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TKM INSTITUTE OF MANAGEMENT

The Legacy of TKM College Trust

The TKM College Trust was founded by Janab A.Thangal Kunju Musaliar, a successful industrialist, philanthropist and businessman. Born in a middle class family on 12th January 1897 at his ancestral home in Kollam. Janab Thangal Kunju Musaliar built up a vast business empire which dominated the cashew export trade in the 1940s and 50s. As a man of extra ordinary vision, he foresaw the tremendous importance of education and this led to the establishment of the TKM College Trust in the year 1956. T.K.M. College of Engineering, the first private Engineering College in Kerala, was set up by the Trust in 1958 followed by the T.K.M. College of Arts and Science in the year 1965. Janab Musaliar passed away on 19th February 1966 after an illustrious career that paved the way for advancement of professional education in Kerala.

True to the vision of its founder, the TKM College Trust has, over the years, added several other educational institutions to its fold - The TKM Institute of Management in 1995, The T.K.M. School of Communication & Information Technology in 1996, the T.K.M. Centenary Public School in 1997, the T.K.M. High School and T.K.M. Higher Secondary School in 2000, the T.K.M. Institute of Technology in 2002 and the T.K.M. School of Architecture in 2014.

Today, the dream of the late Janab A. Thangal Kunju Muslaiar of uplifting society through education has to a large extent been fulfilled. His life exemplifies greatness in its true sense. Several of his initiatives, innovations and achievements are standing monuments in the changing national and global scenario. No wonder that the Government of India has thought it fit to issue a commemorative stamp in recognition of the services of this great man in 2001.

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From the Desk of Chief Editor

[1]Jb. T.K. Shahal Hassan Musaliar
[1]Hon.President, TKM College Trust

I am happy to note that TKM Institute of Management is publishing the 10th Volume, Issue 1 of the TKM International Journal for Research in Management.

I would like to extend my gratitude to all the authors, members of the editorial board and distinguished reviewers, who have voluntarily contributed their time, effort and expertise to make the issuance of the journal successful.

TKM International Journal for Research in Management is primarily focused on research and review work based on contemporary multidisciplinary topics in Management Science. This peer-reviewed journal comprises of twelve research write-ups of academicians, research scholars and students.

This issue aims to shed light on the transformative shifts happening across industries and business firms and how innovation and efficiency drive business growth.

Through insightful analysis and thought-provoking commentary, we aim to provide our readers with a comprehensive understanding of the business trends shaping the current era.

I encourage all contributors to explore these themes and offer their unique perspectives on how businesses can harness the power of innovation to drive success in the modern era.

Thank you for your dedication and contribution to our editorial mission.

HARNESSING SOCIAL MEDIA THROUGH INFLUENCER MARKETING TO BOOST CUSTOMER BRAND ENGAGEMENT

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ABSTRACT

In today's digital world, social media marketing (SMM) is a key strategy for businesses to increase their visibility and build stronger connections with their audience. Successful brands use their pages on platforms like Facebook, YouTube, and Instagram to engage customers through entertainment, interaction, trendiness, customization, and electronic word-of-mouth (EWOM). Good Vibes Brand uses social media to connect with consumers and encourage their active participation, which helps boost customer brand engagement (CBE). A brand's visibility is greatly influenced by these SMM elements, highlighting their importance in brand growth. This study looks at how these SMM elements affect customer brand engagement, focusing on Good Vibes Brand. A questionnaire, based on previous research, measured entertainment, interaction, customization, trendiness, EWOM, and customer brand engagement. Responses from 100 young adults aged between 20 to 35 were used for the study. Structural Equation Modelling (SEM) was used to analyze the relationships between these factors.

Keywords*: Entertainment, Interaction, Customization, Trendiness, Electronic Word of Mouth, Customer Brand Engagement.*

I.INTRODUCTION

Social media has changed how businesses connect with their customers. With over 4.9 billion people using social media worldwide, it has become a key tool for companies to reach their target audience. Platforms like Facebook, Instagram, YouTube, and Twitter offer real-time interaction, allowing brands to engage with consumers, promote products, and build loyal customer bases (Barger & Labrecque, 2013). Successful social media marketing (SMM) involves creating content that connects with the audience and encourages likes, shares, comments, and reviews (Ashley & Tuten, 2015). SMM helps businesses build brand awareness, generate leads, and increase sales (Hootsuite, 2020). It provides a space for customer engagement, which is essential for building loyalty and keeping customers (Forrester, 2019). Customer engagement on social media is more than just being visible; it's about creating meaningful interactions that build long-term relationships. This engagement comes from content that is entertaining, informative, and relevant. It not only attracts followers but also

encourages user-generated content like reviews and ratings (Kaplan & Haenlein, 2010).

Electronic word-of-mouth (EWOM) plays a big role in influencing buying decisions, making it an important part of SMM (Chu & Kim, 2011). By interacting with customers on social media, businesses can improve customer satisfaction, solve problems, and collect useful feedback (Sprout Social, 2020). Good social media marketing and engagement can lead to greater customer loyalty, better retention, and more revenue (Bain & Company, 2016). Social media platforms also offer advanced tools to measure how well marketing efforts are working. By looking at metrics like engagement rates, reach, and customer feedback, brands can adjust their strategies to better meet customer needs (Peters et al., 2013). Understanding how SMM elements affect customer engagement is important for building a strong, loyal brand.

1.Relationship Between Entertainment And Customer Brand Engagement

The connection between social media marketing (SMM) entertainment and customer brand engagement (CBE) has become a popular topic in recent studies. Entertainment in social media content is key to attracting consumer interest and encouraging engagement. When brands create fun and entertaining content, it draws more viewers and prompts them to like, share, and comment, which boosts overall customer engagement (Dessart, 2017). Content like funny posts, engaging videos, and interactive quizzes creates positive emotions, making people more likely to interact with the brand. This type of content often goes viral, increasing the brand's visibility and reach on social media (Tsai & Men, 2017). Entertainment in SMM also helps build a strong emotional connection with the audience, which is important for long-term brand loyalty and advocacy (VanMeter et al., 2018). Recent studies show that entertaining content in SMM has a big impact on how consumers feel about a brand and how engaged they are. Tafesse and Wien (2018) found that entertaining social media content encourages consumer behaviors like discussing the brand and sharing posts. Research by De Vries, Gensler, and Leeflang (2017) shows that entertaining posts lead to higher engagement compared to content that is only informational or promotional. Overall, entertainment in social media marketing plays a key role in increasing customer brand engagement. By creating fun, engaging content, brands can build stronger connections with their audience, leading to more loyalty and positive word-of-mouth. So, it is argued that:

H1: There is a relationship between entertainment and customer brand engagement

2.Relationship Between Customization And Customer Brand Engagement

The link between customization in social media marketing (SMM) and customer brand engagement (CBE) is becoming more important for improving customer interactions and loyalty. Customization means tailoring

content and marketing efforts to fit individual preferences, creating a more personal experience for consumers. This personalized approach boosts engagement because it makes content feel more relevant and meaningful to the audience (Thomas, 2021). Examples of customized SMM include personalized recommendations, targeted ads, and addressing customers by name in messages. These personal touches make consumers feel valued and understood, leading to higher engagement and stronger emotional connections with the brand (Nunan, Sibai, Schivinski, & Christodoulides, 2018). Studies show that personalized marketing on social media leads to more likes, shares, comments, and even brand advocacy (Malthouse & Li, 2017). Customization also helps brands meet the specific needs and preferences of different customer groups, improving the overall customer experience. A study by Barreda, Bilgihan, Nusair, and Okumus (2020) found that personalized social media interactions increase customer satisfaction and loyalty, which leads to higher brand engagement. Customization helps create more relevant and interesting content, which is essential for keeping consumers engaged in a competitive digital space (Tafesse, 2020). By offering personalized experiences, brands can build stronger connections with their audience, leading to greater engagement, loyalty, and advocacy. Therefore, it is stated that:

