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EDITORIAL

It is a matter of great honour to present the 12th volume of Amity Management Review. In our perpetual endeavour to facilitate dynamic interactions between academia and industry professionals in the business and management landscape, this volume too offers valuable insights in the transforming post-pandemic era. The seismic shift in the global economy marked by volatility, uncertainty, complexity and ambiguity (VUCA) provides both challenges and opportunities to business organizations. The risk of global recession, substantiated by the United Nations report on Global downturn, indicates a major economic crisis. Juxtaposed to this is the embarkment of innovation, digital technologies for sustainable development, and the advent of generative artificial intelligence technologies, being applied ubiquitously in all sectors of management thus enabling navigation in the challenging environment of the post-COVID business ecosystem.

Echoing this line of thought, the collection of research in this issue provides innovative insights that promote our aim in a knowledge-creating, innovative, social and environment-sustainable world for everyone. To provide a comprehensive understanding of the dynamic interplay between the various factors influencing different sectors. We present research that highlights a proactive and engaging roadmap to development in the world. It is also aimed that the issue provides a foundation for future research and innovation.

The first research titled “Foreign Direct Investment's Influence on the Indian Banking Industry: Factors, Impact, and Benefits” by Dr Hitendra Trivedi, Dr Gaurav Bagra, Dr Dharmendra Mehta, offers a holistic view of the impact of Foreign Direct Investment (FDI) on the Indian Banking sector. The study is based on secondary data which is analysed using various statistical tools. Research shows positive associations between FDI and the performance of banks through the parameters of Earnings Per Share (EPS) and Net Profit (NP) of selected banks in India. Thus, the study establishes the role of FDI in enhancing banking operations through technology, management practices, and risk management, ultimately improving financial stability.

The second article titled “Comparative Analysis of Financial Distress Prediction Models for Indian Banks: Altman Modified, Grover, and Fulmer Approaches” by Dr. Anil Verma, Mr. Ramesh Kumar Jabdolia compares compare financial distress predictions of Altman Modified Fulmer models. This study employs a quantitative approach. Secondary data, i.e. financial statements of selected banks for 2017-2020, were being used in the study. The data were statistically analysed. The outcomes revealed that there are differences in predicting financial distress in commercial banks on the National Stock Exchange of India between 2017 and 2020 using the Altman Modified, Grover, and Fulmer models. The Grover & Fulmer models were found to be most helpful in determining financial distress in this investigation. Various metrics and inferential analysis have been used to appraise financial distress.

The third article titled “Sustainable Economic Development Strategies” by Ms. Chahana Chaturvedi explores the concept of sustainable economic development and its associated strategies focusing on the promotion of renewable energy to ensure green growth. The reports and papers considered in the evaluation are from Science Direct (from the year 2010-2022). Also, the study includes the progress and evaluation of sustainable development goals “affordable clean energy” specifically which is the need of the hour.

In continuation of the insightful discussion on sustainable development, our fourth contribution titled “Fashion and Sustainability: Integrating Circular Economy for Long-Term Impact” by Mr. Tarun Tilokchandani and Ms. Chitra Sharma, innovatively integrates the circular economy principles into fashion supply chains to properly manage environmental impact and encourage responsible resource utilization, addressing current deficiencies in traditional practices. The study utilizes a mixed-methods approach. This study employs qualitative and quantitative methodologies to explore circular economy principles and assess sustainability in fashion supply chains.

The fifth article produced by Ms. Sunita Kumar titled “Fast Fashion Driving Climate Change & Its Sustainability” examines how trends in the fashion industry relate to the phenomenon of climate change. It also raises concerns about the adaptation of fast fashion and suggests strategies to lessen and eventually eradicate the effects of fast fashion.

Dr. Ammani P and Prashanth Kumar Sreram offer a cautionary tale of reconciling disruption with industry intricacies in their case study titled “Katerra: Building Dreams and Collapsing Realities”. The study takes a deep dive into the reasons for the downfall of the well-versed aim of Katerra for end-to-end manufacturing, even drawing parallels with electronics production. The intricate details of Katerra's ambitious journey to revolutionize the construction industry, backed by SoftBank, culminating in a surprising bankruptcy announcement in June 2021 are highlighted in the research.

The final article produced by Ms. Pooja Sachdeva titled “Unraveling the Impact of Online Consumer Reviews on Consumer Buying Behaviour” examines the rise and popularity of online consumer reviews and how it impacts consumer buying behaviour. The study examines the central and peripheral cues using The Elaboration Likelihood Model of persuasion as a referent theory. After an extensive literature review, a conceptual model has been proposed to show the effect of online consumer reviews (OCRs) on consumer buying behaviour which can help researchers and marketers in the future to understand its intricacies and to use it effectively.

I hope that this issue of Amity Management Review proves to be insightful for addressing the challenges of the dynamic transformative and evolving corporate world. It is also expected to lay the foundations for further innovative exploration in future research.

Prof. Amit Jain
Patron

Foreign direct investment's influence on The indian banking industry: factors, Impact, and benefits

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Abstract

In India, FDI plays a crucial role in driving economic growth, attracting large corporations with its flexible regulations, favourable laws, and competitive labour costs. Post-independence policy reforms, especially post-liberalization in 1991, have made India an appealing destination for FDI, boosting economic development and foreign currency reserves. Empirical evidence suggests positive associations between FDI and bank performance, leading to recommendations for raising the FDI ceiling in the banking sector and revising entry regulations for foreign banks. This research focuses on evaluating the impact of FDI inflows on the Earnings Per Share (EPS) and Net Profit of selected Indian banks. Using data from secondary sources and employing financial and statistical tools like SPSS, CAGR, regression, and ANOVA, the study reveals a positive correlation between FDI and bank performance indicators such as EPS and Net Profit margins, particularly for banks like SBI and ICICI. The research findings, reinforced by the correlation table and ANOVA results, underscore the significant role of FDI in enhancing banking operations through improved management practices, technology, and risk management, thereby contributing to overall financial stability.

Key Words: FDI, Bank Performance, Indian Economy, Banking, ANOVA

INTRODUCTION

Foreign Direct Investment (FDI) is an investment strategy spanning different nations, with control and ownership at its core. It takes two primary forms: inorganic, involving acquiring a host country's existing company, and organic, expanding operations into the host country. FDI methods vary, from establishing foreign subsidiaries to mergers and joint ventures. FDI often targets regions with skilled workforces and promising prospects, differing from purely capitalist economies. It involves more than finance, often including management agreements and tech collaborations. For countries like India, FDI fuels substantial economic growth, attracting large corporations due to flexible regulations, favourable laws, and competitive labour costs.

In the present scenario, India, with abundant resources, is an FDI magnet, catalysing economic development and boosting foreign currency reserves. Policies evolve to welcome investors. Policy reforms post-independence accommodated changing economic landscapes to flourish and modernize industries especially post-liberalisation of 1991.

Foreign Direct Investment (FDI) involves capital flows from foreign investors into companies, and it comprises three main components: equity-based capital, reinvested profits, and intra-organization loans. Looking at India's economic context, there have been periods of growth and challenges. India saw substantial economic growth from 2004 to 2008, but growth rates dipped between 2009 and 2013. Presently, Indian banks face the challenge of managing non-performing assets (NPAs), requiring intervention from the Reserve Bank of India (RBI) through significant capital injections.

REVIEW OF LITERATURE

Study of Wei, W. (2005), delves into the comparative economics of India and China, shedding light on these emerging economic giants. While quantitative in nature, the study offers valuable insights for Indian policymakers seeking to enhance FDI policies. Wenhui challenges previous studies, cautioning against overestimating differences between the two nations, though noting that the study focuses solely on FDI from OCED countries. Notably, the research highlights factors that favour China, including a larger domestic market and stronger international ties with OCED nations, making it more attractive to FDI. However, the study refrains from making specific recommendations for either country.

In 2013, M. Devajit emphasized the strategic significance of foreign direct investment (FDI) for the Indian economy, emphasizing that FDI brings more than just capital; it offers various other benefits. The author recognised the need for FDI to boost the Indian economy and advocated for a shift from a services-led growth approach to one led by industry. He also provided policy recommendations, urging the government to maximize FDI's potential by creating policies that generate employment and enhance production, savings, and exports, thereby harnessing India's growth potential for a prosperous future.

Kamath et al. (2013), conducted a comprehensive study of the Indian banking industry, covering various aspects including financial reforms, emerging opportunities, competition, challenges, future prospects, and the significance of e-banking. The authors argued that relaxing FDI caps on the banking sector, particularly for Foreign Institutional Investors (FIIs), could attract more foreign investment and modernize the industry. They further pointed out that beyond capital infusion, increased FDI could bring advanced technology and improved management practices, enhancing the overall productivity and innovation in both public and private banks. The authors also encouraged infrastructure development to extend banking services to rural areas, creating a vast market and further potential for the Indian banking sector's growth. Trivedi et al. (2016) have previously utilized DEA method for measuring efficiency in financial institutions. Their study emphasized the significance of selecting an appropriate DEA model as these models vary based on scale and orientation. Given that managers typically have more influence over input variables than output variables, this results in an overall impact on the performance assessment of banks.

The study of Dwivedi & Kumar (2017) underscores the critical role of India's banking sector in wealth creation and economic growth, with FDI serving as a vital bridge between investment and savings. Using a quantitative research approach based on secondary data, the study acknowledges that socio-political factors have occasionally hindered FDI growth in Indian banking. Notably, the finance sector saw the highest FDI inflow in 2012-13. The study's conclusion emphasizes addressing banking challenges, leveraging FDI benefits, and advocating for regulatory updates to expedite projects and unlock capital. Furthermore, it highlights FDI as a necessity due to India's capital constraints, advocating for increased liberalization of FDI policies by the Reserve Bank of India.

As per Vyas's (2018) study, FDI is deemed crucial for India's development due to insufficient domestic capital for planned expenses. The study traces India's cautious pre-liberalization FDI approach, governed by the Foreign Exchange Regulation Act (FERA) of 1973, which capped foreign equity at 40%. Post-1991 liberalization removed barriers, facilitating greater FDI inflows. In the paper, the author used quantitative analysis and government data to identify FDI determinants. The services sector attracts the most FDI, with banking at 17%. The study stresses India's ongoing need for FDI and proposes measures for increased inflows.

The review of various research papers on foreign direct investment (FDI) and its impact on the Indian economy and the banking sector highlights the different approaches taken by different authors. While numerous studies have examined FDI trends and their effects on the Indian economy, limited research has been conducted on FDI in the banking industry, and the performance of Indian banks concerning FDI remains an underexplored area. This study aims to address this gap by analyzing and comparing the profitability of selected banks and assessing the impact of FDI on their profitability.

OBJECTIVES OF THE RESEARCH

The primary objectives of this research are mentioned as follows:

- To investigate and evaluate the influence of foreign direct investment (FDI) inflows on the earnings per share (EPS) of chosen banks operating in India.
- To examine and assess the consequences of foreign direct investment (FDI) inflows on the net profit of selected banks in India.

RESEARCH DESIGN

In a comprehensive review of research types, it is evident that most authors categorize research designs into three main categories: Exploratory Research, Descriptive Research, and Causal Research. This categorization is typically based on the specific information requirements (Malhotra, 2004; Zikmund & Carr, 2003). Descriptive research, as highlighted by Cooper and Schindler (2003), aims to provide detailed descriptions of phenomena or characteristics related to a subject population. It answers fundamental questions such as who, what, when, where, and how concerning a particular topic. This research type also involves determining the proportion of the population that possesses specific characteristics and identifying associations among variables.

The sample period for this study spans from FY 2014-15 to FY 2019-20. Such an extended timeframe, exceeding five years, is assumed to be essential for comprehensive research encompassing the observation of FDI inflow patterns, trends, and determinants during both different economic tenures. In this research, the universe consists of the top 35 banks from both the public and private sectors listed on the NSE, and they were selected based on their market capitalization. This list of banks serves as the sample frame. Two banks, SBI and ICICI, were chosen as sample banks, one each from the public and private sector to exhibit the data collection, analysis and results.

This study predominantly relies on secondary data from a diverse array of sources, including research papers, magazines, journals, books, and websites. Primary sources of secondary data were the annual reports of selected banks, supplemented by information from outlets like the Bombay Stock Exchange (BSE), FDI statistics, and the Money Control website. Additional data sources encompassed Reserve Bank of India (RBI) bulletins, the Annual Survey of Industries, reports from business associations, and publications from academic institutions, as well as recognized magazines, journals, and periodicals.

The data collected from secondary sources were analyzed using SPSS and MS. Various financial and statistical tools were applied to extract meaningful insights from the gathered data. To assess the influence of foreign direct investment on the performance of the selected banks, conventional financial tools and techniques such as CAGR, Growth Analysis, Descriptive Statistics, Regression and ANOVA were employed.

The working hypotheses for this study are as follows:

H01 posits that there is no significant impact of foreign direct investment on the earnings per share (EPS) of selected banks in India.

H02 posits that there is no significant impact of foreign direct investment on the net profit (NP) of selected banks in India.

ANALYSIS AND DISCUSSION

India is a preferred destination for FDI from various countries. FDI in the banking sector goes beyond financial support; it fosters technological progress and modern management practices while driving innovation and diverse service offerings. As per our research objectives, this study seeks to delve into the intricate relationship between Foreign Direct Investment (FDI) and the performance of select Indian banks. Table 1 below presents a comprehensive overview of the growth in FDI across various years:

TABLE 1 : FDI INFLOW IN INDIA DURING LAST DECADE

S. No.	Financial Year-wise	FDI Equity inflow (US \$ billion)	Yearly Growth (in %)	FDI inflow (US \$ billion)	Yearly Growth (in %)
1	2014-15	29.74	-	45.15	-
2	2015-16	40.00	0.2565	55.56	0.187365
3	2016-17	43.48	0.080037	60.22	0.077383
4	2017-18	44.86	0.030762	60.97	0.012301
5	2018-19	44.37	-0.01104	62.00	0.016613
6	2019-20	49.98	0.112245	74.39	0.166555
7	2020-21	59.63	0.161021	81.72	0.089696
8	2021-22	59.83	0.003342	83.57	0.022137
9	2022-23	46.03	-0.29980	71.35	-0.171268
		CAGR	5.611%	CAGR	5.886%

Source: Ministry of Commerce & Industry through <https://data.gov.in/>

It can be observed that the Foreign Direct Investments in the country during the above-mentioned period have shown a continuous increase overall. The growth in the years 2015-16 and 2019-20 was found to be higher compared to the remaining years. Later, a considerable slowdown, attributed to a decrease in investments due to COVID-19, can be observed. The overall pattern is found positive for the FDI inflow in India. The compounded annual growth rate for the sample period for the equity inflow and overall inflow was found as 5.611% and 5.886% respectively. In the further segment of the study, the overall FDI inflow is considered in place of the FDI equity inflow for the computational references.

FDI in banks can positively impact their performance through capital infusion, technology upgrades, expertise transfer, and market expansion, among other factors. In the study, an attempt is being made to exhibit the same through the sample banks' performance via parameters of EPS and net profit margin. The following table presents the earnings per share of SBI and ICICI for the sample duration along with the yearly and compound growth.

TABLE 2 : FDI INFLOW IN INDIA DURING LAST DECADE

S. No.	Financial Year-wise	SBI	Yearly Growth (in %)	ICICI	Yearly Growth (in %)
1	2014-15	17.55	-	19.32	-
2	2015-16	12.98	-0.35208	16.75	-0.15343
3	2016-17	13.43	0.033507	15.31	-0.09406
4	2017-18	-7.67	2.750978	10.56	-0.44981
5	2018-19	0.97	8.907216	5.23	-1.01912
6	2019-20	16.23	0.940234	12.28	0.574104
7	2020-21	22.87	0.290336	24.01	0.488546
8	2021-22	35.49	0.355693	33.66	0.286690
9	2022-23	56.29	0.350818	45.79	0.264905
		CAGR	15.6829%	CAGR	11.3898%

Source: Compiled from various published reports for the study duration

In continuation of performance observation, the second parameter considered was net profit margin which is further exhibited in the following table:

TABLE 3 : NET PROFIT MARGIN OF SAMPLE BANKS IN INDIA (%) DURING THE PERIOD OF STUDY

S. No.	Financial Year-wise	SBI	Yearly Growth (in %)	ICICI	Yearly Growth (in %)
1	2014-15	8.59	-	22.76	-
2	2015-16	6.06	-0.41749	18.44	-0.23427
3	2016-17	5.97	-0.01508	18.09	-0.01935
4	2017-18	-2.96	3.016892	12.33	-0.46715
5	2018-19	0.35	9.457143	5.3	-1.32642
6	2019-20	5.63	0.937833	10.6	0.5
7	2020-21	7.69	0.267880	20.46	0.481915
8	2021-22	11.49	0.330722	27.02	0.242783
9	2022-23	15.12	0.240079	29.20	0.074657
		CAGR	07.3235%	CAGR	03.1635%

Source: Compiled from various published reports for the study duration

The data can be primarily analyzed by observing the correlation between these performance parameters and FDI as mentioned in the following table extended from the data calculations for Pearson Correlation Coefficient. Subsequently, the results of ANOVA are mentioned for SBI and ICICI for testing the significance difference among EPS, NP and FDI in independent tables as mentioned below:

TABLE 4 : CORRELATION BETWEEN FDI AND SELECTED PARAMETERS

	SBI			ICICI		
	FDI	EPS	NPM	FDI	EPS	NPM
FDI	1.00	-	-	FDI	1.00	-
EPS	-0.151	1.00	-	EPS	-0.5781	1.00
NPM	-0.3286	0.9827	1.00	NPM	-0.716	0.9726

Source: Compiled from data calculation for the study

TABLE 5: CALCULATIONS FOR PERFORMANCE PARAMETERS OF SBI PARAMETERS WITH FDI

	SUM OF SQUARES SS	DEGREES OF FREEDOM	MS	F STATISTIC	P-VALUE
Regression	11,432.48	2	5,716.24	81.772	0.00
Residual	1,048.57	15	69.9046		
Total	12,481.05	17			

TABLE 6 : BONFERRONI AND HOLM RESULTS: ALL PAIRS SIMULTANEOUSLY COMPARED FOR SBI

TREATMENTS PAIR	BONFERRONI AND HOLMT-STATISTIC	BONFERRONI P-VALUE	BONFERRON IINFERENCE	HOLM P-VALUE	HOLM INFERENCE
NP vs EPS	1.0306	0.9571475	insignificant	0.3190492	Insignificant
NP vs FDI	11.5544	2.17E-08	** p<0.01	2.17E-08	** p<0.01
EPS vs FDI	10.5238	7.63E-08	** p<0.01	5.08E-08	** p<0.01

TABLE 7: CALCULATIONS FOR PERFORMANCE PARAMETERS OF ICICI PARAMETERS WITH FDI

	SUM OF SQUARES SS	DEGREES OF FREEDOM	MS	F STATISTIC	P-VALUE
Regression	8,396.29	2	4,198.15	80.8581	0.00
Residual	778.7988	15	51.9199		
Total	9,175.09	17			

TABLE 8: BONFERRONI AND HOLM RESULTS: ALL PAIRS SIMULTANEOUSLY COMPARED FOR ICICI

TREATMENTS PAIR	BONFERRONI AND HOLM-T-STATISTIC	BONFERRONI P-VALUE	BONFERRON IINFERENCE	HOLM P-VALUE	HOLM INFERENCE
NP vs EPS	0.3233	2.2528	insignificant	0.7509	Insignificant
NP vs FDI	10.8478	0	** p<0.01	0	** p<0.01
EPS vs FDI	11.1711	0	** p<0.01	0	** p<0.01

The relationship between FDI in banking and these performance indicators of the banking institutions reinforces the research findings and contributes to a more comprehensive understanding of the performance of the banking industry in the country. The correlation table exhibits the existence of a relationship among the parameters of banks' performance such as considered in the study as EPS and net profit margin for the sample banks SBI and ICICI. Further, the P value derived through ANOVA rejects the null hypothesis for both of the proposed hypotheses of the undertaken study.

