterns, increasing sales patterns, decreasing sales patterns, and stable maturity patterns.

The adoption of a new product by the market from its inception to maturity is influenced by various factors such as market potential, technology, competition, and macroeconomic factors. The demand system, supply system, and supporting resource environment are the main forces that influence the penetration of new products in markets.

Understanding the phases of the PLC curve helps managers acquire and use information about events, trends, and relationships in an organization's external environment, enabling them to plan future actions and adapt to changing external forces. This optimizes the organizational learning process, allowing firms to better adapt to changing external environments and interpret changes.

A firm's understanding of the current phase of the PLC can improve foresight and strategy formulation, providing organizational criteria for interpreting information and insights from changing PLC characteristics. Effective PLC usage is crucial for establishing in-house foresight competence.

Keywords : - PLC, PLC theory, PLC curve, Product life, strategy formulation, strategic marketing.

Introduction

Both academic and practicing worlds have widely accepted the value of Product Life Cycle (PLC) theory as a strategic marketing tool. At the same time, it has been thoroughly criticized for its conceptual deficiencies and strategic shortcomings. Both these perspectives have been empirically demonstrated. This leads to the question whether all the researchers were on a common platform in terms of their interpretation of important underlying assumptions and definitions of PLC theory. Similar differences in perceptions and opinions, in viewing PLC, as a strategic tool have been noticed among the industry managers. This has led to a doubt whether a small thread of variance in the conceptual interpretation of the PLC theory could have led the researchers and practitioners to reach different conclusions. These empirical evidences due to conceptual disorientation among the researchers have lead to the debate on the validity of the PLC theory as a strategic tool.

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Through this article, an effort is made to answer the question whether the PLC curve acts as a guideline for companies in making appropriate strategies or it is a mere outcome of the impact of collective strategic efforts of competing firms. In other words, is PLC is a cause for strategic decisions or a result of collective strategies of competing firms?

This paper re-evaluates the existing literatures of PLC theory and the contrasting arguments about its validity as a strategic tool. A number of research findings examined including the empirical evidences in its support and against and a wide range of PLC patterns that have been identified by the researchers. The paper observes that much of the research work has been carried out to investigate the curve patterns for different product categories including consumer durables, non durables, and industrial products, and to examine the length and shape of different phases of the PLC. Whereas, this article maintains that the forces that shape the curve patterns and the changing business environments along the PLC curve do remain valid irrespective of curve pattern and so is its strategic importance. This article concludes that, despite the pattern of the curve, understanding the phase of PLC an organization is in can enhance its foresight and strategy formulation. It detrmines up organizationally applicable standards that provide prepared human minds to catch sight of information, insight and knowledge from the abundance of 'signals' that are being discharged by the changing characteristics of changing phases of PLC. Its effectiveness also depends on the practitioners' ability to determine what to consider and how to ascertain the worth of information. The whole concept of usefulness of PLC Theory is quintessentially a matter of human judgment and less of calculation.

This article has been organized as follows. In section one, the prominent features of PLC along with supporting research are summarized. In section two, the critics of PLC theory are summarized. In section three, various factors influencing the rate of penetration on a new product and the shape of the growth curves along with market structure formation have been analyzed. In section four, the summary of both contradicting views of PLC theory has been discussed along with the forces that shape up the life cycle curves. Also, the importance of understanding of the changing business environments along the changing PLC phases is discussed and finally in section V, concluding remarks on the strategic utility of life cycle curves is presented.

PLC theory

The concept of Product Life Cycle (PLC) was developed in 1950s (Dean, 1950). The theory is based on the concept of diffusion and adoption of innovations (Rogers, 1962), which explains the pattern of gradual acceptance of a new product by the market from its inception to displacement, by a new invention which is functionally and technically much superior. Later the PLC theory was profoundly backed by a very influential research article by Theodore Levitt (1965), which made the concept much more popular stimulating the interest of the researchers resulting in many important research studies in this area (Willian E cox Jr, 1967), (Polli and Cook, 1969). The researchers over a period of time initiated empirical research on multiple aspects of the PLC concept and upheld the basic assumptions and validity of the theory. As per the classical PLC theory, the market environmental parameters like demand, competition intensity, Technology advancements, customer knowledge, expectations etc keeps changing and thus making the companies to adopt appropriate marketing strategies at each phase of PLC to achieve their respective marketing objectives.