H1: There is a relationship between customization and customer brand engagement

3.Relationship between Interaction and Customer Brand Engagement

The connection between interaction in social media marketing (SMM) and customer brand engagement (CBE) is very important, as interactive features on social media greatly boost consumer engagement. Interaction means two-way communication between brands and consumers. This includes responding to comments, joining conversations, and encouraging user participation through polls, contests, and live sessions. This back-and-forth communication helps create a sense of community and belonging, which is key to deeper brand engagement (Bolton et al., 2018). Interactive social media marketing helps brands build relationships with their audience by giving quick responses and having meaningful conversations. This type of interaction increases trust and loyalty because consumers feel heard and valued by the brand (Men & Tsai, 2016). For example, studies show that when brands respond to customer questions and feedback on social media, it improves customer satisfaction and increases engagement, like more likes, shares, and comments (Hudson et al., 2016).

Interactive content, such as quizzes, surveys, and user-generated content campaigns, encourages users to take part actively. This not only keeps the audience engaged but also gives brands useful insights into consumer preferences and behaviors, helping them adjust their marketing strategies (Ashley & Tuten, 2015). Dessart (2017) found that interactive social media practices

are linked to higher consumer engagement and brand loyalty. Recent studies also highlight the importance of interaction in SMM. Voorveld et al. (2018) found that interactive brand communications on social media improve how consumers view a brand's authenticity and trustworthiness, both of which drive engagement. Another study by Hollebeek, Glynn, and Brodie (2021) showed that interactive marketing strategies are crucial for creating immersive brand experiences that hold consumer interest. By encouraging two-way communication and offering ways for users to participate, brands can build stronger relationships with their audience, leading to more loyalty, satisfaction, and advocacy. So, it is contented that:

H1: There is a relationship between interaction and customer brand engagement

4.Relationship Between Electronic Word-of -Mouth (EWOM) And Customer Brand Engagement

EWOM plays a crucial role in shaping customer brand engagement by enhancing trust and credibility. When consumers read reviews, testimonials, or user-generated content, they are more likely to trust the information as it comes from peers rather than the brand itself (Cheung & Thadani, 2012). Positive EWOM can significantly boost brand engagement by encouraging consumers to interact with the brand, share their experiences, and become brand advocates (Erkan & Evans, 2016). On the other hand, negative EWOM can also drive engagement, albeit through crisis management and brand response strategies that seek to address and resolve customer concerns (Van Noort & Willemsen, 2012). Research indicates that EWOM affects various dimensions of customer engagement, including cognitive, emotional, and behavioral engagement. Cognitive engagement is influenced by the information and knowledge shared through EWOM, which helps consumers make informed decisions (Dessart, Veloutsou, & Morgan-Thomas, 2015). Emotional engagement is fostered when consumers feel a connection to the brand through positive reviews and shared experiences (Hollebeek, Glynn, & Brodie, 2014). Behavioral engagement is evident when consumers take action based on EWOM, such as making a purchase, recommending the brand to others, or actively participating in brand communities (Islam & Rahman, 2016).

Recent studies have further underscored the impact of EWOM on customer brand engagement. According to Kim, Sung, and Kang (2014), the quality and credibility of EWOM significantly influence consumer engagement behaviors, such as sharing content and participating in brand-related discussions. Additionally, research by Wang, Yu, and Wei (2012) found that EWOM not only enhances consumer trust but also positively impacts their engagement intentions and loyalty. EWOM is a pivotal factor in driving customer brand engagement. By fostering trust, providing valuable information, and creating emotional connections, EWOM encourages consumers to interact with brands more deeply and frequently, ultimately leading

to increased loyalty and advocacy. So it is stated that:

H1: There is a relationship between electronic word of mouth (EVOM) and customer brand engagement

5.Relationship Between Trendiness And Customer Brand Engagement

Trendiness refers to the ability of brands to stay current with the latest trends, incorporating popular culture, and timely topics into their social media content. This approach resonates well with consumers, particularly younger demographics, who are more likely to engage with content that feels fresh and relevant (Godey et al., 2016). When brands leverage trending topics, memes, and viral content, they tap into the existing online conversations, making their presence felt in a more immediate and impactful way (de Vries, Gensler, & Leeflang, 2017). This not only attracts attention but also encourages consumers to participate in the dialogue, sharing and commenting on posts that reflect current trends. Recent studies indicate that incorporating trendiness in social media strategies can lead to higher levels of engagement. A study by Schivinski and Dabrowski (2016) found that trendiness significantly impacts consumer attitudes and engagement behaviors, such as liking, sharing, and commenting on brand posts. Moreover, research by Balakrishnan, Dahnil, and Yi (2014) suggests that brands that successfully integrate trendy content into their social media marketing see higher interaction rates and increased consumer loyalty.

Consumers are more likely to engage with brands that they perceive as leaders in adopting new trends and technologies (Hollebeek, Srivastava, & Chen, 2019). This engagement is not only limited to social media interactions but can also translate into offline behaviors, such as increased brand consideration and purchase intentions. Trendiness in social media marketing plays a pivotal role in enhancing customer brand engagement. By staying current with trends and incorporating them into their content strategies, brands can capture consumer interest, encourage active participation, and foster stronger emotional connections with their audience. So, it is hypothesised that:

H1: There is a relationship between trendiness and customer brand engagement

II.METHODOLOGY

1.Sampling

This study used a Non-Probability Sampling method, specifically convenience sampling. Online survey was created and shared using Google Forms to collect responses. The data was gathered from people aged 20 to 35 who use social media. Around 200 customers of the Good Vibes brand were contacted for responses during April and May 2024. Out of these, 129 people responded to the survey. In the end, the study used 100 responses from participants who completed all the questions.

2.Data Collection

Data was collected using a survey questionnaire with 25 questions adapted from

Fornell-Larcker (1981). The questionnaire used a 5-point Likert scale, asking respondents to rate their agreement from "Strongly Agree" to "Strongly Disagree." Tests for validity and reliability were used to check the strength and consistency of the questions, helping to ensure accurate analysis and meaningful results.

III.STRUCTURAL EQUATION MODELAND HYPOTHESES TESTING

Structural Equation Modeling (SEM) was used to understand how different factors are connected in the study. SEM helps identify cause-and-effect relationships between these factors by combining data and assumptions. It has two main parts: one looks at how hidden (latent) variables relate to each other, and the other checks how the variables are measured. Warp PLS 8.0 software was used for the analysis, which uses Partial Least Squares (PLS) regression. It gives us results like path coefficients, which show the strength of the relationships, and weights, which highlight how important each measurement is.