CONCLUSION

India has undoubtedly seen significant FDI inflows, yet it's imperative to recognize its untapped potential. The current high-wire performance of the RBI has its limitations and poses economic destabilization risks, underscoring the need for financial reform. Furthermore, the role of FDI in the banking sector has been historically overlooked. Beyond capital infusion, it enhances banking operations through technology, management practices, and risk management, ultimately improving financial stability. FDI can also address various capitalization issues in India's banking sector, benefiting the broader economy. Empirical research shows positive associations between FDI and the performance of banks through the parameters of Earnings Per Share (EPS) and Net Profit (NP) of selected banks in India. In a similar study, Kumar & Meena (2023) recommended that India should consider raising the FDI ceiling in the banking sector and revising the stringent entry regulations for foreign banks. Lastly, in the context of this study, there are several ways to enrich future research and develop a more robust model. Firstly, incorporating the latest data from recent years may enhance the relevance in future. The study can be extended and enhanced by including additional variables related to bank performance to improve the understanding of the topic. Future studies could focus on post-2019-20 samples, considering the significant global slowdown in banking performance due to COVID-19's impact.

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Comparative analysis of financial distress Prediction models for indian banks: altman Modified, grover, and fulmer approaches

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ABSTRACT

This study is an attempt to compare financial distress predictions of Altman Modified, Grover and Fulmer models. This study employs a quantitative approach. Secondary data i.e. financial statements of selected banks for 2017-2020 were used in the study. The data were statistically analyzed using descriptive statistics, One-Way ANOVA, paired sample t-test, and Stationarity test. The outcomes revealed differences in predicting financial distress in commercial banks on the National Stock Exchange of India between 2017 and 2020 using Altman Modified, Grover, & Fulmer models. The Grover & Fulmer models were found to be most helpful in determining financial distress in this investigation. Various metrics and inferential analysis have been used to appraise financial distress. As per the results of this study, almost all banks are in a safe zone according to the Altman modified and Grover model, and 10 per cent are in a distress zone as per the Fulmer model. The EBIT/Total Asset ratio exhibited the greatest degree of fluctuation. Key observations facilitate executives, depositors, governing bodies, as well as stakeholders in representing their rights in the nation's banking industry.

Keywords: *Financial distress, Altman Modified, Grover model, Fulmer model, commercial banks*

INTRODUCTION

Economic prosperity necessarily involves those commercial enterprises that focus on innovation, boost efficiency and broaden through strategies to succeed. The skill set of a financial institution is largely inspired by one's effectiveness (Sumbodo, 2010). The financial gain earned by the firm could be used to quantify its efficiency. If indeed the corporation can yield massive returns, it does probably have a substantial cash flow there too, enabling it to conduct business effectively to prevent financial distress or risks to its business operations (Muflihah, 2017). Financial distress happens when a firm becomes unable to sustain itself as an outcome of a misunderstanding in acquiring potential markets or in a strategic plan.

The Reserve Bank of India (RBI) states that the Indian Banking system is satisfactorily capitalized and well-regulated. The nation's fiscal and operational conditions have been far better compared to other nations across the world. As far as credit, the real economy and risk investigations related to liquidity are concerned, most banks in India are equipped with plenty of resources and also have consistently performed in scenarios of falling economies globally. The rollout of innovative banking has seen the emergence of pay-outs and microfinance banks as innovative banking models. The RBI's proposed reforms may contribute towards facilitating the banking industry's reconfiguration in India. The digital payment gateway has accelerated among 25 countries, with India's "Immediate Payment Service (IMPS)" ranked fifth in "Faster Payments Innovation Index (FPII)".

According to the IBEF website, the Indian banking system consists of twelve public sector banks, 46 overseas banks, 22 private sector banks, 56 RRBs, 1,485 UCBs, and 96,000 rural cooperative banks and cooperative credit institutions. ATMs in India were 213,145 as of September 2021. Bank assets increased all over sectors from FY18 to FY21. In FY21, total banking assets comprising both PSBs and Private Sector banks increased to 2.48 trillion US\$. Total assets in public and private banking sectors were \$1,602.65 billion and 878.56 billion US\$ in FY21. 0.29% (CAGR) of increase in Bank credit realized during FY16 to FY21. Total credit lengthened in FY21 amounted to

1,487.60 billion USD. An increase of 12.38% CAGR was realized in deposits from FY16 to FY21, with it reaching 2.06 USD trillion in 2021.

1.47 trillion USD was adjudged for bank credit as of September 24, 2021, along with 1.46 USD trillion credit to non-food industries. Financial statements can be used to forecast a company's bankruptcy. Companies prepare financial statements and disclosures to provide useful information for investment and funding decisions. Predicting a company's survival is vital for the organization and its executives to foresee the emergence of financial distress, which can lead to financial collapse. This is evaluated through financial statement analysis using monetary ratios. (Sumbodo, 2010).

Evaluation of bankruptcy signs is considered necessary in predicting future insolvency. Consequently, to test, the researcher investigated financial distress there in the years 2017-2020 to determine which organisations would then experience distress and which would be productive (Adriana, 2012).

The firm needs a prediction tool or prototype to diagnose insolvency when trying to predict financial distress. A financial distress model must be developed to predict potential business distress in a bank early enough to allow the firm to take preventive measures and avoid bankruptcy. Prior to going bankrupt, there is financial distress. A specific model can be used to detect financial distress relatively early (Rahayu, 2016).

The Fulmer model was administered to a sample of 60 companies and then the "stepwise multiple discriminant analysis" approach to assess 40 financial ratios was used. As per Fulmer, 30 businesses failed while the other 30 did succeed. The Fulmer model includes 9 ratios and demonstrates a consistency rate of 98 per cent in predicting corporate failure one year in advance, with an average accuracy of 81 per cent for forecasts made more than one year before bankruptcy.

Previous research, such as that performed by Lukman & Ahmar (2015), revealed contradictory conclusions in evaluating the prediction of bankruptcy inside a financial institution, asserting that there were discrepancies in the prediction model of financial distress perseverance. As per calculations using the Fulmer h-score model, a significant proportion of the mining sector in 2011-2014 had an insolvency rate of 26.35 per cent, while 73.65 per cent of businesses were predicted to be productive.

Rahmadani (2015) conducted research that illustrated the effectiveness of financial data management and analysis from 2011 to 2015 utilising three financial distress prediction models. In this particular instance, Fulmer & Springate prophesied PT. Bank Ekonomi Raharja declared bankruptcy during this period, whereas the Altman method projected PT. Bank Ekonomi Raharja was labelled as being in the "grey area." Moreover, the threshold of compliance among both bankruptcy prediction and assessor viewpoints was only 20%, and this was in full compliance with stock exchange circumstances that had been taken off the market. Ambarwati et al. (2016) realised discrepancies in the measurement of financial distress predictions in their investigation. In 2013, and 2015, the Altman Z-Score predicted bankruptcy, while in 2014, it projected a grey area.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

As per Hanafi (2014), financial distress can be grouped into short-term capital adequacy problems and insolvency. The evaluation of cash inflows, the assessment of the strategic plan, as well as the company's financial statements can all disclose measures of financial hardships. Financial distress can be understood as the onset of new or cognitive problems related to bankruptcy, arising from a downturn in a corporation's financial circumstances or constraints that occur before bankruptcy or insolvency. A company will go insolvent if it cannot sustain its continued existence. Bankruptcy could be seen using the flow and stock frameworks (Hanafi, 2014: 638).

Springate (1978) researched to develop a model that could be used to predict the possibility (indication) of bankruptcy. He employed 19 widely used financial ratios that could be used to forecast financial distress. He eventually discovered four ratios that could be used to predict the possibility (indication) of bankruptcy with an accuracy of up to 92.5 per cent. He declared a company bankrupt if its score was less than 0.862 (S 0.862). For comparison, the business was labelled as sound financial if the S-Score numerical results were approximately equal

to 0.862 (S 0.862). The year 1984 had been used.

VARIATIONS IN PREDICTION OF FINANCIAL DISTRESS RESULTS BETWEEN SPRINGATE MODEL AND FULMER MODEL

Both Springate and Fulmer Models are models that can predict future company bankruptcy and end up serving as advance detection for management to re-evaluate the cash flow when insolvency is acknowledged. This test evaluates significant differences statistically between the Springate model and the Fulmer model so that the highest predictive model between the two approaches can be discovered in forecasting the corporation's degree of financial complexity.

Signalling theory could also help organisations (brokers), entrepreneurs (stockholders), and external stakeholders disclose more information by generating relevant financial statements keeping quality or integrity in mind. To help ensure that parties involved genuinely think about the accuracy and reliability of accounting information submitted by the corporation (agent), the company must acquire a viewpoint from those other stakeholders who can express ideas on accounting records. The organisation must be transparent and open when displaying the annual financial performance. The accounting information will disclose whether the business is in financial health or distress (Jama'an, 2008).

OBJECTIVES:

The objectives of this study were to;

- To understand the financial health of sample banks using the Altman Modified, Grover and Fulmer Model, and
- To test statistically the significant differences among Altman Modified, Grover & Fulmer models in predicting financial distress in Banks listed on the Indian Stock Exchange (NSE) during 2017-2020

RESEARCH METHODOLOGY

This study used a quantitative research framework. Secondary data sources were used in the investigation, precisely consolidated financial statements in the manner of income statement and balance sheet for each financial institution from 2017 to 2020 in Indian banks listed on the NSE. In this study, hypotheses were tested using One-way ANOVA, paired sample t-test, and Stationarity test. Ghozali (2013) sets out the terms for evaluating the normality and homogeneity inferences before ANOVA testing.

TABLE 1: DETAILS OF SELECTED MODELS

Model	Equations	Variables	Zone of Discrimination
Altman Modified (2002)	$Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$	X1 = Working capital ÷ total assets X2 = Retained earnings ÷ total assets X3= Earnings before interest and taxes ÷ total assets X4 = Book Value of Equity ÷ total liabilities	Z > 2.99 – Safe 1.81<Z<2.99 – Grey Z<1.81 - Distress
Grover (2001)	G Value = 1.650X1 + 3.404X2 – 0.016ROA + 0.057	X1= Working capital ÷ total assets X2= = Earnings before interest and taxes ÷ total assets X3 (ROA)= net income ÷ Total assets	GS ≥ 0.01 – Healthy GS ≤ -0.02 - Distress

Model	Equations	Variables	Zone of Discrimination
Fulmer (1984)	F=5.52 X1+0.212 X2+0.073 X3+1.27 X4- 0.12 X5+2.335 X6+0.575 X7+1.083 X8+0.894 X9- 6.075	X1= Retained earnings ÷ Total assets , X2= Sales ÷ Total assets X3= Profit before taxes ÷ Equity X4= Cash flow ÷ Total Debt X5= Debt ÷ Total assets X6= Current liabilities ÷ Total assets X7 = Logarithm of assets X8= Working capital ÷ Total Debt X9= Logarithm of PBIT ÷ Interest	FM>0 – Healthy FM<0 – Distress

FACTS AND FINDINGS:

Facts and Findings:

Data normality is a mandatory requirement that must be fulfilled in every parametric test. The normality test can be done using various methods, one of them using the Kolmogorov-Smirnov method. A piece of data can be said to be normal if it has a significance value of more than 0.05. Conversely, the data can be called abnormal if it has a significance value of less than 0.05 (sig. <0.05). Normality test was done for all selected models before framing hypothesis testing.

TABLE 2 : ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

		Z- Score_Altman Modified	F- Value_Fulmer Model	G_Score_Grover Model
N		120	120	120
Means		4.909682021	9.064187680	1.290811101
Normal Parameters^{a,b}	Std. Deviation	.5433747396	13.0067460245	.1491639534
Most Extreme Differences	Absolute	.070	.142	.082
	Positive	.054	.142	.082
	Negative	-.070	-.127	-.070
Kolmogorov-Smirnov Z		.765	1.554	.901
Asymp. Sig. (2-tailed)		.602	.016	.392

a. Test distribution is Normal. b. Calculated from data.

Normality test results obtained from the above table reveal that F Value Fulmer Model data (p value, 0.016) have a significance value of less than 0.05. It can be concluded that the data distribution is not normal. Testing the hypothesis can be done using the non-parametric test.

Model-wise distribution of sample banks for their financial health

Following is the description of selected banks for their financial health parameters i.e., Healthy or Distress as an outcome of computation through various models considered for this research analysis.

TABLE 3 : MODEL-WISE DISTRIBUTION OF SAMPLE BANKS FOR THEIR FINANCIAL HEALTH

Model	Financial Health Parameters (Healthy/ Distress)	Frequency	Percent
Altman Modified	Healthy	120	100.0
Fulmer Model	Healthy	104	86.7
	Distress	16	13.3
	Total	120	100.0
Grover Model	Healthy	120	100.0

Altman Modified has estimated the financial health of Indian banks as healthy with 100% of mark. Fulmer model with 86.7% mark has shown the “Healthy” financial status of Indian banks.

Grover model predicted Indian Banks with “healthy” status with 100.0% of mark.

YEAR-WISE FINANCIAL HEALTH ANALYSIS FOR EACH COMPUTED MODEL

After conducting an overall prediction analysis of selected models, it was then decided to investigate the frequencies of these selected Indian banks for their financial health for the period of the year 2017 to the year 2020 on an annual basis. Computation of same is as under:

TABLE 4: YEAR WISE FINANCIAL HEALTH ANALYSIS FOR EACH COMPUTED MODEL

Model	Year	Status	Frequency	Percent
Altman Modified	2017	Healthy	30	100
	2018	Healthy	30	100
	2019	Healthy	30	100
	2020	Healthy	30	100
Fulmer Model	2017	Healthy	27	90.0
		Distress	3	10.0
		Total	30	100.0
	2018	Healthy	24	80
		Distress	6	20
		Total	30	100
	2019	Healthy	27	90.0
		Distress	3	10
		Total	30	100
	2020	Healthy	26	86.7
		Distress	4	13.3
		Total	30	100
Grover Model	2017	Healthy	30	100
	2018	Healthy	30	100
	2019	Healthy	30	100
	2020	Healthy	30	100

The Altman Modified model as well as the Grover Model predicted the financial health of selected Indian banks, indicating a 100% inclination towards a 'Healthy' status throughout the entire study period (2017-2020). The Fulmer model predicted the financial health of selected banks with a greater inclination towards a 'Distress' status compared to a 'Healthy' status during the study period. In the year 2019, it was highest, with 90% of the selected banks classified as 'Healthy.'

Comparison of selected models for selected Indian Banks

- H0: There is no significant difference in the Z-Score of Altman Modified/ F Value of Fulmer Model/ G Score of Grover Model for selected Indian Banks
- Ha: There is a significant difference in the Z-Score of Altman Modified/ F Value of Fulmer Model/ G Score of Grover Model for selected Indian Banks

Security Name		Z- Score_Altman Modified	F Value_Fulmer Model	G_ Score_Grover Model
AU Small Finance	Mean	5.446	-0.127	1.433
	Std. Deviation	0.333	0.993	0.133
	Minimum	5.073	-1.464	1.333
	Maximum	5.839	0.672	1.618
Axis Bank Ltd	Mean	5.169	2.469	1.358
	Std. Deviation	0.141	1.074	0.039
	Minimum	5.064	0.885	1.327
	Maximum	5.372	3.224	1.415
Bandhan Bank Ltd	Mean	5.942	3.441	1.563
	Std. Deviation	0.167	1.621	0.030
	Minimum	5.769	1.903	1.525
	Maximum	6.170	5.677	1.595
Bank of Baroda	Mean	4.906	8.799	1.289
	Std. Deviation	0.177	4.531	0.040
	Minimum	4.753	5.523	1.260
	Maximum	5.156	15.480	1.346
Bank of India	Mean	5.052	6.008	1.315
	Std. Deviation	0.070	2.587	0.027
	Minimum	4.996	2.448	1.294
	Maximum	5.149	8.650	1.351
Bank of Maharashtra	Mean	4.490	11.816	1.187
	Std. Deviation	0.444	16.885	0.099
	Minimum	3.956	-10.988	1.065
	Maximum	4.922	28.032	1.285
Canara Bank	Mean	4.742	9.203	1.246
	Std. Deviation	0.078	0.983	0.023
	Minimum	4.668	8.294	1.221
	Maximum	4.843	10.319	1.274
Central Bank of India	Mean	4.253	24.411	1.109
	Std. Deviation	0.393	4.136	0.096
	Minimum	3.802	19.280	1.001
	Maximum	4.682	29.070	1.215
City Union Bank	Mean	5.570	27.937	1.443
	Std. Deviation	0.089	13.859	0.017
	Minimum	5.476	15.058	1.425
	Maximum	5.676	42.451	1.465
CSB Bank Ltd	Mean	5.120	16.460	1.380
	Std. Deviation	0.240	5.746	0.050
	Minimum	4.779	10.106	1.320
	Maximum	5.343	21.883	1.441

DCB Bank Ltd	Mean	5.144	6.665	1.320
	Std. Deviation	0.186	0.817	0.047
	Minimum	4.894	5.867	1.257
	Maximum	5.342	7.635	1.371