Subsequently, the PLC theory has been portrayed, explored and annotated so often in the literature of marketing that the concept continues to be one of the fundamental topics of marketing management across the globe among both the academic fraternity and practicing managers. It is observed that

the Classical PLC curve pattern has been validated by atleast 15 different research studies (Rink and Swan, 1979) which were based on varieties of products ranging from consumer non durables, consumer durables and industrial products.

Despite of some strong critiques, the product life cycle theory remains as one of the prominent theories among the contingent theories of strategic management. The PLC theory prescribes generic strategies at different phases of product life (Buzzell 1966; Clifford 1977; Cox 1967; Doyle 1976; Levitt 1965; Wright 1971) as the market situation in each of the phases of product life is different from other phases. Though the concept of PLC as a strategic tool has been modified by several researchers over time, the fundamental premise that there are given sets of strategies associated with each stage still remains. The PLC theory can be used prescriptively to formulate strategies related to marketing, finance, production and R&D aspects of the firm as the product moves from one stage to other. Highlights of the prescribed strategies from some selected research have been presented here. For example, during the growth phase of the PLC, marketing plays a vital role as the objective of the firm remains the market share maximization (Patton 1959): highly intensified marketing activities (Hofer 1975), high price and high advertising (Buzzell 1966): publicity and aggressive sales promotion (Wasson 1974): establishment of a strong brand image and distribution niche (Fox 1973). At maturity phase, low production costs(Staudt et al. 1976; Fox 1973; Wasson 1974) and marketing effectiveness (Clifford 1977) become crucial. Optimizing capacity utilization (Hofer 1975; Smallwood 1973), Increasing the manufacturing process stability (Catry and Chealier, 1974), Routinizing the activities and processes (Fox 1973) and using effective mass marketing channels (Smallwood 1973) help achieve low costs. At the same time, market segmentation (Levitt 1965; Smallwood 1973), Product mix broadening (Staudt et al. 1976) and improved services (Levit 1965, Staudt and taylor 1976) contribute to marketing effectiveness. When maturity sets in, greater standardiza-

tion (Dean 1950) and a lower product differentiation (Buzzell 1966; Patton 1959) is suggested. Some authors also recommend that Superior quality (Hofer 1975; Smallwood 1973), price penetration (Buzzell 1966; Clifford 1977; Patton 1959) and reduction in R&D expenses (Fox 1973) are crucial. At decline stage, a quick exit from the market is usually recommended (Staudt et al. 1976). Thus milking the activities of all possible profit (Wasson 1974) are the key strategic action. Cost control (Clifford 1977) by cutting marketing expenses (Buzzell 1966; Staudt et al. 1976; Wasson 1974). Specializing the channels (Smallwood 1973), simplifying the production line (Fox 1973), relying on mass production (Forrester 1959), elimination items which are not generating profits (Wasson 1974), reducing the product differentiation (Forrester 1959; Patton 1959), raising price (Fox 1973, Wasson 1974) and cutting R&D expenses from an initial level (Fox 1973) are all recommended as successful strategic actions. Some authors have also suggested (Hall 1980; Harrigan 1980; Porter 1980) possible existence of more aggressive strategic stances based on increasing investment and marketing efforts.

Critics of PLC theory

Though the PLC theory was initially strongly accepted by both academic and practicing executives, there were researchers who challenged the very concept of PLC and its existence. For example, Dhalla and Yuseph (1976) strongly questioned the PLC concepts, its assumptions and empirically demonstrated that the life cycle patterns of all products do not follow the classic PLC curve and life cycles can be of many patterns varying across products and markets. In their research, they have strongly presented PLC curve as an outcome based on the impact of collective efforts of the competing firms in the industry. Hence framing the firm's strategies based on this curve could mislead the company. As mentioned earlier, the research stressed the fact that different products can have different curve patterns and classical PLC is not a universally applicable pattern. They further questioned the PLC theory's applicability

in strategic management due to the facts that each phase of PLC can have a very long duration, and annual sales often fluctuate making it difficult to predict when the next phase will appear and how long each phase lasts. Many times these fluctuations in sales will give a false impression of changing phases prompting companies to design wrong strategies.