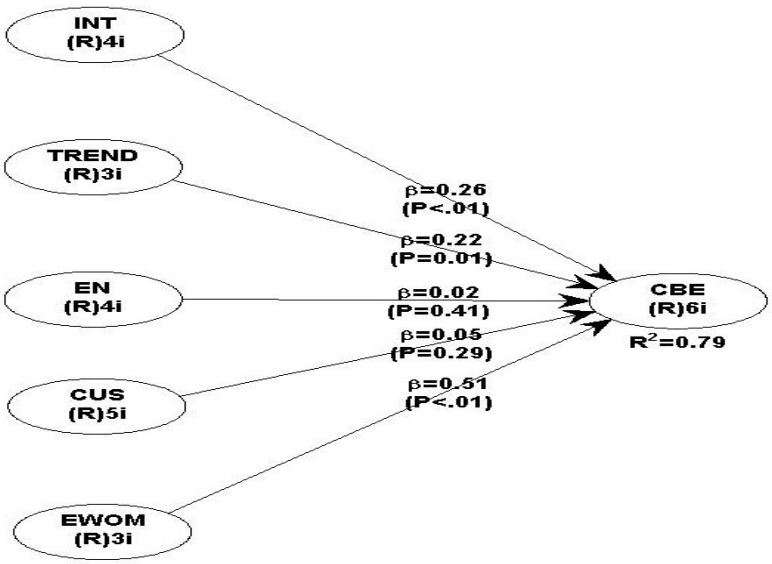

Figure 1: Structural Model Showing Path Coefficients and Significance Level

Table 1: Assessment of Latent Variables' Quality

Measures	Criteria						
	Range	**EN**	**CUS**	**INT**	**EWOM**	**TREND**	**CBE**
R^2	Large effect ≥0.35						0.792
Adjusted R^2	Large effect ≥0.35						0.781
Composite reliability	Greater than 0.70	0.862	0.873	0.883	0.864	0.850	0.926
Cronbach alpha	Greater than 0.70	0.785	0.816	0.822	0.764	0.734	0.903
Average variance extracted	Greater than 0.50	0.612	0.580	0.653	0.679	0.654	0.677
Full collinearity VIF	Less than 3.3	2.939	3.708	3.413	3.009	2.618	3.409
Q-squared	Greater than 0						0.711
Skewness	Range from -2 to +2	-0.030	-0.134	-0.143	-0.041	-0.039	0.155
Kurtosis	Range from -7 to +7	-0.207	-0.177	-0.143	-0.041	-0.039	0.155
INT- Interaction, TREND – Trendiness, EN- Entertainment, CUS – Customization, EWOM – Electronic word of Mouth, CBE – Customer brand engagement							

Source: Primary Data

The assessment of latent variables in the table shows that the model fits the data well. The R-squared value for the endogenous variable is 0.792, which is above the moderate threshold set by Cohen (1988) for regression models (small = 0.02, moderate = 0.15, large = 0.35). This is also supported by the recommendations of Hair et al. (2014) and Wong (2013). This means that about 79-80% of the variance in the endogenous latent variable (Customer Brand Engagement, or CBE) is explained by the exogenous variables in the model, as shown in Figure 1. The internal reliability of the model is confirmed by composite reliability and Cronbach's alpha values, both of which are above the standard cutoff of 0.7. The predictive relevance (Q^2) of the model is also strong, with a value of 0.711 for CBE, which is above zero. This indicates that the exogenous variables accurately predict the endogenous variables (Hair et al., 2014; Kock, 2015; Sarstedt et al., 2014).

Convergent validity is confirmed, as the average variance extracted (AVE) for the latent variables exceeds the minimum acceptable value of 0.5. Additionally, the full collinearity variance inflation factor (VIF) for the latent variables is below 3.3, suggesting there is no common method bias or collinearity issues in the model (Kock, 2015; 2019). The normality is also acceptable, as skewness and kurtosis values fall within the recommended ranges of -2 to +2 and -7 to +7, respectively (Brown, 2006; Kline, 2016). Therefore, the measurement model is considered suitable for further analysis.

Table 2: Model Fit Indices

Model Quality Assessment		
Parameters (Average)	**Results**	**Significance/ expected**
Average path coefficient (APC)	0.213	P=0.007
Average R-squared (ARS)	0.792	P<0.001
Average adjusted R-squared (AARS)	0.781	P<0.001
Average block VIF (AVIF)	2.999	acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)	3.182	acceptable if <= 5, ideally <= 3.3
Tenenhaus GoF (GoF)	0.714	small >= 0.1, medium >= 0.25, large >= 0.36
Sympson's paradox ratio (SPR)	1.000	acceptable if >= 0.7, ideally = 1

Source: Primary Data

In addition to evaluating the latent variables, the model fit parameters indicated that the path model was adequate. The R^2 values were moderate to large and statistically significant. The average path coefficients were significant at $p < 0.05$, confirming strong relationships between variables. Variance inflation factors (VIF) were all below the baseline threshold of 3.3, indicating nominal multicollinearity issues. Reflective indicators showed loadings of 1.000, and formative indicators had loadings greater than 0.7, confirming convergent validity. The model's goodness of fit (GoF) was high, with a value of 0.714. Discriminant validity was also confirmed, as the loadings of the latent variables were higher than those of adjacent variables (Kock, 2015; Sarstedt et al., 2014).

Table 3: Path Analysis of Structural Model

Path	β Value	SE	p-value	effect size (f^2)	Hypothesis
EN→CBE	0.022	0.099	0.412	0.013	Not Supported
CUS→CBE	0.054	0.099	0.293	0.033	Not Supported
INT→CBE	0.258	0.093	0.003	0.185	Supported
EWOM→CBE	0.513	0.087	<0.001	0.409	Supported
TREND→CBE	0.216	0.094	0.012	0.152	Supported

Source: Primary Data

The path analysis of the structural model (figure 1) using a linear composite-based partial least squares algorithm showed that statistical significance existed across three hypothesized paths: EWOM positively predict CBE with the largest effect (β=0.513 p <0.001, effect size $f2$=0.409). INT and TREND also positively predicted CBE with reasonable large effects (β=0.258. p =0.003, effect size $f2$=0.185 and β=0.216. p = 0.012, effect size $f2$=0.152). The relationship of EN and CUS on CBE were found to be not significant in the study.

1V.DISCUSSION

The connection between interaction and customer brand engagement in social media marketing shows how important it is for brands to communicate actively with their audience. When brands encourage interaction

through comments, direct messages, polls, and live sessions, they create a sense of community and build a stronger connection with their followers. This leads to higher customer engagement, as followers feel valued and are more likely to share content, join discussions, and support the brand. For marketers, this means that investing in strategies to increase interaction is key to building better relationships with customers. Interactive content grabs attention and encourages meaningful engagement, which helps build brand loyalty and trust. By creating an interactive environment, brands can improve their visibility, encourage user-generated content, and drive sales and growth. In short, interaction is a crucial driver of customer brand engagement and an essential part of successful social media marketing.

The positive relationship between trendiness and customer brand engagement in social media marketing shows how important it is for brands to stay up-to-date with popular trends. When brands align their content with current trends, like viral challenges, trending hashtags, or cultural moments, they grab the audience's attention and connect better with their target market. Trendy content is more likely to be shared, liked, and commented on, which leads to more engagement and visibility. This means that adding trendiness to their social media strategy is key for brands to stay relevant and appealing. By focusing on what's popular, brands can create excitement around their products, encouraging more active participation from their audience. This engagement boosts brand awareness and helps build a stronger connection with customers, who see the brand as dynamic and in tune with their interests. So, embracing trendiness is a powerful way to increase customer brand engagement and stay competitive in the digital world.

The relationship between electronic word of mouth (eWOM) and customer brand engagement in social media marketing shows the strong influence of online customer reviews and recommendations. When customers share their positive experiences with a brand through posts, comments, and reviews, it has a big impact on their followers and peers. This kind of user-generated content builds trust and credibility, as people tend to trust real customer recommendations more than traditional ads. This shows that encouraging and using eWOM is important for boosting customer brand engagement. Brands can do this by providing great products and services, interacting with customers, and encouraging happy customers to share their experiences online. By promoting positive eWOM, brands can reach more people, attract new customers, and create a loyal group of brand supporters. In short, eWOM is a key tool for increasing engagement, as it boosts the brand's visibility and strengthens its reputation and trustworthiness.