Security Name		Z- Score_Altman Modified	F Value_Fulmer Model	G_ Score_Grover Model
Dhanlaxmi Bank Ltd	Mean	4.853	29.028	1.397
	Std. Deviation	0.110	4.362	0.024
	Minimum	4.759	22.904	1.374
	Maximum	5.007	32.928	1.422
Federal Bank Ltd	Mean	5.331	11.365	1.364
	Std. Deviation	0.143	2.800	0.034
	Minimum	5.131	7.569	1.318
	Maximum	5.447	13.778	1.392
HDFC Bank Ltd	Mean	5.149	12.718	1.347
	Std. Deviation	0.135	0.269	0.034
	Minimum	4.987	12.524	1.306
	Maximum	5.272	13.104	1.378
ICICI Bank Ltd	Mean	4.003	6.636	1.049
	Std. Deviation	0.400	2.103	0.099
	Minimum	3.590	4.717	0.944
	Maximum	4.355	9.380	1.134
IDBI Bank Ltd	Mean	4.747	-12.942	1.224
	Std. Deviation	0.066	10.949	0.028
	Minimum	4.680	-24.581	1.182
	Maximum	4.832	-0.906	1.241
IDFC First Bank	Mean	3.873	-2.754	1.005
	Std. Deviation	0.540	3.587	0.135
	Minimum	3.371	-7.087	0.867
	Maximum	4.367	0.405	1.127
Indian Bank	Mean	4.878	9.419	1.266
	Std. Deviation	0.219	4.085	0.059
	Minimum	4.611	6.768	1.191
	Maximum	5.127	15.496	1.327
Indian Overseas Bank	Mean	4.509	-6.986	1.220
	Std. Deviation	0.288	22.650	0.062
	Minimum	4.092	-40.105	1.137
	Maximum	4.753	10.551	1.288
IndusInd Bank Ltd	Mean	5.324	2.999	1.401
	Std. Deviation	0.130	0.959	0.033
	Minimum	5.225	2.175	1.374
	Maximum	5.512	4.378	1.448
Jammu & Kashmir Bank	Mean	5.104	38.922	1.320
	Std. Deviation	0.171	7.748	0.044
	Minimum	4.857	28.859	1.256
	Maximum	5.242	46.884	1.355
Karnataka Bank Ltd	Mean	5.105	28.838	1.335
	Std. Deviation	0.352	18.145	0.096
	Minimum	4.578	13.464	1.191
	Maximum	5.305	51.325	1.389

Security Name		Z- Score_Altman Modified	F Value_Fulmer Model	G_ Score_Grover Model
Kotak Mahindra Bank	Mean	4.381	4.255	1.099
	Std. Deviation	0.232	0.721	0.041
	Minimum	4.151	3.504	1.059
	Maximum	4.691	5.225	1.156
Punjab National Bank	Mean	4.730	4.428	1.255
	Std. Deviation	0.147	4.841	0.025
	Minimum	4.551	-0.135	1.223
	Maximum	4.909	9.738	1.279
RBL Bank Ltd	Mean	5.138	2.209	1.343
	Std. Deviation	0.395	0.620	0.072
	Minimum	4.691	1.696	1.254
	Maximum	5.523	3.106	1.411
South Indian Bank	Mean	5.163	12.993	1.353
	Std. Deviation	0.161	4.624	0.041
	Minimum	4.924	7.364	1.292
	Maximum	5.266	18.680	1.378
State Bank of India	Mean	4.287	5.931	1.117
	Std. Deviation	0.127	5.596	0.031
	Minimum	4.140	0.256	1.077
	Maximum	4.411	13.513	1.144
UCO Bank	Mean	4.208	4.550	1.108
	Std. Deviation	0.167	6.231	0.035
	Minimum	4.008	-3.280	1.070
	Maximum	4.396	11.860	1.151
Ujjivan Small Finance	Mean	5.808	-0.187	1.596
	Std. Deviation	0.433	2.170	0.143
	Minimum	5.184	-2.522	1.383
	Maximum	6.167	2.374	1.684
Union Bank of India	Mean	4.865	3.423	1.284
	Std. Deviation	0.165	1.344	0.025
	Minimum	4.636	2.047	1.246
	Maximum	5.000	4.954	1.302
Total	Mean	4.910	9.064	1.291
	Std. Deviation	0.543	13.007	0.149
	Minimum	3.371	-40.105	0.867
	Maximum	6.170	51.325	1.684

TABLE 6: RESULTS OF ANOVA TEST

		Sum of Squares	Degree of Freedom	Mean Square	F	Sig.
Z-Score_Altman Modified * Security Name	Between Groups	28.527	27	1.057	14.709	.000
	Within Groups	6.608	92	.072		
	Total	35.135	119			
F Value_Fulmer Model * Security Name	Between Groups	14762.316	27	546.752	9.368	.000
	Within Groups	5369.561	92	58.365		
	Total	20131.878	119			
G_Score_Grover Model * Security Name	Between Groups	2.218	27	.082	17.583	.000
	Within Groups	.430	92	.005		
	Total	2.648	119			

TABLE 7: MEASURES OF ASSOCIATION

	Eta	Eta Squared
Z-Score_Altman Modified * Security Name	.901	.812
F Value_Fulmer Model * Security Name	.856	.733
G_Score_Grover Model * Security Name	.915	.838

P values in the table above for all are found less than significant values. Therefore, the alternate hypothesis is accepted, and it can be stated that there is a significant difference in the Z-Score of Altman Modified/ F Value of Fulmer Model/ G Score of Grover Model for selected Indian Banks.

The Altman Modified model indicates that among all banks in India, Bandhan Bank Ltd had the healthiest financial status throughout the entire study period (mean: 5.94). According to the Fulmer Model, Dhanlaxmi Bank Ltd had the healthiest financial status (mean: 29.02). On the other hand, the Grover model shows that Ujjivan Small Finance Bank (mean: 1.59) had the healthiest financial status among all selected banks in India.

The different financial distress scores in various models and the security of the selected banks are strongly associated, as the Eta values are found to be greater than 0.07. The financial distress measurement of selected Indian banks using the Grover model (83.8%) is found to be the most effective (Eta Square: 0.838).

Pair-wise comparison of significant differences in selected models

·H0: Fulmer Model, Grover Model and Altman Modified models are not very effective in predicting the financial distress of selected Indian Banks.

·Ha: Fulmer Model, Grover Model and Altman Modified models are effective in predicting the financial distress of selected Indian Banks.

Sub Hypothesis 1: The Fulmer Model has better capability as compared to the Altman Modified Model in predicting the financial distress of selected Indian Banks.

Sub Hypothesis 2: The Altman Modified Model has better capability as compared to the Grover Model in predicting the financial distress of selected Indian Banks.

Sub Hypothesis 3: The Grover Model has better capability as compared to the Fulmer Model in predicting the financial distress of selected Indian Banks.

TABLE 8: PAIRED SAMPLE T -TEST STATISTICS

		Mean	N	Standard Deviation	Standard Error Mean
Part 1	Z-Score_Altman Modified	4.909682021	120	.5433747396	#####
	F Value_Fulmer Model	9.064187680	120	#####	#####
Part 2	Z-Score_Altman Modified	4.909682021	120	.5433747396	#####
	G_Score_Grover Model	1.290811101	120	.1491639534	#####
Part 3	F Value_Fulmer Model	9.064187680	120	#####	#####
	G_Score_Grover Model	1.290811101	120	.1491639534	#####

TABLE 8: PAIRED SAMPLES CORRELATIONS

		N	Correlation	Sig.
Part 1	Z-Score_Altman Modified & F Value_Fulmer Model	120	.128	.165
Part 2	Z-Score_Altman Modified & G_Score_Grover Model	120	.970	.000
Part 3	F Value_Fulmer Model & G_Score_Grover Model	120	.136	.138

TABLE 9: PAIRED SAMPLES TEST

		Paired Difference					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. error Mean	95% Confidence Interval of Differences				
					Lower	Upper			
Part1	Z-Score_Altman Modified - F Value_Fulmer Model	-4.15	12.95	1.18	-6.50	-1.81	3.51	119	.001
Part 2	Z-Score_Altman Modified - G_Score_Grove Model	3.62	0.40	0.04	3.55	3.69	99.02	119	.000
Part 3	F Value_Fulmer Model - G_Score_Grove Model	7.77	12.99	1.19	5.43	10.12	6.56	119	.000

Since the p-value for all three pairs was found to be less than a significant value (0.05), the null hypothesis is rejected and it can be stated that the Fulmer Model has better capability as compared to the Altman Modified Model in predicting the financial distress of selected Indian Banks, the Altman Modified Model has better capability as compared to the Grover Model in predicting financial distress of selected Indian Banks and Grover Model has greater ability than Fulmer Model to predict financial distress of selected Indian Banks.

Fulmer model (mean, 9.06) is more efficient in predicting the financial distress of selected Indian Banks compared with the Grover and Altman Modified Model while the Altman Modified can predict the financial distress of selected Indian Banks better than the Grover Model (mean, 4.09).

Analysis to test Stationarity

Ho: Series is trend stationary

Ha: Series is non-stationary

TABLE 10: STATIONARITY TEST

Sr No	Model Name	Levin, Lin & Chu Statistics	Probability	ADF Fisher Chi Square		PP Fisher Chi Square		Result
				Statistics	Probability	Statistics	Probability	
1	GROVER	-14.575	0.00	312.009	0	306.575	0	Stationary
2	ALTMAN_MODIFIED	-11.1163	0.00	274.196	0	273.887	0	Stationary
3	FULMER	-13.8237	0.00	340.916	0	326.698	0	Stationary

Since the null hypothesis failed to be rejected, this test provides enough evidence for all aforementioned financial distress measurement models. The series is trend stationary.

KEY FINDINGS

The Altman Z-score modified model takes into account four independent variables, each of which signifies a financial ratio. A score of less than 1.81 ensures that the firm is on the verge of a financial crisis. Scores above 2.99 indicate that the firm is in a healthy position, whereas scores somewhere between 2.99 and 2.99 demonstrate that they are in the grey area (Altman, 2002). The Grover model considers three independent variables, each of which represents a financial ratio. A score of less than or equal to -0.02 indicates that the organisation is on the verge of a financial crisis. Scores greater than 0.01 show that the firm is financially healthy (Grover, 2001). Fulmer Model takes into account 9 independent variables, each of which symbolises a financial ratio. A score less than zero appears to indicate that the bank's business position is crumbling. Scores larger than 0.00 demonstrate that the bank's finances are in decent form (Fulmer, 1984). All selected banks were found to have good financial status. The Altman Modified model predicted Bandhan Bank Ltd to be in the healthiest financial condition while the Fulmer Model predicted Dhanlaxmi Bank Ltd, and the Grover model predicted Ujjivan Small Finance to be in the healthiest financial health.

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SUSTAINABLE ECONOMIC DEVELOPMENT STRATEGIES

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ABSTRACT

There is a growing consensus and acceptance that 'economic development' and 'environmental conservation' are mutually inclusive. The concept of 'sustainable economic development' is globally acknowledged in the 21st century. To ensure sustainable economic development, a major emphasis is laid on the promotion and usage of renewable clean energies for a productive and progressive future. Adoption and accommodation of 'sustainable economic development strategies' is the need of the hour and to ensure that these objectives are attained, collective, and consistent efforts are to be made in this direction. The research paper highlights the concept of sustainable economic development and its associated strategies focusing on the promotion of renewable energy in ensuring green growth. The reports and papers considered in the evaluation are from Science Direct (from the year 2010-2022). Also, the study includes the progress and evaluation of sustainable development goal 7 "Affordable Clean Energy" specifically.

Keywords: sustainable economic development, renewable energy, green growth

INTRODUCTION

There are enough scientific studies and research evidence stating that anthropogenic activities (man-made activities) particularly overutilization and excessive exploitation of resources have led to severe environmental destruction and degradation. So, in today's times, the concept of 'sustainable economic development' has become increasingly significant and relevant. In the 21st century, the issue has global recognition. In simple terms, sustainable development means integrating the economic and social environmental objectives of a society while aiming to maximise human welfare without compromising the abilities of future generations to meet their requirements. The intertwining of 'economic development' with 'environmental conservation' is the need of the hour and hence the concept of 'sustainable economic development' has gained popularity. The various ways to attain sustainable economic development constitute sustainable development strategies. Academicians and policymakers are collaborating in devising, analysing and reviewing to elaborate various sustainable development strategies. The relation between sustainable development and the use of energy resources in particular is of great importance.

This review paper focuses on the role of clean energy systems as one of the most vital parts of sustainable strategies as it requires these energy resources to be utilized, assisted and extracted judiciously and efficiently. Sustainable strategies focus on the usage and promotion of renewable energy sources replacing the non-renewable polluting source. This reduces the dependence on polluting sources, fulfilling the present-day requirements of the world. Sustainability has been taken as a key solution to the current ecological, economic and social challenges. Therefore, clean energy systems evolving from the usage of renewable sources of energy fulfil industrial and other requirements. Hence development and utilization of clean energy (also called green energy since its environment friendly and non-polluting) should be given high priority.

BRIEF HISTORY OF SUSTAINABLE DEVELOPMENT

Sustainable development as a concept started in the 1960s as a forest management effort in Europe. The landmark effort, which laid the foundation for sustainable development, took place in 1972 when the United Nations Conference on Human Environment was organised in Stockholm, Sweden. In 1980, a world conservation strategy was released, but the concept became popular only after the release of Brundtland's report titled 'Our Common Future'. Then, with the commencement of the 'Earth Summit' organised by the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil in 1992 where 178 nations participated along with 2400 nongovernmental organisations, it gained momentum and universal acceptability. In the year 2000, the United Nations declared the Millennium Development Goals targeted to be achieved by 2015.

Recently in 2015 'Transforming Our World: The Agenda 2030 for Sustainable Development' adopted the 17 Sustainable Development Goals (SDGs) at the United Nations Sustainable Development Summit in New York, the United States of America. The SDGs, also known as global goals, aim to end poverty, protect the planet and ensure that by 2030, all people enjoy peace and prosperity. They are recognised as integrated stating that development must balance social, economic and environmental sustainability and call for a global partnership of developed and

developing countries. Among the 17 SDGs, goal 7 highlights 'affordable clean energy' further strengthening and emphasising the need for sustainability. Persistent efforts are being made globally to meet the twin challenges of 'economic development' and 'environmental conservation' for these two are mutually dependent and inclusive of one another. This review paper focuses on establishing and promoting this relation through the progress study of sustainable development strategies with a special focus on the development of clean energy systems.

SUSTAINABLE DEVELOPMENT STRATEGIES

The rapid rate of urbanization and industrialization has resulted in the deterioration of the environment leading to overutilization of resources, global warming, climate change, loss of biodiversity and so on. Energy resources are classified into two types: Non-Renewable and Renewable. Non-renewable sources (like coal, petroleum, and fossil fuels) are the ones that cannot be reused, are exhaustive in nature, take millions of years to form and are major sources of environmental pollution and degradation. Renewable energy sources refer to non-polluting and environmentally friendly sources like solar, wind, hydro, tidal, oceanic, etc. They are in abundance in nature.

Sustainable strategies, also called green strategies, focus on the adoption, usage and promotion of renewable sources for progressive sustainability and security. They focus on the reuse and recycling of resources. Emphasis is laid on the adoption of solar energy-induced setups (solar panels) to generate electricity. Though the initial cost of setups is quite high, the government provides subsidies for its establishment. Additionally, there are rebates on the electricity bill for solar panels, as is the case in India, not only for industrial and commercial units but also for the household sector.

Increasing energy efficiency and promoting resource-energy utilization involves certifying the appropriate allocation of resources to maximize benefits in the design and operational costs of setups, ensuring economic feasibility.

Another very important renewable energy is bioenergy in which biomass -- a component produced from plants and animals -- produces bioenergy such as biofuel, biodiesel, bio-oil, and ethanol. Biomass includes agricultural waste, wood waste, organic waste, municipal waste, etc. Biodiesel generated from agricultural feedstock is used as a substitute for fuel in transportation. In the process of generating biofuel from biomass, by-products are also produced. Biofuel can be used as a fuel and its remaining by-products can be used as manure and fertilizers in the agriculture sector.

Sustainable strategies promote the adoption of cost-effective low-carbon technologies, utilizing renewable energy sources to achieve economic efficiency through collaborative and consistent efforts by the global community. These strategies have short as well as long-term implications and benefits as they aim to generate economic employment and growth while promoting innovation and efficiency. They are also aimed at preserving the environment and emphasising the use-reuse of natural resources to promote sustainability and improve the quality of life.

To give an impetus, most of the countries in the world have formulated their renewable energy policies and targets; and also provide subsidies and grants in clean energy establishments. These energy systems, though durable and environmentally amicable, are economically straining as they require huge amount of investments. This is the reason that even after so many initiatives of international organisations, they fail to achieve the targeted growth in ensuring clean energy outlooks. In 2015, the United Nations formally adopted the Sustainable Development Goals to be achieved by 2030, but the progress reports published are not yielding satisfactory results.

SIGNIFICANCE OF THE STUDY

Economics is the study of the management of scarce resources that can be put to unlimited use. The need for management of this scarcity is even more in the time of global warming and climate change. As there is a growing energy demand globally, along with excessive dependence on specific non-sustainable and non-renewable energy sources, and ever-increasing population pressure, the study of energy economics regarding sustainable economic development strategies becomes inevitable. This review paper will help in raising awareness about the issue of economic growth and development consistent with environmental sustainability. With the help of various high-quality research papers, review papers and reports published by distinguished and well-known authors, this review paper stresses on the need of the integration of welfare, economics and sustainable development. This paper, though in the form of an empirical conclusion of various studies, helps in providing inputs to environmentally sustainable economics.

METHODS AND MATERIALS

To review the progression in the development of clean energy technologies, the researcher has studied and analysed the data report published by the International Energy Agency (Tracking Clean Energy Progress) and the United Nations (Sustainable Development Report 2022). In conjunction with it, the researcher also reviewed the past papers from Science Direct and Research Gate from 2010 to 2022. The basics of energy economics are done from a book titled Energy Economics by Subhes C Bhattacharya. The researcher accessed various international organisations through the Internet to have a better understanding of the research area.

FINDINGS

Adnan M. et al.(2006) proposed essential factors of green energy development like financing, innovative green technologies, evaluation tools, and public awareness for sustainable development. The researchers concluded that with the increase in the technological, sectoral and applications ratio, the green-based sustainability ratio also increases. Through their studies, they found that fossil fuel consumption and green energy consumption are expected to reach 13807.2 and 2694.9 million tonnes of oil equivalent (Mtoe) by 2050 respectively. This means that the dependence on fossil fuels will still be high. They concluded that the negative impact on the environment can be minimised with the adoption of green technologies.

Shayegh S. et al. (2017) and Sinkaou E et al.(2018) focused on the need for public awareness and assimilation of academics with research and development initiatives involving the youth in the innovation and developmental projects related to green energies and stressed local and collective participation. Kandpal T. et al. (2014) suggested in their research paper several renewable energy education plans, including balancing theoretical and practical aspects of environmental economic studies, conducting fieldwork assessment projects, and establishing synergy with energy and environmental conservation.

Yan J. et al. (2017), in their editorial, pointed out that urban cities are important producers and consumers of energy and also major contributors of greenhouse gas emissions in the world. Focusing on the power grid integration, they stated that power generation through renewables is facing difficulties at the planning and operational levels. They also discuss interactions for energy, economics and environment, and summarise the exploration, exploitation, conversion and use of energy.