Eleven unique curve patterns were identified by further research studies, which were quite different from the classical PLC curve (Rink and Swan, 1979). According to Rink & Swan, the cycle-recycle pattern has been found in four studies, including drugs (Cox,1963), food products, household products (Hinkle, 1966), and industrial fluid measuring devices (Cunningham, 1969). An increasing sales pattern was uncovered in three studies (Cox, 1963; Buzzel,1967; Frederickson, 1969). Although two studies support the decreasing sales pattern (Buzzel, 1967; Cox, 1963), two other studies found a stable maturity pattern (Buzzel,1966; Hesden, 1966). It has been demonstrated by the above curve patterns and empirical evidences that the life cycle patterns for all products may not follow the classical PLC curve. The reasons for variations have been analyzed in the later parts of this article.

One of the most exhaustive research attempts to contest the PLC concept was carried out by Marketing science institute* covering approximately 100 product categories in food, health and personal care products. The outcomes were discouraging with only 17% of the product classes and 20% of the product forms having the tendency to follow the classical PLC pattern, and the rest have their own patterns. In their report, the researchers made the following remarks.

"After completing the initial test of the life cycle expressed as verifiable model of sales behavior, we must register strong reservations about its general validity, even stated in its weakest, most flexible form. In our tests of the model against real sales data, it has not performed uniformly well against the objective standards over a wide range of frequently purchased consumer products, nor has it performed equally well at different levels of product sales aggregation....

Our results strongly suggest the life cycle concept, when used without careful formulation and testing as an explicit model, is more likely to be misleading than useful"*. They brought a dramatic example of few companies having achieved success due to imaginative marketing strategies ignoring PLC theory.

The review of literature of PLC theory has highlighted two important perspectives. The pro PLC stream has adhered closely to the tenets of the theory in accepting it and its usefulness as a strategic tool. The counterpart contributions have virtually challenged the very existence of PLC theory and its validity as a strategic tool. It proposes that PLC is a result of impact of collective efforts of competing firms, and it cannot be a basis for strategy formulations. It also suggests that the strategies prescribed by the PLC theory can be fatal for a firm if it applies it without exercising caution.

The next section of the article dwells upon the causes of the curve patterns of industry life cycles and whether the understanding of the PLC pattern can enable the firm in rolling out effective strategies. Further this paper tries to answer whether the PLC curve can be influenced by a firm or it has no control over the PLC except using it as a base for understanding the market structure evolution and base its strategies.

Factors influencing the new product penetration and life cycle patterns

A pattern in which a new product gets adopted by the market right from its inception to maturity depends on numerous factors like market potential, technology employed, competition, and other macro economic factors. Each of these factors interacts with others to either facilitate or inhibit the rate of sales growth or decline (Porter 1980; Tellis and Crawfod 1981; Day 1981; Witz 1985). In another important study (Mary Lambkin and George S. Day), the forces that influence the penetration of new products in markets have been classified as the demand system, the supply system, and the supporting resource environment.

According to Lambkin and Day, the demand factor that influences the rate of diffusion of new products is the collection of potential buyers or market potential. If the product has good demand due to un-met consumer needs or by outperforming the present alternative, the chances of early adoption is possible. Also, the demand factor is highly dynamic to the extent it may be changed over a period of time by exogenous factors such as demographic and economic trends and evolution of complementary markets (Mahajan and Muller 1979). The other determinants of rate of acceptance could be perceived comparative advantage of the new product over the best available alternative, perceived risk by customers, information availability and other barriers to early adoption. For instance, the demand side factors that propelled the rapid proliferation of air-conditioners across the globe were affordability of technology, growth in population, strong economic progress, industrialization, rising standards of living, increased per capita income and commercial applications. As air-conditioners originally were luxury goods meant only to the wealthy and prosperous in society, they are increasingly becoming necessities in many developing nations, leading to further growth in the air-conditioner market.