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DISRUPTIVE TECHNOLOGIES FOR 5G AND BEYOND WIRELESS COMMUNICATION

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ABSTRACT

The research and development in the field of wireless communication throughout these decades has evolved from 1G to 5G and beyond. In the field of wireless communication, the advancements in research are not easily reflected in industry standards. This paper presents some of the disruptive technologies that are in the initial phase of standardisation and also under research for implementation in future generations of wireless communication. The technologies presented in this paper are massive MIMO, THz Communication, OTFS and IRS. Massive MIMO (Multiple Input Multiple Output) is one of the promising technologies that has emerged along with 4G. Though massive MIMO is in its implementation phase, many significant research works are being carried out which can further improve the performance adaptable to the future generations. THz (Tera Hertz) communication is another technology that can revolutionise 6G. As the applications and users increase day by day, existing technologies fail to meet the requirements. It is a common scenario that in high speed train, mobile communication networks face severe disturbances. OTFS (Orthogonal Time Frequency Space) is a recently evolved technique which can overcome the challenges faced in high speed environments. The accessibility and coverage of wireless networks greatly depend on the type of environment. IRS (Intelligent Reflecting Surface) has emerged as a remarkable solution where direct accessibility is blocked by buildings or some other obstructions. Though these technologies are prominent from the research analysis, the widespread application of these in industry standards and marketing will be progressive and highly competitive.

Keywords*: Disruptive Practices, Multiple Input Multiple Output, 5G, Communication, Intelligent Reflecting Surface.*

I.INTRODUCTION

The wireless communication is one of the major industry where technology boom is not only a visualization. Its benefits are experienced by people from all sections of society, though the level of application varies. Considering the technology development in wireless communication, undoubtedly it can be mentioned that the generations have evolved at a faster pace than the human generations have evolved.

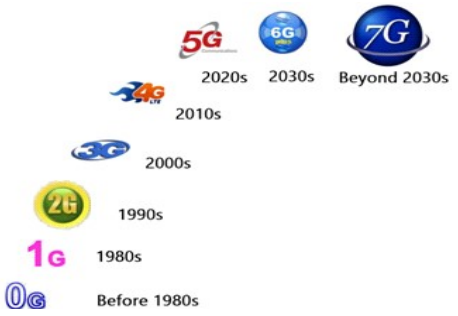

Figure 1: Evolution of Wireless Communication over Generations

Figure 1 shows the evolution from 0G to 5G and the future of wireless communication networks in the coming years. However, when we analyse the evolution of wireless communication, we can observe a gap between the research and real-world implementation of the technology. It is worth to note that the recent research works talk about even 7G, while the implementation phase is still named as '5G and beyond'. Since wireless communication has its application globally, the industry has to carefully follow standard protocols before implementation and marketing. These protocols are standardised by a committee formed by experts from research, industry, academia, marketing and so on. There are numerous technologies developed by the research groups in the area of wireless communication worldwide.

In Figure 2, the technology advancements in the field of wireless communication while 1G to 6G has evolved. This paper presents a few disruptive technologies significant for future wireless communication networks, which are in various phase of implementation and research. Without focussing on the technical details, the paper gives an overview of the industry and market trends of these technologies.

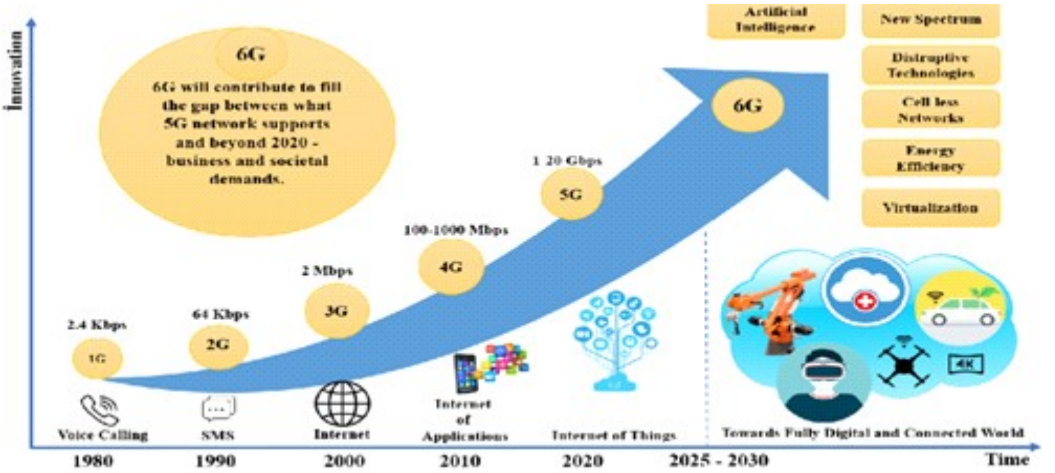

Figure 2: Technology Development Over 1G to 6 G Wireless Communication Networks

Outline: Section II describes about Massive MIMO technique, while Section III presents the concept of Tera Hertz communication. Section IV and V explains the OTFS modulation and IRS technology respectively. Section VI concludes the paper.

II.MASSIVE MIMO

Figure 3: Massive MIMO Structure and Application

Massive MIMO is a physical implementation of antenna system where we have Multiple Input Multiple Output (MIMO) system. To be more specific massive MIMO refers to an antenna system where there are hundreds and thousands of antennas in a system. Figure 3 shows a representative model of implementation of massive MIMO. The research analysis for massive MIMO were started from the times of 4G onwards and the initial stage of physical implementation has started in 5G. The major advantage of massive MIMO is summarized as it can handle the needs of large number of users thereby more effectively utilizing the available spectrum.

2.Global Massive MIMO Market

Figure 4 shows the global market trends of the massive MIMO technology. The intense research and the promising results made it a strong competitor among the various technologies acceptable for the standardization of 5G. This also motivated the telecom industry to invest in this technology. The report showed in Figure 4 shows the significance of massive MIMO in 5G and beyond wireless communication networks.

Figure 4: Global Massive MIMO Market

1.Massive MIMO Market Concentration

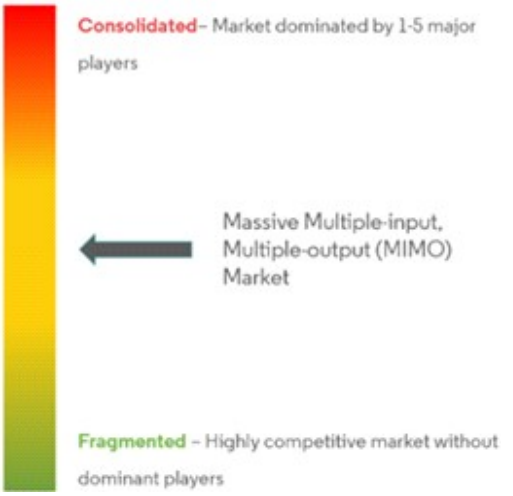

Figure 5: Massive MIMO Market Concentration

Figure 5 gives an overall idea of massive MIMO market concentration. It is observed that the market of massive MIMO is dominated by almost five of the major companies which are listed below.

- Samsung Group
- Ericsson
- Huawei Technologies
- Nokia
- ZTE

Since massive MIMO is in the initial phase of implementation, the top investors are the global telecom giants. If we further analyse from the consolidated market to fragmented market, the competitors in this field are not limited to these major companies. The

acceptance of massive MIMO in the 5G standards, many subsidiary and start-up companies also had the conviction to invest in this technology.