Sandberg M. et al. (2019), in their paper, made a comparative analysis of green growth and degrowth based on a critical social theory. Explaining critical social theory, they emphasized that it explicitly recognizes that any effort to change society rests on normative ideals. It is not purely philosophical but also practically applicable when social and human aspects are considered. They stated that degrowth has a better and stronger normative and should be preferred and accepted. Though green growth is a dominant strategy accepted in the academic and policy discourse, it relies only on technological innovations, to improve the efficiency of resources in production and consumption while the use of natural resources is reduced. It does not alter the consumption pattern. Degrowth is a simultaneous movement that criticizes economic growth as a policy objective and proposes alternative solutions for organizing socio-economic life. The majority of studies on degrowth indicate that it has significant potential to prevent environmental degradation and reduce greenhouse gas emissions. Degrowth prioritizes environmental conservation, human well-being, and social equity as primary normative ideals for strengthening and structuring the economy.

Sethi P. et al. (2020) examined the implications of globalization, financial development, economic growth, and environmental conservation on India's environment. They emphasized that although there has been considerable growth in renewable energy adoption, widespread utilization of clean energy technologies is not feasible until the investment and production costs of these energies are reduced.

Wang G et al. (2022) define and study the sustainable development goal 7. Their study indicates that the consumption of renewable energy sources has resulted in tremendous contribution towards the economic prosperity of the Asian economies. Expansionary fiscal policies and programmes should be undertaken for the promotion of eco-friendly power production, they conclude.

Jaiswal K et al. (2022), in their studies, emphasise on the mitigation of climate change and environmental health with the assistance of renewable energy sources. They discuss different types of sustainable energies- solar, bioenergy, wind, and hydro focusing majorly on the development of bioenergy. Urbanisation and excessive exploitation of fossil fuels have led to severe energy crises and serious environmental hazards. Bioenergy is the best alternative solution to the problem. Bioenergy is generated through biomass. Quality biomass generation, low environment impact conversion technologies, and barriers are the key areas to improve bioenergy production. They suggested that dividing the biomasses according to their molecular compositions such as cellulose-rich, lignin-rich,

etc helps in refining the resultant product. Microorganisms like bacteria are used to ferment biomass sugar to ethanol, which is then mixed with diesel to produce E-Diesel, a product used in trucks and buses. There are many other strategies for producing biofuels and bioenergy. Sustainable and environment-friendly production of fuels, chemical products, and electricity from biomass is one of the best substitutes for fossil fuels.

Some international reports released by distinguished international institutions have revealed some major findings regarding the progress of renewable energy in the world and the data are as follows:

International Energy Agency (2022) stated that renewables play a critical role in clean energy transitions. They are responsible for over one-third of carbon dioxide (CO₂) emissions reductions in 2020-2030 under net zero emissions by 2050 scenario. It stated that “the deployment of renewable in power, heat, and transport sectors have successfully kept the rise in average temperatures below 1.5 Celsius. Annual renewable energy use (not including bioenergy) has to increase at an average rate of 13 per cent during 2022-2023. Also, renewables, in particular wind and solar technologies are responsible for the largest reductions of global carbon dioxide emissions between 2020 and 2030.

The Sustainable Development Goals report (2022) revealed that the global electricity rate rose to 91 per cent in 2020 from 83 per cent in 2010. And to say, if the present trends continue at the same pace 92 per cent of the world population will have access to electricity by 2030, but 670 million people will still be deprived of electricity.

Between 2010 and 2020, the proportion of people with access to clean cooking fuels and technology increased by 12 per cent, reaching 69 per cent. However, 2.4 billion people still relied on inefficient and polluting cooking systems in 2020. The share of renewables in the total final energy consumption reached 17.7 per cent in 2019 which was 1.6 per cent points higher than in 2010.

Renewables usage in the transport sector also reached 3.6 per cent in 2019 which was 2.6 per cent higher than in 2010. International public financial flows also showed a declining trend of 24 per cent approximately as compared to the previous year, amounting to \$10.9 billion in 2019. The five-year moving average also displayed a downward trend for the first time since 2008 from \$7.5 billion in 2014-2018 to \$16.6 billion in 2015-2019.

Global Status Report (2022) documents the progress in the renewable energy sector highlighting the opportunities developed by renewable-based economies including governance through localised energy production and value chains.

The reports highlight that the highest share of renewable energy use was in the electricity sector i.e. 28 per cent while the lowest was in the transport sector i.e. 3.7 per cent. Despite this, most of the global energy demand was met by thermal energy production. Policy support for renewables remained high throughout 2021, particularly in the power sector. Modern bioenergy provided 5.3 per cent of the global demand. Renewables generated 28.3 per cent of global electricity in 2021 similar to 2020 levels.

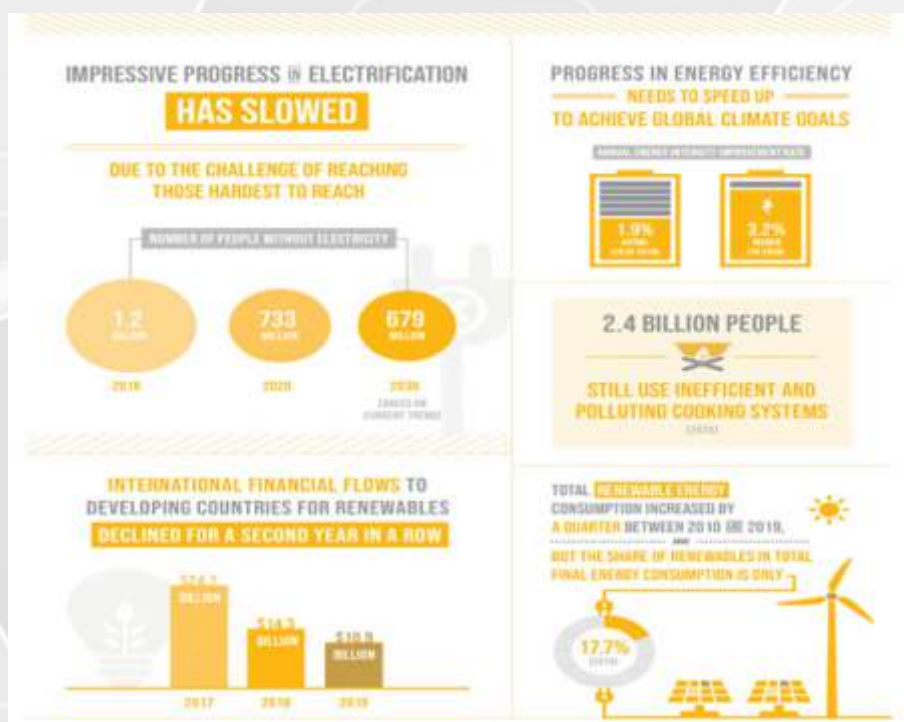


FIGURE 1: UNITED NATIONS SUSTAINABLE DEVELOPMENT REPORT 2022

Source: United Nations sustainable development report; www.undp.org

CONCLUSION

As per the United Nations Sustainable Development Report 2022, the world is progressing towards sustainable energy targets, but the current progress is inadequate to attain Sustainable Development Goal 7 'Affordable Clean Energy' by 2030. Millions of people still lack access to electricity. There is a continuous rise in prices of commodities, energy, and shipping that has further augmented the cost of producing and transporting solar photovoltaic technologies. Achieving energy and climate goals requires consistent and persistent support from public and private capital investments in clean and renewable energy setups, particularly in developing countries. Even after large-scale adoption and acceptance of renewable energy, solar, hydro, wind, and geothermal sources still need to expand significantly to meet the net-zero emissions target. There is a significant gap between policies or targets on paper and their implementation in practice, leading to policy paralysis.

The concept of degrowth is gaining recognition and is considered better and broader than green growth, as it ensures environmental preservation, human welfare, and social equity for economic development. Though still underdeveloped, it has promising potential.

Adopting clean cooking practices will not only reduce health risks among households but also promote green and healthy recovery. Traditional uses of biomass, such as burning wood, have remained relatively stable.

To lower dependence on fossil fuels, which cause excessive carbon dioxide emissions, bioenergy can be used. Biomass (material from plants and animals) can be converted into bioenergy products like bio-oil, biofuel, and biodiesel, serving as alternatives to fossil fuels. Bio-oil produced from agricultural activities can be used as fuel, and the remaining product can be utilized as manure or fertilizer in the agricultural sector.

Financial factors significantly influence the integration of renewable energies, as renewable energy costs are higher than traditional non-renewable sources. Additionally, developed countries are not easily transferring clean technologies to developing countries. The lack of financial inflows makes it difficult for developing countries to establish clean energy systems. Therefore, it is necessary to ensure the low-cost and effective transfer of technology to the developing world, and regulations should be made in this regard.

There should be an increase in funding for research and development at both national and international levels to initiate more research processes and foster new developments in this field.

Considerable efforts need to be made in initiating renewable energy education programmes aimed at developing awareness at various levels in society, particularly involving the youth. The youth should be made a part of special programmes related to sustainable development and clean energy mechanisms so that they can come up with new ideas for a progressive future. These practices should not be confined to higher levels (international organizations, institutions, or governments); rather, work should be done at the grassroots level for a complete and comprehensive approach to ensuring sustainable economic development. Most reports reveal that we are falling behind in our efforts and are progressing more slowly than necessary to transition from a fossil fuel-based economy to a renewable-based economy. An energy-efficient and renewable-based economy is a game changer for a safer, more secure, resilient, cost-effective, and sustainable future.

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FASHION AND SUSTAINABILITY: INTEGRATING CIRCULAR ECONOMY FOR LONG-TERM IMPACT

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ABSTRACT

The fashion industry is a major driver of global economic activity but is also one of the most environmentally destructive sectors. It contributes significantly to pollution, resource depletion, and waste generation. With increasing awareness of these issues, there is a growing demand for sustainable practices that can mitigate the environmental impact of fashion production and consumption. The circular economy presents a viable solution, focusing on eliminating waste and promoting the continual use of resources. The integration of circular economy principles in fashion involves several key strategies: redesigning products to be more durable and recyclable, using sustainable materials, implementing efficient manufacturing processes, and promoting new business models such as rental, resale, and repair. Collaboration across the supply chain is essential, involving stakeholders from designers and manufacturers to retailers and consumers. Additionally, educating consumers and enforcing supportive policies can drive the adoption of sustainable practices. Implementing circular economy practices in the fashion industry has shown promising results. Brands adopting these principles report reductions in waste and resource consumption, as well as positive consumer responses to sustainable products. For example, the use of recycled materials and biodegradable fabrics has decreased environmental footprints. Business models centred around garment longevity, such as rentals and second-hand markets, have also gained traction, highlighting the economic viability of sustainability. Integrating circular economy principles into the fashion industry is not only a response to environmental challenges but also an opportunity to innovate and create value. By redesigning products, optimizing resources, and promoting sustainable consumption, industry can significantly reduce its ecological impact. Collaboration and education are critical to this transition, ensuring all stakeholders contribute to a more sustainable future. Embracing circular economy practices paves the way for a resilient and eco-friendly fashion industry.

KEYWORDS: Fashion industry, sustainability, circular economy, environmental impact, recycling, upcycling, biodegradable materials, sustainable practices, garment longevity, consumer education

INTRODUCTION

The fashion industry is a fast-paced global domain, influencing trends and styles worldwide. From luxury brands to quick-turnaround fashion, it caters to diverse consumer preferences, contributing significantly to the global economy. However, the industry's rapid growth has raised concerns about its environmental and social impacts (Gazzola et al., 2020; Niinimäki et al., 2020).

In recent years, a paradigm shift has emerged within the industry as stakeholders recognize the imperative to address sustainability (Machado et al., 2019). The environmental toll of traditional practices, such as excessive water usage, chemical pollution, and textile waste, has prompted a reevaluation of fashion's impact on the planet (Niinimäki et al., 2020). Consumers, too, are increasingly conscious of the need for ethical and sustainable choices, influencing industry practices and demanding transparency (Brydges & Heinze, 2018).

Amidst this, the exploration of sustainability within the fashion sector becomes paramount. This research focuses on the integration of circular economy principles into fashion supply chains, aiming not only to mitigate the negative ecological impacts but also to redefine the industry's ethos towards responsible and eco-friendly practices (Hvass & Pedersen, 2019; Shirvanimoghaddam et al., 2020).

LITERATURE REVIEW

Circular Economy in Fashion

The literature on the circular economy in the fashion industry emphasizes its role as a sustainable solution. According to the Ellen MacArthur Foundation (2017), the circular economy in fashion aims to minimize waste, keep products and materials in use, and regenerate natural systems. Kirchherr et al. (2017) provide foundational insights, advocating for a systemic approach to achieve circularity.

Fletcher and Tham (2019) explore the transformative potential of circular fashion, focusing on innovative business models and design strategies. Their research underscores the importance of consumer engagement and education in realizing circular economy goals. Dana Thomas's "Fashionopolis" (2019) delves into the environmental and social

impacts of fast fashion while proposing circular alternatives. This book provides a broader context for understanding the urgency of transitioning towards circularity in the fashion industry.

Lüdeke-Freund et al. (2019) contribute insights into the challenges and opportunities of implementing circular economy principles in global fashion supply chains. Their findings stress the need for collaboration among stakeholders and the integration of circular strategies throughout the value chain. In "Cradle to Cradle: Remaking the Way We Make Things" by William McDonough and Michael Braungart (2002), the authors propose a regenerative design approach aligning with circular economy principles. They advocate for a shift from a linear "take, make, dispose" model to one emphasizing sustainability and longevity.

SUSTAINABILITY IN FASHION SUPPLY CHAINS

The literature on sustainability in fashion supply chains emphasizes the crucial need for environmentally conscious practices within the industry. Smith and Brower (2012) stress the escalating environmental impact of traditional supply chain practices in the fashion industry. They highlight resource depletion, pollution, and social issues associated with conventional production processes, underscoring the urgency for sustainable alternatives.

Morgan and Birtwistle (2009) explore the role of sustainable sourcing and materials in fashion supply chains. Their research emphasizes the significance of ethically sourced raw materials and eco-friendly production processes as integral components of a sustainable supply chain. Goworek et al. (2012) focus on consumer perceptions and behaviours related to sustainable fashion. Their findings suggest a growing consumer awareness regarding the environmental and social impacts of fashion, influencing purchasing decisions and prompting a demand for greater transparency from brands.

Charter and Tischner's (2001) comprehensive work provide a framework for sustainable supply chain management in the fashion industry. Their research outlines strategies for integrating sustainability into various stages of the supply chain, from design and production to distribution and end-of-life disposal.

ECO-FRIENDLY PRACTICES

The literature on eco-friendly practices in the fashion industry underscores the importance of adopting environmentally conscious approaches across the supply chain. Fletcher (2016) explores sustainable fashion design, emphasizing the role of eco-friendly materials and processes in reducing the environmental impact of clothing production. The research highlights the influence of designers in steering the industry towards more sustainable practices.

Perry and Towers (2013) investigate the potential of upcycling as an eco-friendly practice in fashion. Their work explores how repurposing existing garments and materials can contribute to waste reduction and promote a more circular fashion economy. In a study by Thomas (2018), slow fashion is examined as an eco-friendly alternative to fast fashion. The research advocates for a shift towards conscious consumption, prioritizing quality over quantity and encouraging the creation of long-lasting, timeless fashion items.

Bocken et al. (2017) outline cradle-to-cradle design principles in the fashion industry, proposing a holistic approach where products are designed considering end-of-life considerations, ensuring safe return to the environment or recyclability.

RESEARCH GAP

i. Investigation of Circular Economy Concept: While foundational insights into the circular economy concept in the fashion industry exist (Kirchherr et al., 2017; Lüdeke-Freund et al., 2019), there's a lack of detailed empirical research on its practical implementation within fashion supply chains. Existing studies provide theoretical frameworks but fall short of addressing the real-world challenges and opportunities associated with adopting circularity.

ii. Assessment of Sustainability in Fashion Supply Chains: Despite acknowledging the importance of sustainability in fashion (Smith & Brower, 2012; Morgan & Birtwistle, 2009), there is a gap in comprehensively evaluating sustainability practices throughout the industry's supply chains. Current research tends to focus on specific aspects, neglecting a holistic assessment of sustainability initiatives from sourcing to end-of-life disposal.

iii. Proposal of Eco-Friendly Practices for Integration: While some research explores eco-friendly practices (Fletcher, 2016; Perry & Towers, 2013), there is a lack of specific recommendations for integrating these practices into fashion supply chains. Existing studies often lack practical insights into overcoming implementation challenges and assessing the feasibility of eco-friendly practices on a broader scale.

OBJECTIVES

The objectives of this research were to:

1. To Explain the Circular Economy Approach, Particularly the 6R System in Fashion
2. To Highlight the Urgency of Circular Economy Integration in Fashion Supply Chains
3. To Identify Challenges and Opportunities in Integrating Circular Economy Principles within Fashion Supply Chains

RESEARCH METHODOLOGY

The research methodology employed in this study was carefully crafted to provide a comprehensive understanding of the integration of circular economy principles within fashion supply chains and the promotion of sustainability through eco-friendly practices. Adopting a qualitative approach, the study prioritized an in-depth exploration of existing literature on circular economy principles, sustainable practices in fashion supply chains, and various eco-friendly initiatives within the industry. This involved conducting an extensive literature review, which served as the foundation for understanding the theoretical frameworks and practical applications relevant to the research topic.

Ethical considerations were paramount throughout the research process, with measures implemented to uphold confidentiality and anonymity for all participants involved in data collection. Additionally, transparency was maintained in the research design and data analysis methods to ensure the credibility and reliability of the findings. By adhering to ethical guidelines, the study aimed to uphold the integrity of the research process and minimize any potential biases.

It's worth noting that the study exclusively focused on qualitative methodologies, emphasizing detailed analysis of real-world instances where circular economy principles and eco-friendly practices have been implemented within fashion supply chains. This qualitative approach allowed for a nuanced exploration of the complexities and nuances surrounding the adoption of sustainable practices in the fashion industry, providing valuable insights for future research and practical applications.

RESEARCH AND ANALYSIS

The research and analysis aim to explore the integration of circular economy principles in fashion supply chains, promoting sustainability through eco-friendly practices (Ellen MacArthur Foundation, 2017). The section is divided into three main parts, each corresponding to one of the study's core objectives. Firstly, the need for circular economy integration will be discussed, highlighting the limitations and environmental impact of the traditional take-make-dispose model in fashion (Fletcher, 2016). Secondly, the circular economy approach, particularly the 6R system (reduce, reuse, recycle, redesign, remanufacture, and refurbish), will be explained in detail, providing insights into how these principles can be applied to the fashion industry (Bocken et al., 2016). Finally, the challenges and opportunities associated with implementing circular economy principles within fashion supply chains will be identified and analyzed, offering recommendations for overcoming barriers and leveraging potential benefits (Claudio, 2007; Geng et al., 2012).