The pattern of market development also depends on the supply system of the market. For example, in case of air conditioner market the companies around the globe who influenced the market growth were Airwell Group, Carrier Corporation, Daikin Industries, De'Longhi SpA, Electrolux AB, GD Midea Holding Co., Ltd, GE Appliances & Lighting, Goodman Manufacturing Company, L.P., Haier Group, Hisense Group, Hitachi, Lennox Industries Inc., LG Electronics Inc., Mitsubishi Electric, Nordyne Inc., Panasonic Corporation, Rheem Manufacturing Company, Samsung Electronics Corp., Sanden Corporation, Sharp Corporation, Toshiba Carrier Corporation, Trane Inc., Whirlpool Corporation, and York International Corporation, among others.

The resource commitments and strategic choices of the pioneering firm impact the way markets open up. The number and types of competing firms that enter the market and their strategic choices in the beginning of the PLC can have a long-lasting impact on the market. Based on the initial market emergence a number of other firms will follow and the subsequent market growth pattern is influenced by their level of resources and strategic choices. Another important influencer, which can play an important role in the pattern of market development, is the resistance offered by the existing substitutes in their defensive efforts in enhancing their market offerings to reduce the perceived comparative advantage of new alternatives.

The way in which the demand side factors and supply side factors influence the unfolding of the pattern of market diffusion of a new product is facilitated by exogenous factors and the regulatory environment. For instance, in case of air-conditioners, global warming, reduction of the ozone layer and the El Nino effect became the basic reasons that generated the necessity for air conditioners. Other exogenous factors like technological advancements in product and process, cost and availability of inputs, and status of industry infrastructure can accelerate or delay market penetration. Besides all this, a favorable regulatory environment can be of extreme importance towards legitimizing a new industry. Going by the same example, the government-driven focus on energy efficiency of air conditioners across the globe brings optimism among air conditioner manufacturers, as it indicates to steer demand for energy efficient air conditioning systems like inverter based air conditioners in the future.

As the market starts expanding with wider product diffusion into the market, the market structure starts shaping up with many competitors of different sizes and resource abilities entering the market. These competing companies start using their own strategic choices which are influenced by their competitive positions, their financial sources and their perception about the attractiveness of the market. As the market keeps growing, the entry- to- exit ratio keeps varying with fluctuations

in market shares. At a point on the growth phase the ratio of entry to exit starts reducing with more number of firms exiting the market. This is often termed as the shake out phase by many researchers. Thereafter the market shares stabilize, and the market positions of different competing firms will more clearly emerge.

The study of market structure evolution reveals that demand gradually increases; price decreases, output increases, and the net number of firms initially rise and later shake out (Gort and Klepper 1982, Klepper and Graddy 1990). Most of the existing theories have emphasized several pertinent factors as the reasons behind these changes in market structure. For example, the role of technological changes in shaping market structure has been empirically demonstrated (Phillips, 1971; Utterback and Suarez, 1993; Jovanovic and MacDonald, 1994; Klepper and Simons, 1996; Klepper 1996) by taking six products that span a range of eras and technologies : typewriters, automobile tires, commercial aircraft for trunk carriers, televisions, television picture tubes and penicillin. The other reasons behind gradual stabilization of market size, shakeout in the number of firms and market shares are "emergence of dominant design" (Utterback and Suárez 1993), "race of innovation" (Wang 2007, Jovanovic and MacDonald 1994), and "scale economies in R&D" (Klepper and Simons 2000, Klepper 1996). Some other explanations point to uncertainties in new product markets, for example, "uncertain profit" (Horvath, Schivardi andWoywode 2001) or "uncertain market size" (Barbarino and Jovanovic 2006, Zeira 1999, Rob 1991) can also result in a mass entry and later shakeout.

There are other research studies (Zhu wang, 2007) which disclose how market- specific demand factors, the distribution of income and extent of market size in particular, influence this process of industry evolution. According to this theory when a new product is introduced into a market, high-income consumers tend to adopt it first. The technology then improves with cumulative production (Learning by Doing) and the product subsequently penetrates lower-income groups (TrickleDown Effect and Income Growth Effect). Eventually fewer new adopters are available, and the number of firms starts to decline.

Summary

PLC theory has been widely accepted as a tool for strategic marketing by both academic fraternity and practicing managers. The strategic prescriptions proposed by PLC have been held-up by many researchers with empirical evidences. At the same time, it has been challenged for its validity and it is empirically proven that classical PLC theory cannot be universally fit to all product categories, and there exist many more life cycle patterns besides classical PLC, which vary in shape, duration of phases etc.