III.TERA HERTZ(THZ) COMMUNICATION

Tera Hertz (THz) communication is a recent technology which is in the research phase. The researchers and experts in this area mention this technology as the one which shapes the future of wireless communication. As the name indicates, THz communication refers to the technology in higher frequency band of operation. Figure 6 highlights the frequency band spectrum for THz communication. It is worth noting that the higher frequency band of operation has remarkable advantages, at the same time it has to face a lot of challenges when it comes to implementation phase.

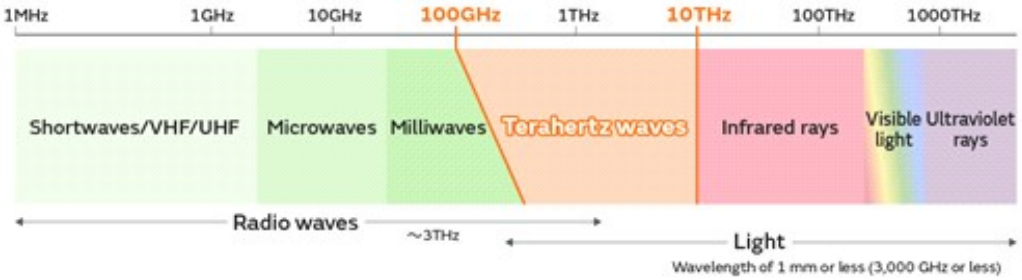

Figure 6: Frequency Band of THz Communication

Figure 7 shows the variety of applications of THz communication once this technology is implemented in the wireless communication standards. This indicates why THz technology can revolutionize the field of future wireless communication. The notable features of THz communication are ultra-high speed data rate, bandwidth, security and efficiency

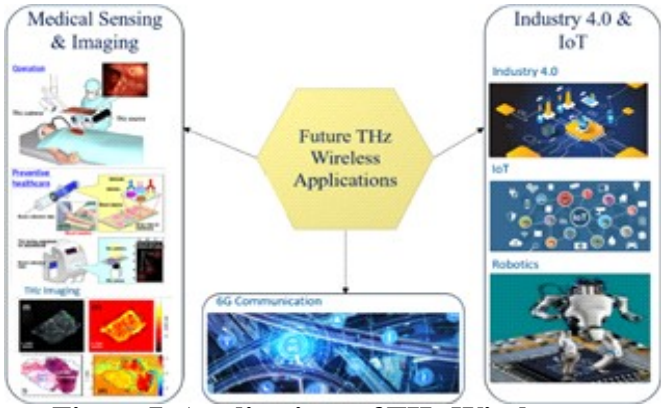

Figure 7: Applications of THz Wireless Communication

1.Tera Hertz Technology Market

Figure 8: Tera Hertz Technology Market Trends

Figure 8 presents the market trend of THz technology in the future. Since this technology is still in the research phase, the implementation of the same is under discussions and debates. The demand of this technology in the medical and pharmaceutical fields is mainly because it is harmless for living organisms. Hence it is widely promoted in the field of non-destructive testing methods.

2. THz Communication Leading Market Players

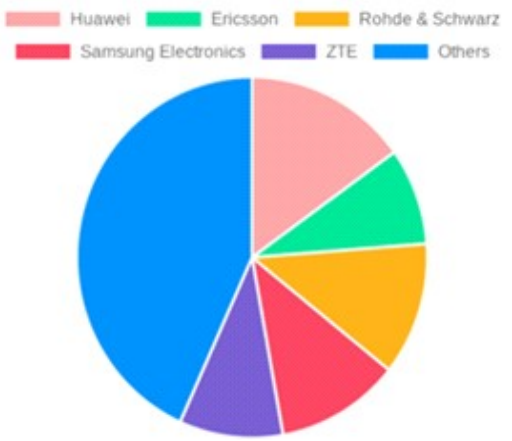

Figure 9: Leading Market Players in THz Technology

The industry forces competing for the dominance in THz communication technology are shown in Figure 9. It can be observed that more than 50% of the market is dominated by the leading telecom companies. The remaining market share is controlled by a number of industries which are spread globally. A few among those companies are listed in Figure 10. It is worth noting that the promising results from the wide research in this area motivates more secondary companies to take up the challenge in implementing THz communication.

Figure 10: Secondary Market Holders of THz Technology

III OTFS:

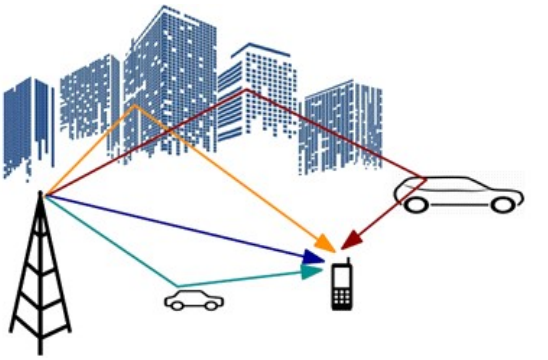

Figure 11: A Random Wireless Environment

We know that the environment in which wireless communication happens is random in nature. Figure 11 presents a random wireless communication environment which has different obstructions in between. It is a very common scenario that the user will be in motion. It can be as slow as in a traffic block or as fast as in a high speed train. The communication happening in these type of environments are called V2X communication. It is a real-time problem faced by the mobile users to face distractions while moving in high speed environments. OTFS (Orthogonal Time Frequency Space) has emerged as a solution to this problem, where the static user and a high-velocity user can be equally served.

Figure 12 shows a particular scenario where OTFS is applicable successfully. In same environment we can observe that at time $t=t_0$ and at $t=t_0+\Delta$ the signal is received from various directions, depending on the location of moving vehicles. OTFS helps to virtually create an environment which seems to be static even when it is a V2X environment. Hence the users are not affected by the change in environment.

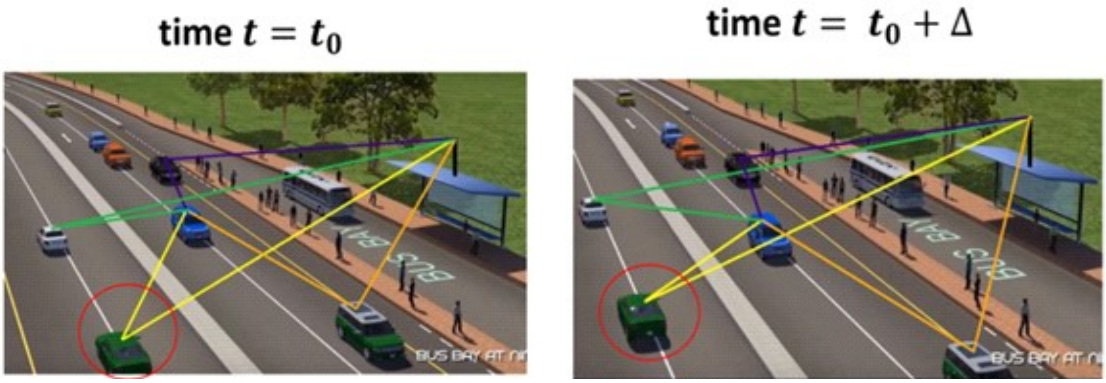

Figure 12: A Changing Wireless Communication Environment Where OTFS is Beneficial

OTFS is first introduced by Cohere Technologies, which is a company not named as telecom giant. OTFS is still in the initial research phase. Research and development wing of major telecom companies are focusing on the practical realization and challenges that can be faced for the implementation of OTFS. One of the major attractions of OTFS is that it is compatible with the existing OFDM system, making it a promising technique to be implemented in 5G and beyond wireless communication standards.