THE CIRCULAR ECONOMY APPROACH: A PARADIGM SHIFT TOWARDS SUSTAINABILITY

The circular economy approach represents a fundamental shift in how we produce, consume, and dispose of goods, aiming to create a regenerative and sustainable economy (Ellen MacArthur Foundation, 2013). Within the fashion industry, adopting circular economy principles is increasingly recognized as essential for mitigating environmental impact, reducing waste, and promoting long-term sustainability (Fletcher, 2017). This segment provides an in-depth exploration of the circular economy approach, with a specific focus on the 6R system, as applied to fashion supply chains (Bocken et al., 2014). By understanding the principles and strategies of the circular economy, stakeholders in the fashion industry can embrace innovative solutions to address pressing environmental and social challenges while fostering a more resilient and ethical fashion ecosystem (Stahel, 2016).

INTRODUCTION TO THE CIRCULAR ECONOMY

The concept of the circular economy represents a fundamental shift in economic thinking, advocating for a systemic approach to resource management that seeks to decouple economic growth from resource consumption and environmental degradation (Ellen MacArthur Foundation, 2013). Unlike the traditional linear model of "take, make, dispose," the circular economy aims to create a closed-loop system where resources are kept in use for as long as possible, with their value retained and regenerated at the end of their lifecycle.

In the context of the fashion industry, the adoption of circular economy principles is paramount to addressing the sector's profound environmental and social challenges (Bocken et al., 2014). The linear model of fashion production, characterized by high resource consumption, extensive waste generation, and exploitative labour practices, is no longer sustainable in the face of escalating global sustainability concerns (Fletcher, 2017).

THE CIRCULAR ECONOMY OPERATES ON SEVERAL FOUNDATIONAL PRINCIPLES:

i. **Design for Longevity and Circularity:** Products are designed with durability, reparability, and recyclability in mind, ensuring that they can be reused, refurbished, or recycled at the end of their lifecycle (Bocken et al., 2016). This shift towards circular design fosters a culture of longevity and reduces the need for resource-intensive production processes.

ii. **Resource Optimization and Efficiency:** The circular economy emphasizes the efficient use of resources throughout the production process, minimizing waste and maximizing resource utilization (Kirchherr et al., 2017). By adopting practices such as lean manufacturing and material optimization, fashion companies can reduce their environmental footprint and enhance resource efficiency.

iii. **Closed-loop Systems and Material Circularity:** Central to the circular economy is the concept of closed-loop systems, where materials and products are continuously circulated and regenerated within the economy (Bocken et al., 2016). Through initiatives such as closed-loop recycling and remanufacturing, fashion companies can minimize the extraction of virgin resources and reduce the environmental impact of their operations.

iv. **Collaboration and Stakeholder Engagement:** The transition to a circular economy requires collaboration and cooperation across the entire value chain, from designers and manufacturers to consumers and policymakers (Kirchherr et al., 2017). By engaging stakeholders and fostering partnerships, the fashion industry can accelerate the adoption of circular practices and drive systemic change.

By embracing the principles of the circular economy, the fashion industry has the opportunity to reimagine its business model and create a more sustainable and resilient future (Claudio, 2007). Through innovation, collaboration, and a commitment to circularity, fashion companies can mitigate their environmental impact, enhance resource efficiency, and contribute to the creation of a more sustainable and equitable global economy (Geng et al., 2012).

THE 6R SYSTEM IN FASHION SUPPLY CHAINS

The 6R system represents a comprehensive framework for integrating circular economy principles into fashion supply chains (Korhonen et al., 2018). Each "R" -- Reduce, Reuse, Recycle, Redesign, Repair, and Remanufacture - offers unique strategies to minimize waste, extend product lifecycles, and promote resource efficiency. In this section, we delve into each component of the 6R system, providing explanations and real-world examples of how these principles can be applied within the fashion industry (Charter et al., 2018). Through the adoption of the 6R system, fashion companies can transition towards more sustainable and circular business models, contributing to the reduction of environmental impact and the promotion of a more resilient and ethical fashion ecosystem (Stahel, 2016).

Table 1: 6R system. Author's contribution

6R System in Fashion Supply Chains	Explanation	Examples
Reduce	Explanation of reducing resource consumption and wastegeneration	- Minimizing packaging - Optimizing productionprocesses
Reuse	Explanation of reusing products and materials to extend their lifecycle	- Rental and resale platforms - Upcycling practices
Recycle	Explanation of recycling materials to create new products	- Closed-loop recyclingsystems. - Textile-to-textile recycling Processes
Redesign	Explanation of redesigning products and processes forcircularity	- Design strategies fordurability. - Design for reparability. - Design for recyclability
Repair	Explanation of repairing products to prolong their use	- Repair cafes - Garment mending workshops
Remanufacture	Explanation of r emanufacturing products to restore them to like-new condition	- Refurbished apparel - Closed-loop manufacturing systems

POTENTIAL BENEFITS OF ADOPTING THE 6R SYSTEM

The adoption of the 6R system within fashion supply chains offers numerous potential benefits, encompassing environmental, social, and economic aspects. By embracing circular economy principles, fashion companies can unlock opportunities for sustainability, innovation, and long-term value creation.

Table 2: Benefits of 6S System. Author's contribution

Potential Benefits of Adopting the 6R System	Description	Illustrative Examples
Environmental Benefits	<ul style="list-style-type: none"> - Reduction of resource consumption and waste generation - Conservation of natural resources - Mitigation of environmental pollution 	<ul style="list-style-type: none"> - Decreased carbon emissions - Preservation of biodiversity - Reduction of textile waste in landfills
Social Benefits	<ul style="list-style-type: none"> - Creation of new job opportunities - Improvement of working conditions in the fashion industry - Empowerment of local communities and artisans 	<ul style="list-style-type: none"> - Job creation in recycling and remanufacturing sectors - Adoption of fair labour practices - Support for small-scale producers and artisans
Economic Benefits	<ul style="list-style-type: none"> - Cost savings through waste reduction and resource optimization - Creation of new revenue streams through circular business models - Enhancement of brand reputation and customer loyalty 	<ul style="list-style-type: none"> - Reduced production costs - Increased revenue from resale and rental services - Strengthened brand image as a sustainable leader
Long-term Sustainability	<ul style="list-style-type: none"> - Establishment of a more resilient and adaptable fashion industry - Reduction of dependency on finite resources - Promotion of closed-loop systems and circular supply chains 	<ul style="list-style-type: none"> - Improved industry resilience to external shocks - Reduced risk of resource depletion - Creation of a more sustainable and equitable fashion ecosystem.

URGENCY OF CIRCULAR ECONOMY INTEGRATION

The integration of circular economy principles in fashion supply chains is increasingly recognized as a critical imperative to address traditional fashion practices' significant environmental and social impacts (Ellen MacArthur Foundation, 2017). The conventional take-make-dispose model prevalent in the industry has led to excessive resource consumption, substantial waste generation, and numerous social issues, necessitating a shift towards more sustainable approaches (Fletcher, 2016). This segment will explore the urgency of adopting circular economy strategies by examining the detrimental effects of current practices, the limitations of the linear economic model, and the growing pressure from consumers and regulators for more sustainable and ethical fashion solutions (Claudio, 2007; Geng et al., 2012). Through this analysis, the need for circular economy integration in fashion supply chains will be underscored, highlighting its potential to foster long-term sustainability and resilience in the industry.

ENVIRONMENTAL AND SOCIAL IMPACTS OF TRADITIONAL FASHION PRACTICES

Traditional fashion practices' environmental and social ramifications are significant and wide-ranging, necessitating a reevaluation of industry norms to promote sustainability and ethical standards.

The fashion industry's substantial resource consumption, including water, energy, and raw materials, has garnered attention due to its environmental toll. For instance, cotton cultivation, a staple in the fashion industry, requires vast amounts of water and pesticides, contributing to habitat destruction and biodiversity loss (Jones et al., 2016). Additionally, the production of synthetic fibers, such as polyester, relies heavily on fossil fuels and emits greenhouse gases, exacerbating climate change (Kirchherr et al., 2017).

Furthermore, the fashion supply chain is notorious for its pollution and waste generation. Textile dyeing and finishing processes release hazardous chemicals into waterways, polluting ecosystems and endangering public health (Azim et al., 2013). The disposal of textile waste, often through landfilling or incineration, further compounds environmental issues and contributes to resource depletion (Mont et al., 2020).

Social issues within fashion supply chains also demand attention. Labour exploitation and poor working conditions are prevalent, particularly in garment factories in developing countries (Chowdhury et al., 2020). Workers endure low wages, long hours, and unsafe working environments, highlighting the urgent need for improved labour standards and protections.

Addressing these environmental and social challenges requires a paradigm shift towards circular economy principles in fashion supply chains, emphasizing resource efficiency, waste reduction, and ethical labour practices (Lüdeke-Freund et al., 2019). By integrating circularity into fashion production and consumption, the industry can mitigate its adverse impacts and work towards a more sustainable and equitable future.

LIMITATIONS OF THE TAKE-MAKE-DISPOSE MODEL

The traditional take-make-dispose model, predominant in the fashion industry, poses significant limitations and challenges to sustainability and resource efficiency.

The inherent inefficiency of this linear model results in resource depletion and environmental degradation. Fashion production processes rely on finite resources, such as water, energy, and raw materials, which are extracted and consumed at unsustainable rates (Fletcher & Smith, 2017). Moreover, the linear model promotes a culture of disposability, encouraging short product lifecycles and rapid consumption, leading to increased waste generation and environmental harm (Kozlowski et al., 2018).

Additionally, the take-make-dispose model perpetuates a linear flow of materials through the supply chain, with little consideration for resource recovery or reuse. Products are often designed with planned obsolescence in mind, prioritizing aesthetics and trendiness over durability and longevity (Bocken et al., 2016). As a result, discarded clothing and textiles end up in landfills or incinerators, contributing to pollution and greenhouse gas emissions (Ellen MacArthur Foundation, 2017).

Furthermore, the linear model fails to account for the social implications of fashion production and consumption. Labour exploitation and poor working conditions are common in the race to meet the demand for fast and cheap fashion, particularly in low-wage countries where garment production is outsourced (Morgan & Birtwistle, 2009). Workers endure precarious employment situations and lack access to social protections, highlighting the human cost of the take-make-dispose paradigm.

Addressing the limitations of the linear model is essential for the fashion industry to transition towards more sustainable and ethical practices. Embracing circular economy principles, such as resource efficiency, product longevity, and waste reduction, offers a promising pathway to mitigate the adverse impacts of the take-make-dispose model and foster a more sustainable and resilient fashion ecosystem.

GROWING CONSUMER AWARENESS AND REGULATORY PRESSURES

Consumer awareness of environmental and social issues in the fashion industry is steadily increasing, driving demand for more sustainable and ethically produced clothing (Fletcher, 2018). This shift in consumer preferences has been fueled by various factors, including access to information through digital media, increased transparency from brands, and the rise of sustainable fashion movements.

One example of growing consumer awareness is the emergence of eco-conscious fashion communities and initiatives. Organizations like Fashion Revolution and Sustainable Apparel Coalition have played a significant role in raising awareness about the environmental and social impacts of fashion production and consumption (Fashion Revolution, n.d.; Sustainable Apparel Coalition, n.d.). These movements have mobilized consumers to demand greater transparency and accountability from brands, encouraging them to make more informed purchasing decisions.

Moreover, regulatory pressures are mounting on the fashion industry to address its environmental footprint and labour practices. Governments and international bodies are implementing regulations and standards aimed at promoting sustainability and ethical conduct throughout the supply chain. For instance, the European Union's Circular Economy Action Plan includes measures to promote sustainable product design, recycling, and waste reduction in the fashion sector (European Commission, 2020). Similarly, initiatives like the Fashion Industry Charter for Climate Action, launched by the United Nations Framework Convention on Climate Change (UNFCCC), call on fashion brands to commit to reducing greenhouse gas emissions and advancing circular economy principles (UNFCCC, 2018).

These examples illustrate the growing pressure on fashion brands and retailers to adopt more sustainable and ethical practices in response to consumer demand and regulatory requirements (Fletcher, 2018; European Commission, 2020; UNFCCC, 2018). By embracing circular economy principles and addressing environmental and social concerns, companies can enhance their brand reputation, mitigate risks, and contribute to positive social and environmental outcomes.

NAVIGATING CHALLENGES AND OPPORTUNITIES IN CIRCULAR ECONOMY INTEGRATION

Integrating circular economy principles within fashion supply chains presents both significant challenges and exciting opportunities (Bocken et al., 2014). As the fashion industry grapples with the environmental and social impacts of traditional linear practices, the transition to a circular economy offers a promising pathway toward sustainability. However, this shift is not without obstacles. Addressing technological constraints, supply chain complexities, consumer behaviour, and regulatory frameworks is crucial for the successful adoption of circular practices (Geng et al., 2012; Fletcher, 2016).

At the same time, leveraging innovative technologies, fostering collaborative partnerships, engaging consumers, and advocating for supportive policies can unlock substantial benefits (Stahel, 2016; Korhonen et al., 2018). This section explores the multifaceted challenges and opportunities involved in embedding circular economy principles into fashion supply chains, providing a comprehensive understanding of the landscape and offering insights into potential pathways forward.

CHALLENGES IN CIRCULAR ECONOMY INTEGRATION

Integrating circular economy principles within fashion supply chains is fraught with challenges that must be addressed to facilitate a successful transition. This section delves into the primary obstacles that hinder the adoption of circular practices in the fashion industry.

Table 3: Challengers in Circular Economy. Author's contribution

<p>Technological Constraints</p>	<p>One of the major challenges is the current state of technology. Existing technologies for recycling and remanufacturing are often inefficient or inadequate for handling diverse types of textiles and materials used in fashion. For instance, textile-to-textile recycling processes are not yet fully developed or widely available, making it difficult to recycle garments back into high-quality raw materials (Ellen MacArthur Foundation, 2017). The lack of advanced sorting and processing technologies also complicates the recycling process, limiting the scalability of circular initiatives.</p>
<p>Supply Chain Complexity</p>	<p>Fashion supply chains are inherently complex and fragmented, involving numerous stakeholders across different regions and stages of production. This complexity poses significant challenges for implementing circular practices. Global sourcing networks and the use of multiple suppliers make it difficult to track materials and ensure compliance with circular economy principles (Karaosman et al., 2018). Additionally, the lack of coordination and communication among various stakeholders can hinder the integration of circular strategies, such as closed-loop systems and take-back schemes.</p>
<p>Consumer Behaviour</p>	<p>Consumer preferences and behaviours are critical factors influencing the success of circular economy initiatives. Despite growing awareness of sustainability issues, many consumers still prioritize low cost and convenience over environmental considerations, driving the demand for fast fashion (Niinimäki et al., 2020). Changing consumer behaviour to favour sustainable and circular products requires significant efforts in education and engagement.</p>
<p>Regulatory Framework</p>	<p>Brands face the challenge of effectively communicating the benefits of circular fashion and encouraging consumers to adopt new consumption patterns, such as renting, reselling, or recycling garments.</p> <p>The regulatory landscape also presents challenges for circular economy integration. Environmental regulations vary widely across regions, creating inconsistencies and gaps that complicate compliance for global fashion brands (Pal and Gander, 2018). Furthermore, the lack of enforceable legislation and incentives specifically promoting circular practices means that many companies are not compelled to adopt sustainable measures. Without strong regulatory support, the widespread implementation of circular economy principles remains a formidable challenge.</p>

OPPORTUNITIES IN CIRCULAR ECONOMY INTEGRATION

While the integration of circular economy principles within fashion supply chains presents challenges, it also opens up a plethora of opportunities for innovation and sustainable development. This section explores the key opportunities that can drive the adoption of circular practices in the fashion industry.

i. Innovative Technologies

Emerging technologies hold great promise for advancing circularity in the fashion industry. Advanced recycling techniques, such as chemical recycling, can break down textiles into their raw components, enabling the creation of new, high-quality materials from recycled fabrics (Ellen MacArthur Foundation, 2017). Additionally, blockchain technology offers potential solutions for enhancing supply chain transparency and traceability, ensuring that materials are sustainably sourced and processed throughout their lifecycle (Saberli et al., 2019). These technological advancements can significantly improve the efficiency and effectiveness of circular fashion practices.

ii. Collaborative Partnerships

Collaboration among various stakeholders, including brands, manufacturers, suppliers, and policymakers, is crucial for overcoming supply chain complexities and driving circular economy integration. By forming strategic partnerships, stakeholders can share resources, knowledge, and best practices, fostering a collective approach to sustainability (Karaosman et al., 2018). Successful examples include industry initiatives like the Fashion Pact, where multiple brands commit to common environmental goals, and collaborative platforms that bring together different actors to develop and implement circular solutions.

iii. Consumer Education and Engagement

Educating and engaging consumers plays a vital role in promoting circular fashion. With growing awareness of environmental issues, there is an increasing demand for transparency and ethical practices in the fashion industry. Brands have the opportunity to tap into this shift by implementing effective consumer education campaigns that highlight the benefits of circular fashion and sustainable consumption (Niinimäki et al., 2020). Interactive initiatives, such as workshops, repair cafes, and digital platforms showcasing the journey of sustainable products, can empower consumers to make informed and responsible choices.

iv. Policy and Advocacy

Supportive policies and advocacy efforts are essential to creating an enabling environment for circular economy practices. Policymakers have the opportunity to enact legislation that incentivizes sustainable production, such as tax breaks for companies adopting circular practices, and stringent regulations on waste management and resource use (Pal and Gander, 2018). Additionally, advocacy by industry groups and non-governmental organizations can raise awareness and drive policy changes that support circular economy goals. Examples include the European Union's Circular Economy Action Plan, which aims to promote sustainable growth through circular practices, and various global initiatives advocating for extended producer responsibility.

By leveraging these opportunities, the fashion industry can transition towards more sustainable and circular supply chains, reducing its environmental impact and contributing to a more resilient and ethical global economy.

CONCLUSION

In conclusion, this study has contributed valuable insights into the integration of circular economy principles within fashion supply chains and the significance of sustainability in the industry. Through a meticulous examination of existing literature and real-world examples, several key findings have emerged, shedding light on the challenges and opportunities associated with circularity in fashion.

One of the primary contributions of this study lies in its identification and analysis of the challenges hindering the adoption of circular economy practices in the fashion industry. From technological constraints to supply chain complexities and consumer behaviour, various obstacles must be addressed to facilitate a successful transition towards circularity. By acknowledging these challenges, stakeholders can develop targeted strategies to overcome barriers and drive sustainable change.

Moreover, this study has underscored the importance of collaborative partnerships and innovative technologies in advancing circular economy integration within fashion supply chains. Through strategic collaborations and the adoption of cutting-edge technologies, stakeholders can unlock new opportunities for sustainable innovation and transformation. From advanced recycling techniques to blockchain-enabled traceability systems, there exists a myriad of tools and approaches that can drive positive change in the industry.

In reflection, the significance of circular economy integration in fashion supply chains cannot be overstated. As the industry grapples with environmental degradation and social inequities, the transition towards circularity offers a viable pathway towards sustainability and resilience. Fashion companies can minimise waste, conserve resources, and foster a more ethical and equitable ecosystem by reimagining traditional linear models and embracing circular principles such as reduce, reuse, recycle, redesign, repair, and remanufacture.