By reviewing the PLC literature, it is clear that the rate of penetration of the new products into market depends up on three factors; demand factors, supply factors and exogenous factors. The demand side factors revolves around the theory of diffusion models (Mahajan and Muller 1979; Mahajan and Wind 1985) wherein the factors that influence the demand creation of the product are: existence of genuine customer needs, comparison with the available best substitute, industry infrastructure, modes of communication, characteristics of individual adopters and their responsiveness to interpersonal communication (Gatignon and Robertson 1986; Rogers 1983) etc. Diffusion into the market continues until such time when the market gets saturated with the product or when a superior substitute starts penetrating the market. As the market penetration of the new substitute increases, the existing product has to give way and thereby the demand decreases until it may eventually disappearance.

Several additions were proposed by Robertson and Gatignon (1986) to the basic diffusion model to incorporate the influence of supply side factors on the rate of diffusion and demand. The proposed

additions included structural factors like competition intensity, credibility of suppliers, standardization of designs and resource commitments towards functions such as R&D. The other important supply side factors, which can influence the rate of penetration were price (Bass 1980; Dolan and Jeuland 1981; Robinson and Lakhani 1975), advertising (Dodson and Muller 1978; Horsky and Simon 1983), and personal selling (Lilien, Rao, and Kalish 1981). Besides the market demand and supply side factors, exogenous factors like technological developments, business infrastructure, regulatory environment and macro-economic factors can greatly influence the penetration and growth patterns of new products into a market.

The demand, supply and exogenous factors do not act individually or sequentially but simultaneously. The concurrent interaction of these three basic forces decides the rate of penetration of the new product and the pattern of product adoption by the market. When this rate of adoption of a new product is plotted against time, will give a life cycle curve whether in the hypothetical normal PLC pattern or any other pattern as suggested by the earlier studies. Whatever is the pattern of the curve, the fact remains that the market environment evolves and changes along with the increase in sales until the eventual decrease due to the advent of a superior substitute. The market changes emerging as a consequence of three forces acting will include changes in the market structure and consumer expectations from the suppliers. This dynamism in most markets needs to be understood by individual firms in customizing their strategic choices. Firms that are good at that will survive and flourish.

With proper understanding of the phases of the PLC curve, the managers can be able to acquire and use information about events, trends, relationships in an organization's external environment (Aguilar 1967, Choo and Auster 1993). This knowledge would assist the organization to plan its future course of action. By an understanding of the phase of PLC, an organization can grasp the changes in the external forces that are likely to have business impact so that they may be prepared with operational responses that assure survival and success with their products. It helps in scanning the changing environment in order to avoid surprises, identify threats and opportunities, gain competitive advantage, and improve long and short term planning (Sutton 1988). This optimizes the organizational learning process by which the ability of the firm to improve its adaptation to changing external environment and interpreting the changes.

Concluding remarks

A firm's knowledge about the present phase of PLC of its products can enhance the ability of foresight and strategy formulation. It establishes organizationally relevant criteria that provide prepared human minds to perceive information, knowledge and insight from the multitude of ' signals' that are being emitted by the changing characteristics of changing phases of PLC. The whole concept of usefulness of PLC Theory is quintessentially a matter of human judgment and less of calculation. As such, the whole question of usefulness of PLC concept exists in the interpretative sphere and not that of any analytical or empirical works. Companies that do not give sufficient consideration to a broad variety of signals from growing industry are not likely to flourish because they would have failed to spot critical information about customers, markets, competitors, products etc. Organizations that do adopt the PLC philosophy have the higher chances of succeeding because they are synchronized to their environment – they are aware of the progresses. Besides, the trained eye can spot up-to-the-minute signals and furnish beforehand warnings of change. In other words, using PLC effectively is a key step in establishing an in-house foresight competence.

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3. **Result oriented, Process driven Work Ethic:**
   We adopt dynamic quality processes to ensure accountability and exceptional performances.

4. **We Link and Care:**
   We support and collaborate with all our stakeholders through mutual trust and respect.

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We shall endeavor to do this by:

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- Making the environment conducive for students to develop their creativity, Leadership skills and ability to learn continuously.

We shall follow a data oriented factual approach to Quality Management leading to continual improvement of our processes culminating in total customer satisfaction.