3.IRS

Consider scenario shown in Figure 13. It is very natural to get the signals blocked between users, either partially or fully. This can happen in any situations irrespective of whether the user is static or in motion. This depends on the physical surroundings in which the user is present.

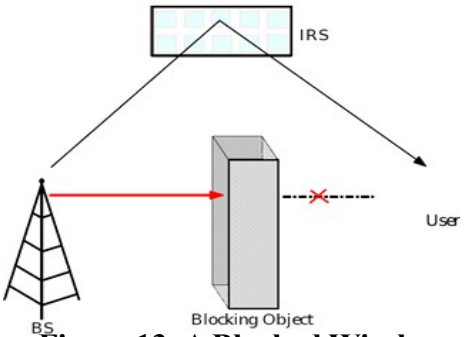

Figure 13: A Blocked Wireless Environment

IRS (Intelligent Reflecting Surface) is a recently emerged area of research in which the users can overcome this challenge. As the name indicates, this will help to reflect the signals intelligently so as to reach the user bypassing the blocks in the path. IRS is a reflecting surface which can be mounted on walls and buildings where there is signal blocking. We can control the reflection direction remotely, which makes it possible to overcome the block.

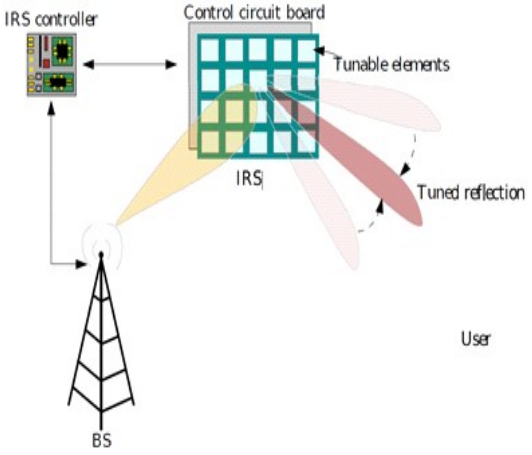

Figure 14: Application of IRS

Figure 14 signifies the advantage of IRS system. It can be observed that we can tune the reflections in such a way that the signal is received by the user. IRS is a very recent topic among the researchers in the field of

wireless communication. The simulation and theoretical results are remarkable to mention that IRS is going to be a solution for "no network coverage" experience of users in the future.

IV. CONCLUSION: RESEARCH AND INDUSTRY GAP IN WIRELESS COMMUNICATION

This paper presents an overview of the emerging and disruptive technologies for 5G and beyond wireless communication. The paper discussed on the major technologies which are in the phase of implementation and also under research. In the field of wireless communication there always exists a time gap between the research and industry. The research is going on in a relatively faster pace than the industrial implementation. That is why researchers speak about 7G and the global wireless industry is still in 5G in implementation phase. The major reason for this time gap is that a wireless environment can never be created exactly as it is in labs for testing. Research is carried out in lab settings which resembles the physical environment. These test beds are very costly to implement. Hence whether the research results are apt for the physical wireless environment can be decided only after these are taken up by industries for testing purpose. Until then the technologies developed from the research field are not approved for the standard wireless communication protocols.

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ARTIFICIAL INTELLIGENCE INFLUENCED CONSTRUCTIVE DISRUPTION IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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ABSTRACT

Disrupting existing markets and creating entirely new markets will disrupt logistics and supply chain industry sectors. Increasing complexity & disruptions in Logistics & Supply Chain Management (LSCM) demand greater agility, responsiveness, visibility and control. Integrating Artificial Intelligence (AI), data analytics and other digital technologies in LSCM helps meeting them. AI in LSCM enhances demand forecasting, inventory management, manufacturing, logistics and generative processes. Any stage of a supply chain may face volatile conditions and breakability anywhere in a supply chain may disrupt a business relying on it when markets fluctuate. AI in various aspects of supply chain offers immense disruptive potential with the promise of improved efficiency, reduced costs and increased customer satisfaction. AI in LSCM presents technical challenges, data quality, privacy & security challenges, cost considerations, change management challenges and ethical concerns that must be addressed to maximize its benefits. Some LSCM companies may not be able to cope up with digital transformation into AI implementation. Data availability, model integration & training, understanding the computation, adaptability and scalability are some challenges companies face when infusing Generative AI into their supply chain operations. If these challenges are addressed well, LSCM will benefit higher order of operational efficiency. However, overall impact of AI on supply chain industry sectors is set to be transformative in the coming years.To stay competitive, organizations must keep on exploring new AI-driven innovations, while staying ahead of advancements in robots, drone logistics, autonomous vehicles and block chain technology that promise SCM to transform further.

Keywords*: Logistics & Supply Chain Management, Demand Forecasting, Artificial Intelligence.*

I.INTRODUCTION

Businesses are moving toward a better readiness, agile and responsive approach to handle complexities, disruptions and uncertainties. This shift moves the focus on improving risk management, flexibility and competitiveness. Secondary operations, unexpected off-times, movements in customer / supplier connects, resources shortage and disruptive events can result in businesses. Businesses depending on out-

dated methods cannot get the insights to respond constructively. Global enterprise is in a scramble for digital readiness, leading all sectors in machine learning deployment. Integrating Artificial Intelligence (AI), data analytics and digital technologies help businesses enhance their readiness and responsiveness.

1.Logistics & Supply Chain Management (LSCM) Today

Disrupting existing markets and creating entirely new markets disrupt logistics and supply chain industry sectors. The stages of supply chain face volatile conditions and instability in supply chain disrupts businesses relying on it when markets fluctuate. Increasing complexity & disruptions in LSCM demand greater agility, responsiveness, visibility and control. Traditional LSCM practices had been focusing on efficiency & cost reduction that are not appropriate in current business environment. LSCM gets transformed by the need for improved readiness, prominence and flexibility.

2.AI in LSCM

AI in LSCM is expected to reach $23 Billion in 2030 from $3.5 Billion in 2023, at a Compound Annual Growth Rate (CAGR) of 30%. If the challenges in LSCM are dealt with AI, LSCM will benefit by operational efficiency & thoughtful decision-making and travel from computation to computational thinking for numerous industries. AI in LSCM enhances demand forecasting, inventory management, manufacturing, logistics and generative processes as below.

a.Demand Forecasting: Accurate demand forecasting is needed for planning raw material purchases, production schedules and distribution. AI offers better solutions through enhanced demand forecasting capabilities. AI analyses customer purchase history, seasonality, demand fluctuations, weather patterns, economic trends & consumer behaviour and provides accurate predictions.

b.Inventory Management: AI optimizes inventory management by analysing relevant data to determine optimal levels of raw materials and finished goods needed at various locations & times and reduces waste. AI helps acquire raw materials, schedule production and distribute finished products. It aligns inventory management with demand forecasts. It enables organizations to optimize inventory levels and reduce waste.

c.Manufacturing: AI manages complex data inputs and improves Manufacturing Resources Planning (MRP) processes. Organizations can anticipate production needs and optimize manufacturing schedules better.

d.Logistics: AI performs extensive data analysis to manage logistics networks, fleets of trucks & ships and warehouses. AI optimizes routes, reduces transportation costs and improves delivery times.

e.Generative Processes: AI generates new data and content through Generative AI. Generative AI tools create new products and identify new vendors & Bills of Materials (BoMs). Generative AI automates the tasks, saves time and reduces errors.