Moving forward, stakeholders across the fashion value chain must prioritize circular economy integration and sustainability as core business objectives. The industry can pave the way for a more sustainable and prosperous future by aligning economic growth with environmental and social responsibility. Through collective action and commitment to circularity, fashion can truly become a force for positive change in the global economy.

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THE EFFECTS OF FAST FASHION ON THE ENVIRONMENT AND WAYS TO PROMOTE SUSTAINABILITY

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ABSTRACT

In recent decades, the fast fashion sector has grown tremendously due to consumer desire for stylish, affordable clothing. However, the quick manufacturing cycles and disposable nature of this industry's products have had a major negative impact on the environment, causing excessive waste, water pollution, and climate change. This essay investigates how fast fashion affects the environment and how greenhouse gas emissions, water use, and textile waste contribute to climate change. It also assesses possible approaches to move the fashion sector toward greater sustainability, including introducing circular economy models, endorsing sustainable materials, and encouraging behavioural shifts and customer awareness. The fashion industry can lessen its environmental impact and clear the path for a more sustainable future by tackling these issues.

Keywords: *Climate change, fashion, customer, clothing*

INTRODUCTION

The rise of fast fashion has revolutionized the way clothing is made, worn, and discarded, causing a transformational shift in the fashion industry in recent decades. The term "fast fashion" describes the quick creation of stylish, affordable clothing in response to current trends in the fashion world. Customers can now regularly update their wardrobes with the newest styles at reasonable costs thanks to this business strategy. However, the industry's reliance on cheap materials, quick production cycles, and throwaway goods has hurt the environment and is a major cause of water pollution, excessive waste, and climate change. The term "fast fashion" describes the quick creation of cheap apparel to follow current trends. This business strategy frequently compromises social and environmental standards in favour of short lead times and inexpensive manufacturing. The apparel business has a significant environmental impact that extends from the point of manufacture to the point of disposal. This essay seeks to draw attention to the damaging environmental effects of fast fashion while suggesting more environmentally friendly options.

ENVIRONMENTAL IMPACT OF FAST FASHION

With 10% of all annual emissions coming from the global fashion business, it is a major contributor to greenhouse gas emissions. These emissions are caused by manufacturing procedures that need a lot of energy and the use of synthetic materials that are produced from fossil fuels. The manufacture, transportation, and disposal of clothing items all contribute to these emissions. The fast fashion model also promotes regular replacement of clothing, which increases production and waste and increases the industry's carbon footprint. Water resources are heavily consumed by the fashion industry, particularly in the stages of manufacturing, dyeing and finishing, and the production of natural fibres like cotton. The production of textiles is also a major contributor to water pollution since untreated wastewater that contains chemicals, dyes, and other dangerous materials is frequently dumped into rivers, endangering both human health and aquatic habitats. Textile Waste and Landfill Burden of the fast fashion business model encourages customers to often throw away garments after only a little time of use, which adds significantly to the amount of textile waste produced. An estimated 85% of textile waste in the US winds up in landfills or incinerators (citation source) where the powerful greenhouse gas methane can take hundreds of years to break down and release.

OBJECTIVE OF STUDY

1. To ascertain the extent to which fast fashion contributes to climate change.
2. To examine how trends in the fashion industry relate to the phenomenon of climate change.
3. To offer recommendations for tactics to lessen and eventually eradicate the effects of fast fashion.

FAST FASHION

The phrase "fast fashion" refers to inexpensive, low-quality apparel that is produced quickly and comes and goes

from the market in response to emerging trends. Fashion Week runway shows, and celebrity wear serve as frequent inspirations for the collections. This industry is based on the fast and inexpensive production of cheap clothing that is pushed through stores as soon as possible to keep up with the newest and most fashionable styles. Fast fashion, however, has a detrimental effect on both the environment and the people who produce it.

FAST FASHION DRIVING CLIMATE CHANGE

Reducing the impact of fast fashion and the global fashion industry is crucial to combating climate change, as they are two of the main contributors to it. Human behaviour can have an impact on climate change regardless of what people choose to wear and how they use objects in their daily lives. According to a 2020 Climate Council report, the fast fashion industry emits about 1.2 billion tons of CO₂ equivalent annually (Hibberd, 2020). Since air, water, and soil are the most essential resources for life to exist on Earth, it is claimed that the fast fashion industry pollutes more than aviation and shipping combined.

STRATEGIES FOR SUSTAINABLE FASHION

Circular Economy Models reducing waste and minimizing resource consumption can be achieved in the fashion sector through the application of circular economy principles. This strategy promotes reuse, repair, and recycling by designing clothing items with consideration for their full lifecycle, from material source to end-of-life management. The lifespan of clothing can be increased and the need for new manufacture can be decreased through initiatives like textile recycling programs, resale marketplaces, and clothing rental services. Reducing the environmental impact of textile production can be achieved by switching to sustainable resources such as novel bio-based alternatives, recycled Fibers, and organic cotton. Reducing the industry's carbon and water impact can be achieved by using energy-efficient manufacturing processes and eco-friendly dyeing and finishing techniques. Promoting consumer understanding of fast fashion's negative environmental effects is essential to enacting long-lasting change. The desire for new fast fashion items can be decreased by encouraging customers to embrace more conscientious consumption practices.

ADOPTING THE PRINCIPLES OF THE CIRCULAR ECONOMY

In the fashion industry, a circular economy approach emphasizes waste minimization and extending the life of materials and products. Reusing old clothing to create new goods can cut down on waste and the need for virgin resources. Companies that have implemented recycling programs, such as Patagonia and H&M, allow their consumers to return used garments for recycling. Reducing the frequency of disposal and replacement can be achieved by designing clothing that is ageless, strong, and able to tolerate use and yet looks great over time. Making the transition to sustainable materials can help to minimize the negative effects of fashion production on the environment. Compared to conventional cotton, organic cotton has a smaller environmental impact because it is grown without artificial fertilizers and pesticides. Recycled polyester and other fibres can lower the energy needed for production and lessen the need for raw materials. Sustainable wood pulp is used to make materials like Tencel, which provides greener options for textiles than conventional ones. Changing the fashion business requires educating customers about the effects their clothing choices have on the environment. Making decisions regarding garment production can be facilitated by giving consumers precise information about the social and environmental aspects of the process. Consumer preferences can be changed, and awareness raised by promoting the advantages of sustainable fashion through influencer partnerships, social media campaigns, and advertising.

RELATION OF FAST FASHION ON CLIMATE CHANGE

It is possible to categorize the fast fashion industry's production activities according to how much coal, oil, gas, and other resources are used in the process by studying its supply chain (Kilman, S., 2020). Pollution and climate change are caused by numerous fast-fashion-related activities, such as shipping clothes rather than laundering them, as well as by numerous other activities throughout the whole supply chain. It may come as a surprise to learn that the primary source of emissions during the manufacture and distribution of fashion items is the raw material used to make clothing. The fast fashion industry's use of materials during production accounts for nearly two-thirds of its carbon footprint. Together with some of the biggest names in the industry, several stakeholders came together in 2018 to take responsibility for altering fashion shows so that their negative effects on the climate can be minimised. A 'Fashion Industry Charter for Climate Action' was established with an aim to mitigate the climate impact of the fast fashion industry and its operations through the reduction of greenhouse gas emissions and decarbonization of their operations.

Human behaviour regarding fashion is subject to rapid change, and as a result, the fashion industry's influence on climate change is stagnant (Nasir et al., 2021). As a result of people's fast fashion culture, clothing production has doubled since 2014 and is predicted to triple by 2024 according to a World Economic Forum study. The world's population growth is to be blamed for the manufacturers' forced production of flimsier, faster, and less effective clothing to meet the constant demand of consumers. The speed at which things are changing globally has greatly

accelerated the way that consumer fashion is evolving. With the introduction of new technologies like online shopping, producers have also purposefully stifled consumer demand, resulting in excessive purchases made by consumers who did not need them. Because of the fast fashion trend among consumers worldwide, it has promoted the purchase of needless goods. The fashion industry used to separate clothing into two or three seasons, but these days it's broken up into over 25 micro-seasons that shift at least twice a month.

IMPACTS OF FAST FASHION IN FUTURE

By 2030, it's expected that clothing consumption will increase by 63% worldwide. This translates to more than 500 billion T-shirts, or 102 million metric tons, from 62 million metric tons (in 2017) in 2030. Concurrently, it is anticipated that the yearly retail value of apparel and footwear will attain \$2.3 trillion by 2030, primarily due to the augmented demand from developing countries.

SOLUTIONS TO REDUCE FAST FASHION & ITS IMPACTS ON CLIMATE CHANGE

Customers can embrace several behaviours that drastically lessen their influence on the environment to encourage sustainability in fashion. One basic strategy is to wear more rather than buy more since our current wardrobe is the most sustainable choice, as the Fixing Fashion study highlights. While synthetic fibres like polyester emit more greenhouse gasses per kilogram than cotton, they also require less water and land, and bio-based synthetic polymers derived from renewable crops emit up to 60% less carbon, thus reading labels can help you make informed decisions. Customers can also affect the market by choosing to buy from firms that care about the environment. By 2020, retailers like GAP and IKEA promised to use more recycled polyester. Another successful tactic is donating unwanted clothing to charity stores, which kept 330,000 metric tons of textiles out of UK landfills. Choosing organic cotton further lessens the impact on the environment as it requires less water and chemical inputs. Waste can be reduced by adopting the sharing economy and using services like Rent the Runway and My Wardrobe HQ for clothes rentals. Careful washing techniques can lessen macrofibre contamination and increase the lifespan of clothes. These techniques include washing less frequently at lower temperatures and turning clothes inside out.

CONCLUSION

The fast fashion business has significantly impacted the environment by contributing to climate change, water pollution, and excessive waste through its unrelenting pursuit of fast manufacturing and disposable trends. However, the fashion industry can lessen its environmental impact and clear the path for a more sustainable future by adopting circular economy models, sustainable materials and production methods, and raising customer knowledge and behavioural change. To emphasize sustainability and promote systemic change within the sector, producers, retailers, legislators, and consumers must work together to address the environmental concerns posed by rapid fashion.

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KATERRA: BUILDING DREAMS AND COLLAPSING REALITIES

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ABSTRACT

Katerra's ambitious journey to revolutionize the construction industry, backed by SoftBank, culminated in a surprising bankruptcy announcement in June 2021. The company's initial focus on materials sourcing and supply faced resistance from established players. Seeking to redefine construction, Katerra aimed for end-to-end manufacturing, even drawing parallels with electronics production. However, the industry's complexities and regional variations challenged this vision. Transitioning to vertical integration, Katerra acquired several firms globally but struggled with integration and financial strains. The collapse of lender Greensill Capital compounded financial woes. The COVID-19 pandemic further disrupted supply chains and projects. Despite technological innovation, Katerra's grand ambitions clashed with construction's intricate realities, leading to a pivot, overextension, and eventual bankruptcy. Katerra's rise and fall offer a cautionary tale of reconciling disruption with industry intricacies.

KEYWORDS: Construction industry, Strategy, Integration, Standardisation, Vertical Integration, Bankruptcy, Pandemic

INTRODUCTION

A bright June morning in 2021 took a shocking turn for Katerra, the tech-darling of construction backed by SoftBank. In a stunning announcement, the company with over 8,000 employees and a project portfolio valued at a staggering \$1.5 billion, revealed its closure and filed for bankruptcy. This came as a surprise, considering Katerra's impressive track record – boasting involvement in over 700 projects and generating an annual revenue of \$1.7 billion. The question on everyone's lips was: What went wrong for this construction giant that seemingly had it all?

ABOUT THE COMPANY

Katerra is an off-site construction company founded by Michael Marks and Fritz Wolf in 2015 in Menlo Park, California, USA (Belinda Carr, 2021). Katerra promoted the use of mass timber, such as glued laminated and cross-laminated members, in their projects. With a comprehensive approach to construction, Katerra took on multiple roles in various projects.

HERE ARE SOME OF THE KEY PRODUCTS AND SERVICES KATERRA OFFERS:

- **Building Design and Engineering:** Katerra provided architectural and engineering services to design buildings efficiently, using advanced technologies like Building Information Modeling (BIM) and computational design.
- **Building Components and Materials:** The company manufactured a range of building components off-site, including wall panels, floor systems, roof trusses, and more. These components were designed for quick assembly on-site, reducing construction time.
- **Prefabricated Construction:** Katerra emphasized prefabrication, where building elements were manufactured in a controlled factory environment and transported to the construction site for assembly. This approach aimed to improve quality, reduce waste, and accelerate construction timelines.
- **Construction Management Software:** Katerra developed software tools to facilitate project management, scheduling, and coordination among various stakeholders involved in construction projects. These tools aimed to improve communication and collaboration throughout the construction process.
- **Modular Construction:** The company ventured into modular construction, creating entire building modules or units off-site and assembling them on-location. This approach aimed to speed up construction further while

maintaining quality standards.

- **Energy Efficiency and Sustainability:** Katerra incorporated sustainable design principles and energy-efficient technologies into their projects, aligning with modern trends towards environmentally friendly construction practices.

They also acted as manufacturers, architects, MEP (Mechanical, Electrical, Plumbing) providers, suppliers, general contractors, and subcontractors (Esler, Bill 2018).

WHAT WENT WRONG?

Katerra, a once-promising player in the construction industry, embarked on a mission to revolutionize how buildings were designed, manufactured, and constructed. The company's vision aimed to disrupt traditional construction methods by leveraging technology, off-site manufacturing, and vertical integration. However, despite its initial success and massive investments, Katerra encountered a series of challenges, and within four years, it burned through its funding, which ultimately led to its downfall. By June 2021, they laid off many employees and filed for Chapter 11 bankruptcy (Rishi Kumar, 2021). Refer to Table 1 for the timeline of events that unfolded.

Table 1: Katerra – Timeline of events

Year	Event
2015	Katerra is founded by Michael Marks and Fritz Wolff. The company aims to disrupt the construction industry by integrating technology, design, and manufacturing to streamline the building process.
2017	Katerra acquires Michael Green Architecture, a Vancouver-based architectural firm known for its mass timber construction and sustainable design expertise.
2018	The company secures a significant investment from the SoftBank Vision Fund, valuing Katerra at over \$4 billion. This funding supports Katerra's expansion and technology development.
	Katerra acquires KEF Infra, an Indian off-site construction company, to strengthen its presence in international markets.
	Katerra announces opening a large manufacturing facility in Tracy, California, equipped to produce a wide range of building components and materials.
2019	Katerra continues to expand its operations globally, including establishing offices in the Middle East and Asia.
2020	The COVID-19 pandemic impacts the construction industry, and Katerra, like many other companies, faces challenges related to project delays and disruptions.
	Despite its ambitious goals and significant investments, Katerra faces financial difficulties and leadership changes. The company's valuation experiences a decrease from its peak.
2021	Katerra announces its plans to restructure and refocus its efforts. The company aims to narrow its focus and optimize its business operations.
	Greensill, another SoftBank-funded business that Katerra had depended on for funding and that had declared bankruptcy in March 2021
	Katerra files for Chapter 11 bankruptcy protection, citing financial constraints and challenges.

Katerra's journey began with a focus on materials sourcing and supply, but it swiftly encountered resistance from the construction industry's established players. The industry's reliance on relationships and traditional supply chains posed a significant barrier for a new entrant like Katerra. The company's struggle to gain approval for its standardized components in major projects highlighted the challenges of penetrating a relationship-based industry where trust and familiarity play pivotal roles (Craig Webb, 2018).

With a background in electronics, founder Michel envisioned revolutionizing the construction industry by applying the end-to-end manufacturing process commonly seen in the electronics industry. An electronic goods assembly line is a systematic and highly organized manufacturing process designed to produce electronic products on a large scale efficiently (refer to Figure 1). It involves a series of interconnected workstations, each dedicated to specific tasks, aimed at transforming individual electronic components into finished products. This type of assembly line is commonly used in the production of consumer electronics such as smartphones, computers, televisions, and other gadgets but is extremely difficult to replicate in construction due to complex interactions between processes back and forth.

However, Katerra adopted an assembly line approach, involved in procuring materials and fixtures in bulk, circumventing intermediaries, and directly supplying general contractors. The company's aspirations were exemplified in their audacious attempt to replicate the success of electronics manufacturing within construction.

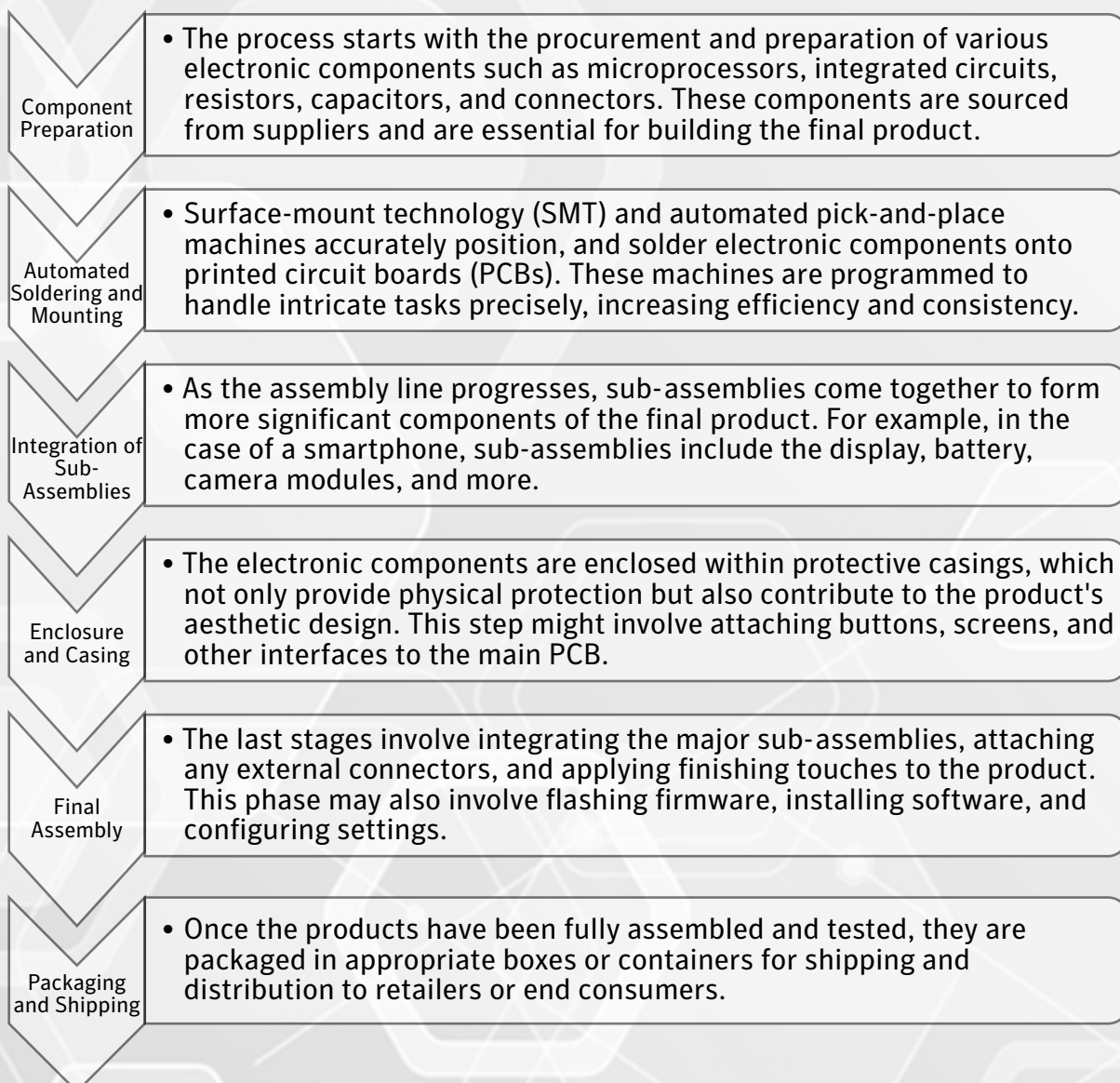


Figure 1: Electronic assembly line

In an interview for a Wall Street Journal article, a former Katerra employee disclosed that the company's executives would draw parallels between their construction ambitions and the streamlined production of iPhones. They presented iPhones as evidence that complex processes could be standardized, likening them to the construction of apartments. However, this analogy proved to be a simplification, as the distinctions between the high-tech realm of electronics and the intricate realm of construction became evident. Construction, unlike technology, is a multifaceted field, and an iPhone is far removed from the complexities of constructing a building.

Katerra's grand strategy encompassed controlling various aspects, from manufacturing windows to crafting their light bulbs, in the belief that this comprehensive approach would lead to substantial time and cost savings. Their vision extended to the notion that prefabricated assembly line parts, created in-house, could be transported to construction sites for diverse projects. However, instead of focusing on specialization, Katerra ambitiously undertook many projects, spanning offices, hotels, single-family homes, and apartment buildings. This ambition, while laudable, presented challenges when attempting to maintain quality and efficiency across such a diverse portfolio of construction types. One fundamental misstep stemmed from the misconception that buildings like iPhones or cars could be standardized, with minor modifications for different regions. Unlike universally adaptable consumer products, buildings are intrinsically tied to specific contexts. The demands of a hospital vastly differ from those of an apartment building, and the intricate interplay of culture, tradition, local environmental conditions, expertise, materials, and code requirements adds layers of complexity that are not easily replicated through an assembly line approach. Katerra's business model projected lucrative profit margins of 25-30% through the production of repeatable prefab components (Craig Webb, 2018). However, reality painted a different picture. The company consistently underbid projects, struggled to meet construction deadlines and exceeded budgets by significant margins. As a result, their financial obligations escalated dramatically, accumulating a staggering debt of up to \$2.8 billion within three years.

Recognizing the limitations of its initial strategy depending on external suppliers, Katerra pivoted towards vertical integration, aiming to control the entire construction process from design to completion. While this approach offered advantages such as enhanced quality control and streamlined operations, it presented substantial challenges. Establishing factories for individual components required substantial upfront investment, and transitioning to a vertically integrated model demanded a re-evaluation of labour practices and skill acquisition. Katerra's experience highlights the complexities and risks of such a transformative shift, particularly in capital-intensive industries.

Katerra's quest to transform into a comprehensive full-service firm involved substantial investments in acquiring and merging companies across the globe. Among these acquisitions were notable names such as United Renovations, Fields Construction, Bristlecone Construction, KEF Infra, Equilibrium, UEB Builders, Fortune Johnson, and Michel Green Architecture. This strategic approach was aimed at expanding Katerra's capabilities and offerings within the construction industry. Nonetheless, the assumption that these acquired entities would seamlessly integrate was met with a reality check (James Throne, 2021). The act of purchasing companies and anticipating immediate cohesion among their workforces proved to be a challenging endeavour. The rapid and extensive expansion, while ambitious, brought forth the potential for clashes and conflicts arising from diverse corporate cultures and operational practices. This form of aggressive and impulsive growth had the potential to create friction and discord rather than a harmonious blending of resources. This added to their financial troubles.

Katerra's financial struggles were compounded by external factors, most notably the collapse of Greensill Capital, a key lender. Greensill Capital was a financial services company that specialized in supply chain financing and working capital solutions. Greensill Capital provided financing to various companies by allowing them to receive early payment for their invoices from suppliers, which helped improve cash flow. This financing was based on securitizing the future payments from these invoices and turning them into tradable financial assets. Katerra was one of the companies that utilized Greensill Capital's services to improve its working capital. By partnering with Greensill, Katerra could access funds earlier than waiting for the full payment of its invoices, allowing the company to manage its cash flow more effectively. However, it is essential to note that both Greensill Capital and Katerra faced financial difficulties in the same period. Greensill faced issues related to the structure of its financial products and its relationship with its major client, the GFG Alliance, which led to its insolvency and subsequent collapse (Eshe Nelson et al., 2021). Combined with the collapse of Greensill Capital, Katerra's ability to secure new capital was severely compromised, leading to a bankruptcy filing. This underscores the vulnerability of companies, even those with substantial investments, to unforeseen external shocks. Further, the pandemic disrupted construction activities globally, leading to project delays, labour shortages, and supply chain disruptions.

The pandemic led to lockdowns, restrictions, and disruptions in various regions, causing delays in construction projects. Worksite closures, supply chain interruptions, and a reduced workforce all extended the project timeline, which could have affected Katerra's ability to deliver projects on schedule. Many construction materials are sourced from different regions globally. The pandemic caused disruptions in the supply chain, leading to shortages of materials and increased costs. The economic downturn resulting from the pandemic has affected the financial health of both Katerra and its clients. Reduced demand for new construction projects, tighter budgets, and financial uncertainty have led to cancellations or postponements of projects. The pandemic's economic impact led to tightened credit markets and reduced investor confidence. This made it more difficult for Katerra to secure the necessary funding for its operations and expansion plans.

Ensuring the health and safety of workers became a top priority due to the contagious nature of the virus. Implementing new safety protocols in construction has increased costs and slowed down productivity. The pandemic created uncertainty in the construction sector affecting Katerra's revenue generation and project pipeline.

CONCLUSION

Katerra, the tech-wielding knight aiming to slay the dragon of inefficiency in construction, was ultimately felled by the very industry it sought to revolutionize. Their dream of a seamless, prefabricated utopia clashed with the stubborn reality of traditional workflows. Caught between ground-breaking ambition and the need for a sustainable business model, Katerra's path became a high-wire act. Their quest to integrate technology and disrupt the status quo, while admirable, ultimately led to a restructuring and a desperate scramble for bankruptcy protection.

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UNRAVELING THE IMPACT OF ONLINE CONSUMER REVIEWS ON CONSUMER BUYING BEHAVIOUR

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ABSTRACT

Advancements in technology have led to drastic changes in consumer behaviour. Consumers have become more aware and make purchase decisions after gathering information from various online platforms. An E-commerce shopping website is one such platform that influences the purchase decision of consumers through online reviews and ratings. Customers can share their experiences with a multitude of consumers by posting their reviews in comments, images, or videos of products. Thus, Online Consumer Reviews (OCRs) are a great way to get insight into products from experienced people. The transformation has helped consumers make correct choices and buy products valued for money. But all this evolution didn't happen overnight. The present paper aims to study the rise and popularity of online consumer reviews and how they impact consumer buying behaviour. The study examines the central and peripheral cues using The Elaboration Likelihood Model of persuasion as a referent theory. After an extensive literature review, the variables have been identified in the study and a conceptual model has been proposed to show the effect of online consumer reviews (OCRs) on consumer buying behaviour which can help researchers and marketers in the future to understand its intricacies and to use it effectively. For a comprehensive assessment of previous research work on OCRs, the TCCM (Theories, Contexts, Characteristics, and Methodology) review framework has been adopted to identify the research gap and suggest future research directions. Thus, it can be concluded that online consumer reviews have been revolutionized and play a major role in the decision to purchase products.

Keywords: Online consumer reviews (OCRs), e-commerce websites, Consumer Behaviour, Elaboration Likelihood Model, TCCM

INTRODUCTION

According to research on Word-of-Mouth (WOM) impacts, a satisfied customer can talk about his good experience with some people, but a dissatisfied customer would tell everyone he/she meets (Cheung et al., 2009). Advancements in technology have changed the way of communication among consumers. The easy access to the internet and various online platforms has allowed consumers to voice their opinions and feedback to others and has widened their interpersonal communication (Akdin, K., 2021). Online consumer reviews (OCRs) on different e-commerce websites are one such way that is popularly used by consumers to spread or obtain information about brands, products, or services (Farki et al., 2016; Sutanto & Aprianingsih, 2016; Roman et al., 2022). It strongly impacts consumer buying behaviour and is growing significantly every year. A Statista poll on the use of product reviews and ratings on e-commerce websites in India in 2022 found that 64% of respondents always read reviews and ratings before making a purchase. Comparatively, 3% of respondents said they never read product reviews or ratings when making an online purchase (Statista, 2022).

Consumers purchasing products from brick-and-mortar stores (offline) also consult online reviews to make purchase decisions (Dellarocas, 2003). It is a great source of information for both consumers and marketers (Park et al., 2007). It can assist consumers in making purchase decisions while helping marketers get valuable feedback about their products or services. The communication style, credibility, argument quality, valence (positive or negative comments), and the number of reviews read are some important factors of OCRs that impact consumer buying behaviour (Cheung & Thadani, 2010; Fang, 2014; Filieri & McLeay, 2014). Source credibility is a factor that helps in persuading and accordingly, the consumer builds attitudes toward products or services and consequently their behaviour (Forman et al., 2008). Consumer ratings are equally important and play a major role in decision-making (Farki et al., 2016). OCRs have become so popular as they can persuade readers and have become a strong choice for consumers to refer to them before making a purchase (Chiou et al., 2018). The psychological process has been explained by the Elaboration Likelihood Model (ELM) which helps us to understand how people can be persuaded to change their attitudes (Petty & Brinol, 2008). This theory of persuasion works on the idea of elaboration. Elaboration is the effort required to comprehend, analyze, and remember a message before accepting

or rejecting it (Hooper, 2019). There are two levels of elaboration -- a higher level of elaboration where people use central route processing (things they thoroughly consider before making a decision), and a lower level of elaboration where people are easily influenced by some simple cue in the persuasion context without scrutinizing the message (Petty et al., 1981).

The study is divided into eight sections. The first section states the research objective which is to identify various factors of OCRs that influence consumer buying behaviour. The second section conducts an extensive literature review of online consumer reviews along with the ELM theory of persuasion. The third section adopts the TCCM review framework as the research methodology to identify the research gap and propose future directions. The fourth section shows the results of the analysis and findings showing the three major credibility factors: online reviews, sources, and platforms as important components that bring a change in the attitude and decision-making of consumers. No study has ever discussed factors from all three categories, so the findings can contribute to the development of a general theory of OCRs.

The fifth section concludes OCRs are an important tool for all companies as they influence consumer buying behaviour. Consumers are sharing their experiences on virtual platforms with strangers. Companies should leverage the vast potential of OCRs to increase sales of their products. The sixth section provides the theoretical framework and practical implications. The study extends the existing knowledge and offers insights to researchers and marketers. The seventh section acknowledges its limitations as the findings are derived from only a thorough literature review. Lastly, the study suggests directions for future research in the area of fake online reviews and the different formats of OCRs like images and videos along with texts.

RESEARCH OBJECTIVES

Online consumer reviews play a large role in consumers' online and offline shopping behaviour. Although many studies have been conducted on online consumer reviews, and have found various independent and dependent variables, the current study attempts to find all possible variables of OCRs that influence consumer buying behaviour. The novel contribution is to identify the various important factors influencing consumer buying behaviour and can be divided into three main categories: online reviews credibility, source credibility and platform credibility.

LITERATURE REVIEW

ELECTRONIC WORD-OF-MOUTH

Since the beginning of humanity, Word-of-mouth (WOM) has been acknowledged as one of the most powerful sources of information transmission. Before the advent of the Internet, customers communicated their product-related experiences to one another through traditional WOM (such as conversations with friends and family) (Sundaram et al, 1998). With the invention of the web, the effect of WOM has widened, bringing new platforms for customers to seek and disseminate information about products. The social web has thus empowered consumers to voice out their opinions and feedback to a large audience through social media websites, e-commerce websites, online discussion forums, blogs, etc. (Cheung & Thadani, 2012). Thus, Electronic Word of Mouth (eWOM) was introduced allowing interaction between consumers virtually which influences purchase decisions. When compared to traditional WOM, e-WOM has the advantages of extensiveness in information dissemination, speed, volume, anonymity, and saving time (Hennig-Thurau et al., 2004; Ali et al., 2019). The research community is paying close attention to eWOM research because of the great potential and difficulties involved with it (Hussain et al. 2016).

Consumers and marketers both frequently generate eWOM, which is known as user-generated content and marketer-generated content, respectively. Organization-controlled websites are used by marketers to disseminate information, while social networking sites are used by customers to share their product experiences (Ali et al., 2019). Companies now interact with customers on social networking sites to receive valuable feedback on their goods and services. This interaction signifies a shift in the conventional business model.

Companies now place high importance on customer engagement, therefore significant developments have been made in online consumer reviews by giving voice and much-needed power to consumers to share their product experience (Chen and Xie, 2008). One of the most important forms of Electronic Word-of-Mouth is the online consumer review, which includes either favourable or unfavourable comments made by customers about a product available for purchase online (Bae & Lee., 2011). Consumers frequently rely on this e-WOM transfer to reduce risks related to product quality and the seller's honesty when they are unable to evaluate a product in person (Ali et al., 2019). Many studies show that people refer to online consumer reviews on various e-commerce websites before

making online as well as offline purchases (Cheung et al., 2012; Roman et al., 2022). Thus, OCRs are a great way to gather information about products with ease and comfort just by going through them at any place and at any time.

HISTORY OF ONLINE CONSUMER REVIEWS

Before the invention of the internet, people had to personally ask others about a company's or product's reputation and quality. The inquiry of products was time-consuming and sometimes fruitless. With the expansion of the internet, consumers can collect information about the company or its products from a large domain. Various online review websites emerged making it easier for consumers to make purchase decisions. Online review services have been available for more than 20 years. The first was established in 1999 and the three main contenders were: Epinions, RateltAll, and Deja. All three were later purchased by other larger companies (Kim, 2021)

As the online review process continued to evolve, five main companies emerged as apparent leaders in online business. Yelp, Amazon, Google, Facebook, and TripAdvisor gained widespread influence and have had a tremendous impact on the evolution of online reviews. (Sprague, 2019).

Gradually online consumer reviews became popular word-of-mouth which disseminates information widely and is a highly trusted source of information (Nielsen, 2013). Thus, there is a significant development in the perceptions of online reviews which are referred to as “Electronic Word-of-Mouth,” “Consumer-Generated Information,” “User-Generated Content,” and “Consumer Feedback.” (Bae & Lee., 2011)

DEFINING ONLINE CONSUMER REVIEWS (OCRS)

Online Consumer Reviews are voluntarily user-generated content about the distinctive features of brands, products, or services by internet users who have purchased, used, or consumed them. OCRs generally refer to the criticism, evaluation, opinion, or comments generated about an object, service, business or experience that is posted on e-commerce websites and is used as a form of online customer feedback (Mudambi & Schuff, 2010). A grade or rating may be issued in addition to written comments and assessments to convey the experience of the consumer. Past literature shows that it is more credible and useful than any other Electronic Word of Mouth (Rangsang and Millayani, 2021). Customers can get in-depth inputs about products and services from other consumers while businesses and producers can get feedback from consumers about the benefits and drawbacks of their goods to better understand consumer needs and identify possible improvement areas.

Table 1- Definitions of Online Consumer Reviews**Source:** The Authors

S.No	Definition	Authors
1.	“Online consumer comments are defined as positive or negative statements about products made by potential, actual or former customers, which are available to many people and institutions via the Internet.”	Stauss, 2000
2.	“Online consumer reviews are regarded as a new type of recommender which is the same as the messenger of conventional communication through word-of-mouth.”	Chatterjee, 2001
3.	“Online consumer reviews often describe product attributes in terms of usage situations and measure product performance from a user’s perspective.”	Bickart and Schindler, 2001
4.	Online consumer reviews can be deployed as a new element in the marketing communications mix and work as an online seller’s free “sales assistant” to help consumers identify products that best match their needs.	Chen and Xie, 2008
5.	“Online consumer comment as a type of product information made by individuals based on their personal experience in using a product.”	Yubo and Jinhong, 2008
6.	Online reviews as “peer-generated product evaluations, posted on company or third-party websites”	Mudambi and Schuf., 2010
7.	“Online consumer reviews are a form of eWOM, which is generated and delivered by consumers who have purchased and used products.”	Bae and Lee, 2011
8.	The concept of online product reviews is defined “as a kind of electronic word-of-mouth written and released by consumers on the Internet, which enables people to easily obtain the opinions and personal experiences of different products from unknown individuals.”	Purnawirawan et al., 2012
9.	“Online consumer review is a form of electronic word of mouth (eWOM) which refers to user-generated content posted on online sites and third-party websites.”	Farki et al., 2016
10.	“Online consumer review is a medium for other consumers to find and obtain information that will influence purchasing decisions.”	Sutanto and Aprianingsih, 2016
11.	“Online consumer reviews are information written online about a product by other consumers who have bought and used the product.”	Rangsang and Millayani, 2021
12.	“Online consumer reviews (OCRs) are an informal type of commercial communication in which information about products, services, or firms are created by consumers, instead of the firm, and shared through different online platforms.”	Roman et al., 2022

Table 1 shows the definitions of Online Consumer Reviews from various authors.

According to a survey by Statista conducted in the year 2021, reviews have a powerful effect on audience behavior. The reviews written on a service or product are like friends’ recommendations, despite being published by complete strangers. In 2021, nearly 70 per cent of online shoppers typically read between one and six customer reviews before making a purchasing decision (Statista, 2021). Less than one in 10 shoppers did not have a habit of reading customer reviews before buying. In recent years, it has become increasingly important to the consumer to read up on a product, business, or service before spending any money (Statista, 2023). Thus, customers’ dependency on online consumer reviews is increasing exponentially every passing year.

THE ELABORATION LIKELIHOOD MODEL (ELM)

American psychologists John Cacioppo and Richard Petty developed the elaboration-likelihood model (ELM) of persuasion in 1986. It emphasizes the cognitive processes that underline people's responses to persuasion. Petty and Cacioppo's (1986) Elaboration Likelihood Model (ELM) adopts a more comprehensive perspective on how two different persuasion techniques affect attitudes. When a consumer's motivation or capacity to evaluate the attitude object is high that is, when the consumer actively seeks out information pertinent to the attitude object itself, the central route is extremely relevant to attitude change (Hooper, 2019). On the other hand, when a consumer's motivation or assessment abilities are low (for example, when they are uninterested or unmotivated) -- that is when they are less likely to concentrate on information pertinent to the attitude object itself -- the attitude change tends to occur via the peripheral route (Hooper, 2019).