Walmart's AI systems predict demand more accurately and optimize inventory levels, reducing stock-outs and overstock situations, resulting cost savings and improved customer satisfaction. DHL's AI powered route optimization algorithms analyse traffic patterns, weather conditions and delivery schedules to determine most efficient routes for its delivery vehicles, resulting reduced

delivery times, lower fuel consumption and smaller carbon footprint. Siemens's AI algorithms analyse data from production lines to identify inefficiencies and recommend improvements, achieving higher production yields, reduced waste and improved product quality.

II.OTHER DIGITAL TECHNOLOGIES WITH AI IN LSCM

1.Internet of Things

(IoT) with AI: IoT devices collect real-time data from various points of supply chain and from manufacturing equipment to delivery trucks. AI analyses these data to provide insights and make real-time adjustments to operations.

2.Block Chain Technology with AI

Block chain provides secured & transparent transaction data of a supply chain. AI analyses these data and optimizes supply chain processes to ensure compliance with regulatory requirements.

3.Robotics with AI

Robots equipped with AI capabilities perform complex tasks with high precision and efficiency. They manage inventory, pick & pack orders and handle shipping logistics.

4.Data Analytics with AI

AI improves data analytics, demand prediction, capacity estimation and network analysis. AI and data analytics across supply chains address challenges in demand forecasting, supplier risk management and route optimization.

5. Drone Logistics with AI

AI powered drones perform route planning, resource allocation & surveillance and improve safety navigation & delivery speed.

6.Computer Vision

Computer vision improves inventory management by tracking inventory levels; improves quality control by detecting real-time discrepancies & inspecting products for defects; improves warehouse automation by guiding robots & autonomous vehicles in warehouses and inspects works to reduce recalls, returns & rework thus improving efficiency and reducing labour costs. Computer vision in supply chain infrastructure, racks, vehicles & drones tabulates goods in real time and monitors warehouse storage capacity. It verifies whether the workers follow company safety protocols and occupational health administration standards. It ensures only high-quality products are shipped to customers.

7.Natural Language Planning (NLP)

NLP in supply chain improves order management by efficiently processing customer orders, responding to inquiries & providing personalized customer service; improves supply chain communication among supply chain stakeholders and improves data analysis & predictive maintenance. It predicts trends, helping organizations make informed decisions.

8.Machine Learning

Machine learning delivers exceptional value to supply chain and logistics operations. Machine learning applications in supply chain range from demand forecasting to shipping route optimization. It improves price planning, predictive analytics, demand forecasting, route optimization, fuel consumption & quality control and reduces process bottlenecks. It enhances timely delivery by optimising

shipping routes, cargo loads and warehouse operations. Implementing machine learning in LSCM can turn data into tools that help make distribution networks more agile, resilient and transparent. Investing in machine learning for LSCM puts enterprises in the strongest position to meet opportunity with preparedness. Benefits of machine learning in LSCM are inventory management, distribution node planning, shipping optimization and returns & reverse logistics.

Uber Freight uses machine learning to

i. ensure that carriers receive guaranteed pricing for trucking & freight and

ii. address vehicle routing, determining the most efficient route for a vehicle to deliver goods to locations.

Incorporating AI in supply chain design improves transparency & planning, minimises losses and identifies opportunities. As a whole, the benefits would be increased efficiency, reduced costs and improved operational reliability. Despite the benefits, implementing AI in LSCM comes with challenges. They must be thoughtfully addressed to maximize the benefits.

III.DISRUPTIONS IN IMPLEMENTING AI IN LSCM

Infusing AI into LSCM can be expensive and difficult. Training costs, start-up & operational costs and complex systems data security line-up as disruptions. Cost of implementation includes technology-acquisition expenses, effects of temporary productivity disruption and labour costs of installation. Successful AI implementation in LSCM requires strategic approach, clear understanding of business goals and commitment to data accuracy & quality. Employees' resistance to change and lack of technical expertise can disrupt the adoption of AI technologies. Data quality and integration with other functional systems require reasonable investment for data management, hardware and quality control. AI in LSCM concerns on data privacy & security, ethicality, technical hitches, cost considerations and change management that must be addressed to maximize the benefits.

1.Data Privacy & Security

The LSCM companies have to implement strong cyber security measures and observe data protection regulations to safeguard information from unauthorized access or breaches.

2.Ethicality

Establishing ethical guidelines for AI use can help moderate concerns and promote trust among stakeholders, considering the impact on employment and ensuring transparency in decision-making processes. Need of AI skilled labour in LSCM makes ordinary LSCM labour go job less or job change.

3.Technical Hitches

Integrating AI in LSCM requires technical expertise that involves investing in skilled personnel & technology and ensuring better systems compatibility & flow.

4.Cost Considerations

Organizations have to do cost-benefit analysis before implementing AI in LSCM. Initial investment in AI technology and training can be expensive.

5.Change Management

Effective change management strategies are needed to enable the transformation by training employees, adjusting organizational structures and fostering a culture. Adopting

AI driven management practices lead to shift in business operational processes and culture.

When LSCM data is fed into a Generative AI system, it makes new information based on the company in which it is employed. To utilise a Generative AI system, it needs thorough training with relevant data, which can be time-consuming and intensive. Such system needs regular fine tuning, during which it can pose a challenge.

IV.TURNING DISRUPTIVE INTO CONSTRUCTIVE

Instead of thinking disruptive events as hurdles, LSCM companies must transform them into constructive stepping stones to compete in their business. People or companies involve in implementing AI in LSCM gain good profit by getting lot of business in the field. AI in LSCM identifies malfunctions & breakdowns in their early stages or predict them before they happen, limiting disruptions and associated financial losses.

SCM using machine learning's predictive capabilities helps buyers & suppliers stay resilient in front of major disruptions. AI predicts and manages frequent disruptions in supply chains like supplier delays or transportation bottlenecks. They can anticipate potential disruptions and take proactive measures to mitigate them. They empower businesses to streamline operations and adapt to disruptions. AI tools analyse large data sets and detect patterns that forecast potential disruptions.

1.AI in Freight Transportation

Disruption of autonomous vehicles in freight transportation industry remains relatively restricted due to regulatory challenges and need of technological advancements. Automation reduces labor costs and increases operational efficiency. AI in freight transportation and its disruptive potential reshapes the future of logistics. A few examples are given below.

- A US based startup, Nuro disrupts the last-mile delivery of goods.
- A warehousing solution, 6 River Systems improves warehouse productivity and efficiency.
- A cloud based software OptimoRoute, optimises delivery routes and schedules.
- A digital freight brokerage platform Loadsmart, matches carrier availability with shipper demand.
- A startup, Portcast predicts arrival times and monitors container shipments.
- An Argentina company, Treggo optimizes delivery routes and schedules.
- A robotics & AI company Kindred, develops robotic systems that automate sorting and handling of items.
- Everstream Analytics Company mitigates supply chain disruptions caused by weather events and geopolitical issues.

2 Generative AI in LSCM

If Generative AI is implemented in LSCM, following challenges must be addressed to utilize it effectively.

a.Data Availability & Quality: For successful implementation of Generative AI, businesses have to ensure their data availability, mostly primary in nature that is of high quality.

b.Understanding the Computation: The output of Generative AI system influences the supply chain decision-making that can work for or against motion. Management must understand that it is transparent and arrive at the defined outcome.

c.Adaptability: A Generative AI system must be more responsive to the changes made by

the management and adaptable to various frameworks, running with innovations and flexibility for better business value of their products.

d.Scalability: A Generative AI system must respond to expansion of business, since there is large scope in LSCM industry either it is a start-up or multi-national company.