Many researchers in the past have considered the Elaboration Likelihood Model when seeking to explain whether high-involvement and low-involvement consumers adopt primarily central or peripheral cues to information processing. (Park et al., 2007; Park & Lee, 2008; Filieri, 2014;). It was found that both central (review quality dimensions like long, relevant, current, and factual OCRs) and peripheral cues (source credibility, overall ranking scores) affect information processing. (Chen et al., 2017).

Argument quality, which denotes the adoption of a central route of information processing, is understood as the quality level of the arguments available in a consumer review as assessed by a consumer (Park et al., 2007), whereas source credibility (i.e., perceived expertise and trustworthiness of a reviewer) and ranking scores are information shortcuts and thus denote a peripheral route of information processing (Filieri, 2018).

Consumers process the information and make assessments given by others to find the right product. The assessment of consumers is influenced by various factors including quality, quantity, credibility, and ratings that were identified as important influencers, transforming their opinion by the reviews of others. Consumer's attitude is influenced by online reviews' persuasion which is a prominent part of information processing. ELM model thus emphasizes the persuasion outcomes of online consumer reviews on individuals.

PROCESS OF PERSUASION AND CHANGE IN THE ATTITUDE OF CONSUMERS

Persuasion is a process by which a person's attitude or behaviour is influenced by communications from other people (Cheung, 2012). There is a progression of sequential stages that a person takes to become persuaded. The communication is delivered to the recipient first, and they pay attention to and understand its contents (including the basic conclusion being urged and perhaps also the evidence offered in its support). The person must accept the argument being made or agree with it to be persuaded, and unless just the most immediate consequences are relevant, they must hold onto this new belief long enough to take action on it (Petty et al., 2006). The ultimate aim of the persuasion process is to get people (or a group) to act in the way that the new attitudinal perspective implies.

Persuasion is affected by both direct and indirect routes to persuasion. A person's motivation and capacity for elaboration are taken into account while calculating elaboration likelihood in the ELM. Ability is demonstrated in the individual's cognitive competency or past skill with the attitude object, whereas motivation speaks to the person's relevance to the persuasive message. People differ in their motivation. (Sher & Lee, 2009). Motivation takes the form of involvement, which determines whether the central or peripheral paths to attitude modification are used or not. The consumer's path during communication processing determines whether a given message changes attitudes or not.

There are several comments present for a product or service and due to scarcity of time or interest, consumers do not go through each one of them. In such cases, it is the source or writer's identity or rating that influences the decision-making or attitude of a consumer which is spontaneous, peripheral, or heuristically. When we merely process information spontaneously, consumers' emotions are more likely to be significant; yet, when consumers carefully process information, cognition dominates. On the other hand, when a consumer finds a review relevant and takes time to process the communication more deliberately and carefully, it is the message strength and argument quality that influences the decision-making or attitude which is thoughtful or central (Petty & Briñol, 2008).

RESEARCH METHODOLOGY

The present study uses the existing literature review to synthesize the impact of online consumer reviews on consumers' buying behaviour. For this purpose, the articles of Web of Science are analyzed in the study. The articles on OCRs of the past two decades 2002- 2022 are identified in this paper through search engines using keywords.

Then the articles that are relevant to the title of this paper have been selected and analyzed, focusing on the motivations and components of OCRs. For article identification, a pool of keywords has been used for the initial search, as online consumer reviews are also used as online recommendations, electronic word of mouth, and user-generated content in the literature. The present study adopted a Theory-Context- Characteristics-Methodology (TCCM) review framework to develop a deep understanding of the theories (i.e., key theories like ELM theory), contexts (i.e., industries), characteristics (i.e., key components and their influence) and methodologies (i.e., research approach and analytical techniques) of the earlier contributions made by various authors.

ANALYSIS AND FINDINGS

The existing literature review has assisted in better understanding the changing attitude of consumers on reading online reviews and identifying the components of online consumer reviews which strongly influence consumer buying behaviour.

COMPONENTS OF ONLINE CONSUMER REVIEWS

The significance of OCRs and how they influence customers' buying decisions have been extensively studied. Important components of OCR that can impact consumer buying behaviour are divided into three categories: Online Review credibility, Source/Reviewer Credibility, and Platform credibility. Online Review credibility includes argument quality, review quantity, review valence, review consistency, review sidedness, review format, review length, and review rating. Source/Reviewer credibility includes source identity, source homophily, source transparency, and reviewer expertise. Platform credibility includes reputation and trust on online platforms.

ONLINE REVIEW CREDIBILITY

Online review credibility is defined as 'the extent to which one perceives online reviews as believable, true, or factual (Fang, 2014). Review credibility is an important factor as it helps consumers make decisions by reducing uncertainties (Cheung et al. 2009; Hussain et al. 2016). Extracting information from online consumer reviews is a challenging task especially when many reviews are available. Reviews are positive, negative, and neutral depending on the consumers' experience (Thomas et al. 2019). Information processing of the comments is not easy. The following are the factors that make online reviews credible:

1. Argument Quality

Written comments are an essential source of collecting information about the product or services. Consumers' comments generate a stronger impact than ratings on consumers' buying behaviour (Tsang & Prendergast, 2009). The purchase decision is influenced by the quality of the message written by the reviewer. Depending upon the accuracy, completeness, timeliness, and rightness of the message, the argument quality is considered as high or low (Chakraborty and Bhat, 2017).

According to existing studies, accuracy plays an important role when consumers thoughtfully process the information (i.e. central route) (Filiari and McLeay, 2014). Accuracy refers to the correctness of online reviews. A reviewer should be able to communicate the experience accurately otherwise the information cannot be considered credible. Like accuracy, completeness of online reviews has also been examined by researchers (Filiari and McLeay, 2014; Cheung, 2014). Review completeness makes it comprehensive and strengthens the quality of the argument. Timeliness refers to the review being outdated or recently posted. The recent reviews make it more credible as they provide updated information about the product or service. Past reviews are less significant and do not catch the attention or trigger the attitude of consumers. Rightness is also closely connected with accuracy as wrong information provided by the reviewers can lead to unsatisfactory decisions.

2. Review Quantity

Review quantity is considered less significant in influencing consumers' buying decisions (regarded as a peripheral cue). Review quantity refers to the number of online reviews available on e-commerce websites. The larger the number of reviews, the greater the chance of grabbing attention and generating a positive impact on consumers, as a large number of reviews depicts the popularity of the product or service. A significant review quantity facilitates the observation of online reviews and aids in their verification (Cheung and Thadani, 2010).

3. Review Valence

Review can be positive, negative, or neutral depending upon the satisfaction and dissatisfaction of consumers. Existing studies have already investigated the impact of both positive and negative reviews on the purchase

decisions of consumers (Purnawirawan et al., 2012; Pentina et al., 2018; Hong and Pittman 2020). Positive online reviews encourage the reader to purchase while negative reviews discourage them (Aggrawal et al., 2022). Researchers have analyzed that negative reviews have a stronger influence than positive reviews on consumers (Lee and Koo 2012; Chiou et al. 2018). Neutral reviews are less impactful as the information is not clear and does not influence the buying decisions of consumers (Mudambi and Schuff, 2010).

4.Review Consistency

The E-commerce website is an online platform that provides access to consumers to read others' experiences and compare. When comparing comments, consumers consider high consistency as an important factor. If reviews are consistent with most other reviews, it makes them more credible. By contrast, inconsistency makes it skeptical and consumers build an unfavourable attitude towards the product (Zhang & Watts, 2008; Luo et al., 2015). Review consistency has been considered a peripheral cue by researchers (Cheung et al., 2012; Thomas et al, 2019).

5.Review Sidedness

Previous studies have shown that a two-sided review is more convincing than a one-sided review (Cheung et al., 2009; Cheung et al., 2012). One-sided reviews provide either positive or negative aspects of the product, which are considered vague, biased, and inaccurate. Two-sided reviews are more comprehensive, detailed, and persuasive as they provide the product's positive and negative aspects. Studies have shown that it is more truthful, and reviewers perceive it as factual and accurate (Cheung et al., 2012). Thus, it makes the online review complete and reliable and helps the reviewer in purchase decisions.

6.Review Format

Consumer disseminates information verbally as well as by posting comments along with images and videos. Technological advancements have revolutionized the presentation format and have been categorized as text-based, image-based, and video-based formats. Past studies have examined that visual display strengthens the credibility of reviews and has a stronger and more positive impact on consumer behaviour (Lin et al., 2011)

7.Review Length

Review length indicates the detailed information of the product explaining the attributes that persuade the consumers. The description makes it believable and subsequently affects their behaviour. The length of review can improve the diagnostic ability of information as detailed information matters when consumers are willingly looking for and comparing the attributes and functionality of the product. Longer reviews provide in-depth product details like how and where the product was used in specific contexts, which facilitates the purchase decision of consumers (Mudambi and Schuff, 2010).

8.Review Rating

Review rating refers to the overall assessment of a product or service in the form of a star icon made by users (Farki et al., 2016). Rating is considered a visual cue that is conceptualized as peripheral due to less cognitive effort required in processing such information. Online customer reviews often have star ratings that range from one to five. A very low rating of one star denotes a very unfavourable opinion of the product whereas a very high rating of five stars denotes a very positive opinion of the product. A rating of three stars denotes a moderate opinion.

9.Review Helpfulness

Mudambi and Schuff, 2010 have defined review helpfulness as "a peer-generated product evaluation that facilitates the consumer's purchase decision process." Review helpfulness has been used to measure consumers' evaluation of a review (Tandon et al., 2021). E-commerce websites ask "Was this review helpful to you?" and place the reviews that are most helpful higher on the product information page.

SOURCE/REVIEWER CREDIBILITY

Source credibility is an important factor as consumers are exposed to a large number of reviews available on e-commerce websites (Upadhyaya and K, 2022). It becomes difficult to trust the reviews as many companies pay individuals to write fake reviews. In such cases, assessing the credibility of sources is hard. Source credibility is influenced by other factors like trustworthiness, tie strength, homophily, and knowledge of the reviewer.

1.Source Identity

Researchers have examined the source identity as a factor that influences the purchase decision. Source identity can be defined as an individual's real name, age, and gender specifications which increase the credibility of the reviews (Chakraborty and Bhat, 2017). According to Liu and Park (2015), reviews with a real name, address, and photo are considered as being more credible than others. Customers, who use this information to make their purchasing decisions, will find reviewers' comments to be more helpful if they share more of their personality (Forman et al., 2008).

2.Source Homophily

The large and easy availability of information on online platforms makes it challenging to trust reviewers. If reviews come from people sharing the same interests, attitudes, beliefs, and thinking or maybe demographic profiles like age or gender, then it fosters a positive attitude towards the review (Wei and Liu, 2020). Furthermore, recent studies show that higher levels of homophily between the consumer and the website result in a positive attitude towards the website and online reviews available on the website (Chawdhary and Weber, 2021)

3.Source Transparency

Source transparency refers to the extent to which users can independently verify the information provided by a source, increasing both the credibility of the source and users' perceptions of the information (Watts and Wyner, 2011). One of the most crucial elements of online transparency is that the information provided must be accurate, simple to understand, and available to Internet users.

4.Source Expertise

Reviewer's expertise is defined as the knowledge of the person regarding a particular topic which is built on his experience and skill. Reviews from experts are more persuasive than from strangers or anonymous users. Experts can communicate well and motivate the viewers by alluring them with their content and style. It has also been seen in a few studies that source experience and source expertise are the same (Jacoby et al., 1986; Baber et al., 2015). Source experience indicates that a person has used that product before sharing the experience with others. He knows the pros and cons, its functionality and characteristics which motivate him to voice his opinion with others.

PLATFORM CREDIBILITY

The E-commerce website is an online platform to disseminate information about products and services to a wide geographical area. Through OCR consumers can voice their opinion on these websites through comments, images, and videos (Lee et al. 2012).

1.Platform Reputation

The popularity or perception of an online review website among consumers is referred to as website reputation (Hsiao et al., 2010). Customers may judge the quality of an online review and its accompanying credibility based on the website's perceived reputation. A reputed website always gives due importance to the voice of the consumers and answers the queries and doubts of the consumers (Tandon et al., 2020). The accurate and prompt information available on e-commerce websites helps consumers to make purchase decisions. Past research has shown platform reputation as a peripheral cue in assessing the information by consumers.

2.Platform Trustworthiness

A trustworthy website is determined by features including accessibility, dependability, convenience, correctness, and security. The importance of trust in e-commerce websites is an important issue. One of the main advantages for every online business must be the use of secure technology for data transfers. But it shouldn't be expected that the customer is a technical expert. Hence, a requirement that is both essential and sufficient is the clear declaration of the use of secured protocols (Tsygankov, 2004).

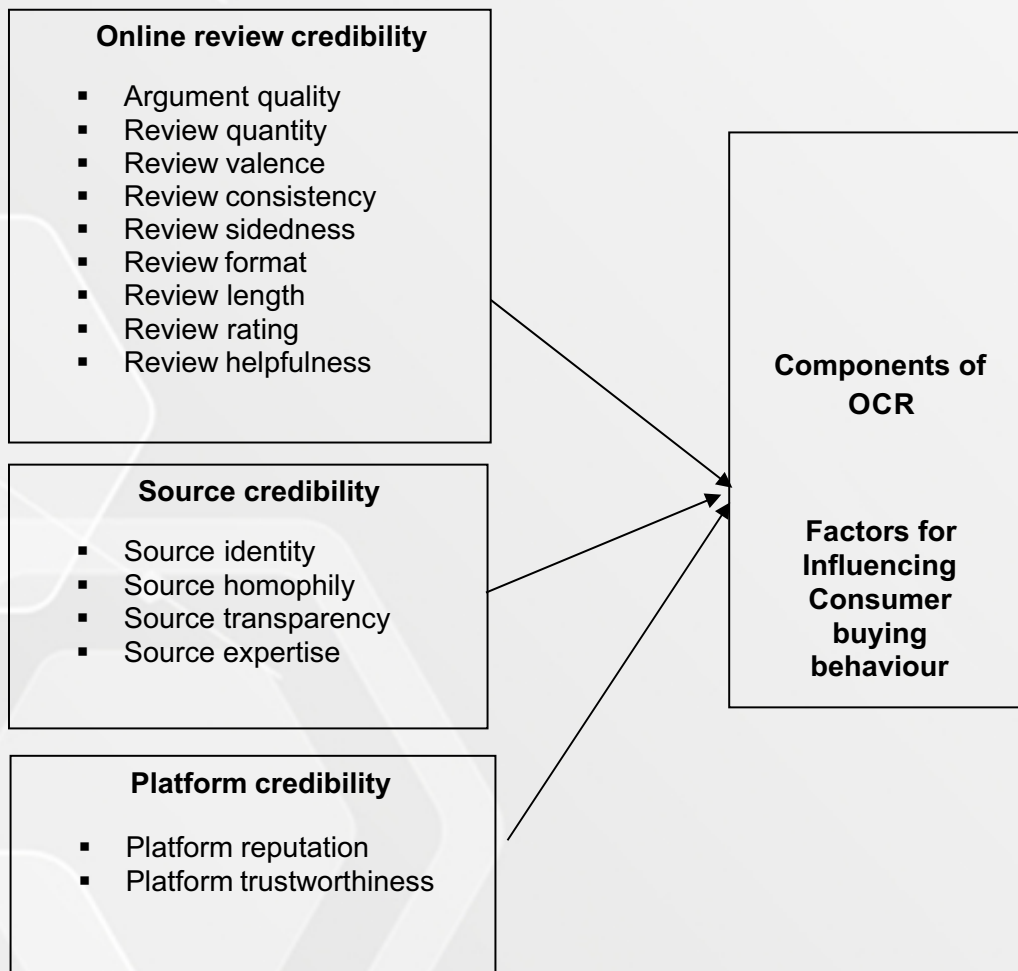


Figure 1: Conceptual Model for Components of Online Consumer Reviews influencing consumer buying behaviour

Source: The Authors

Figure 1 explains various factors or components of OCRs which influence consumer buying behaviour and the study of these factors has assisted in identifying various variables for the study. Although there are several empirical studies on the credibility of online consumer reviews, the findings are limited and contradictory. Therefore, in this paper, after an extensive literature review, three broad groups of components are provided namely, Online Review Credibility, Source Credibility, and Platform Credibility which influence consumer buying behaviour. The insights gained through this conceptual model will assist researchers in future.

CONCLUSION

The present study identified the factors that bring change in consumer buying behaviour through the influence of online consumer reviews and deepen the knowledge of the popular electronic word of mouth. It is undeniable that OCRs have changed how a product is voiced and promoted. Online consumer reviews can express satisfaction or complaints which is an effective tool to persuade customers to purchase a product. The study also examined the central and peripheral cues in the evaluation of online consumer reviews through the ELM model which suggests that the attitude of consumers is formed by the persuasive nature of OCRs which consequently affects the decision-making of consumers. Finally, it is anticipated that this research will spark additional theoretical and practical studies on online consumer reviews.

THEORETICAL AND PRACTICAL IMPLICATIONS

The study suggests several theoretical and practical implications. Previous studies have determined credibility factors as the important variable for influencing consumers' buying behaviour. The present study has identified 15 variables under three broad factors -- Source Credibility, Online Reviews Credibility and Platform Credibility -- that have a strong and significant influence on consumers' buying behaviour. The authors believe that conceptually, this

study adds to the existing literature on OCRs. As a result, a conceptual framework was created to show the components of effective OCRs to extend and enrich earlier contributions. The study's findings are consistent with earlier findings, reiterating the importance of credibility in influencing consumers' decisions on online evaluations before making final purchase choices.

The current study has some practical implications also. It is observed that negative reviews have a stronger impact than positive or neutral reviews. People tend to change their buying decisions when they encounter negative comments posted by consumers on e-commerce websites. Thus, companies or sellers must take steps to avoid negative word of mouth and adopt effective marketing strategies, recognizing the power and growth of OCRs.

Thus, this paper not only shows previous studies of OCR but also provides a roadmap for future marketers and researchers.

LIMITATIONS

The current research enriches a theoretical framework and practical contributions for the various factors identified that influence consumer buying behaviour, but still has certain limitations. The first limitation is that the variables were identified by only a thorough literature review. By creating a questionnaire and then using a statistical tool to analyse the results, more thorough research can be carried out. The second limitation is that not much discussion was done on how these factors can impact consumer buying behaviour for specific products or services, industries, or countries.

DIRECTIONS FOR FUTURE RESEARCH

Although there is a lot of study on the impact of online consumer reviews, there are many gaps in our understanding of how to evaluate online reviews for credibility and address these difficulties. Very few discussions have been held on fake online reviews and the methods to curb them. There is a need to examine the various formats like images and videos to express consumers' experiences. From the perspective of marketers, there should be research on the effective strategies for OCR that marketers might employ to win consumers' trust.

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