Awareness of the risks and realistic goal setting to deliver value to business will create and sustain momentum in LSCM. To achieve the full potential of AI in LSCM, organizations must meet the disruptions and ensure that their approach takes these factors into account, open to innovation. AI in LSCM will result in cost savings in the long run. LSCM organisations should work with their AI partners to develop training programs that are constructive and affordable.

V.CONCLUSION

AI in various aspects of LSCM offers immense disruptive potential with improved efficiency, reduced costs and increased customer satisfaction as part of an Industry 5.0 approach. Based on implementation level of AI and level of disruption, industries or companies have shorter or longer time to mature and integrate into existing supply chain operations. The benefits are not guaranteed and improper implementation may cause damage to the organization. Some LSCM companies may not be able to cope up to digitally transform for AI implementation. But for that, overall impact of AI on supply chain industry is transformative in the coming years. To stay competitive, organizations must keep on exploring new AI-driven innovations, while staying ahead of advancements in robots, drone logistics, autonomous vehicles and block chain that promise SCM to transform further. Influence of such emerging technologies is called as 4th industrial revolution. Machine learning, AI and Generative AI are solving faster, more completely. LSCM companies are seeing a lot of opportunities and the exploration research is continuing.

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A STUDY ON LEAN WAREHOUSE EFFICIENCY BY IMPLEMENTING AUTOMATION WITH REFERENCE TO RETAIL OPERATIONS

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ABSTRACT

Industry 5.0, also known as the Fifth Industrial Revolution, is a new and emerging phase of industrialization that sees humans working alongside advanced technology to enhance workplace processes. This is coupled with a more human-centric focus as well as increased resilience and an improved focus on sustainability. Encompassing more than just manufacturing, this new phase builds upon the fourth industrial revolution (Industry 4.0) and is enabled by developments in I.T. that include facets such as artificial intelligence, automation, big data analytics, the Internet of Things (IoT), machine learning, robotics, smart systems, and virtualization.. In today's fast-paced business landscape, efficient warehouse management is crucial for businesses aiming to stay competitive and meet customer demands. Traditional warehousing methods often struggle to keep up with the demands of modern supply chains, leading to inefficiencies, errors, and increased operational costs. In the realm of modern logistics and supply chain management, the concept of lean warehousing has emerged as a beacon of efficiency and cost-effectiveness. Within the context of warehousing, this translates to minimizing excess inventory, reducing unnecessary movements, and optimizing storage space. The benefits of lean warehousing are manifold: improved order accuracy, reduced lead times, lowered operational costs, and enhanced customer satisfaction. However, the full potential of lean practices can only be realized when combined. With the transformative power of automation. Automation represents the next frontier in warehouse optimization, offering unprecedented levels of efficiency, accuracy, and scalability. By integrating automation technologies such as robotic systems, automated guided vehicles (AGVs), and sophisticated warehouse management software, businesses can elevate their operations to new heights. For instance, robotic picking systems can significantly increase picking speed and accuracy, while AGVs streamline material handling tasks, reducing reliance on manual labor. Furthermore, automation enables real-time monitoring and data-driven decision-making, empowering warehouse managers to proactively address inefficiencies and optimize processes. The synergy between lean warehousing and automation creates a dynamic ecosystem where waste is minimized, productivity is maximized, and customer satisfaction reaches unparalleled levels. This study investigates the efficiency improvements at Lulu Central Logistics

through the implementation of automation, specifically focusing on Automated Guided Vehicles (AGVs). The study found that AGVs substantially increased the speed and accuracy of these processes, thereby reducing labor costs and operational bottlenecks. Despite these gains, certain areas like physical verification and digital updates in WMS remained unaffected, highlighting opportunities for further automation integration.

***Keywords**: Industrial Revolution, Automated Guided Vehicles, Automated Mobile Robot Picking Systems*

I.INTRODUCTION

Despite the widespread adoption of lean principles, traditional warehouse operations continue to face challenges in meeting the evolving demands of the market. Manual handling of goods, inefficient layout designs, and limited visibility into inventory levels often result in bottlenecks, errors, and delays. To address these challenges and further optimize warehouse operations, the integration of automation technologies has become imperative. Automation not only accelerates the pace of operations but also enhances accuracy, scalability, and flexibility. By automating repetitive tasks such as picking, packing, and replenishment, organizations can reallocate human resources to more value-added activities, thereby maximizing productivity and minimizing operational costs.

II.LITERATURE REVIEW

Industry 5.0 (I5.0) is the next industrial revolution that will leverage human intervention in collaboration with intelligent, logical, and smart machines to attain even more user-preferred and resource-efficient manufacturing and supply chain solutions.

A systematic literature review methodology was conducted to understand the present knowledge connected with this theme. This study summarizes 194 research articles from the period 2009 to 2022 to understand the present knowledge connected with this theme. The research findings show a significant gap related to the adoption of I5.0 technologies to prevent or overcome supply chain disruptions. 194 articles, including journal and review articles, were identified in the literature. The study provides a novel and insightful concept related to I5.0 within the context of supply chain disruptions. The potential applications of I5.0 and Industry 4.0 are elaborately discussed in three areas, namely: (1) disruptions in supply chains due to pandemics; (2) disruptions in supply chains due to war; and (3) disruptions in supply chains due to climate change (Agarwal.et al, 2023).

Industry 5.0 initiatives are revolutionizing warehouse management and supply chain efficiency. AI-driven solutions have demonstrated significant cost savings in transportation logistics, supplier efficiency, and inventory management (Vatin et al., 2024). The adoption of Industry 5.0 technologies shows promise in addressing supply chain disruptions caused by pandemics, wars, and climate change (Agrawal et al., 2023). Logistics 5.0 emphasizes smart systems for customized distribution, transportation, and inventory management, leveraging emerging technologies to process extensive datasets for informed decision-making (Andres et al., 2024). The concept of Warehouse 5.0 integrates human-centered technologies such as UAVs, industrial robots, and AR/VR, supported by advanced 5G connectivity, to

enhance personnel training, workflow optimization, and overall warehouse management (Kosmidis et al., 2024). These advancements collectively contribute to more resilient, efficient, and sustainable supply chain operations in the Industry 5.0 era.

Towards the era of Industry 5.0 (I5.0), the globe experiences an evolving web in supply chains, supply hubs, ware-house management, lower latency deliveries, personnel assistance and improved customer experience. To meet the challenges of this reformation, companies, like BMW, Samsung, DHL, IKEA, Amazon, etc., are starting to adopt and develop new human-centered technologies including unmanned aerial vehicles (UAVs), industrial robots, augmented and virtual reality (AR/VR). Additionally, the increased use of technologies, both independently and as collaborative systems, along with the need for remote long-distance cooperative human work, has stretched the capabilities of wireless telecommunications. Kosmidis et al (2024)

Shiyam, & Gupta, M. (2024) puts forward the argument that organizations are in the process of implementing Industry 4.0. Industry 4.0 signifies the transition from embedded systems to cyber-physical systems in terms of technological advancement. With the advent of Industry 4.0, organizational processes are evolving in new ways from time to time to compete and increase profit in the market. Imprecise inventory and warehouse management lead to problems that incur costs and time. To tackle this, there is a need to re-engineer the process with the help of technological innovations. The study employs the Business Process Reengineering approach to redesign the process with Industry 4.0, aiming to gain a deeper understanding of the potential of re-engineered inventory and warehouse management. They see that incorporating Industry 4.0 technologies, such as the IoT, RFID, sensors, and AI, significantly improves inventory and warehouse management by enhancing accuracy, minimizing manual errors, and speeding up processing times in generating and approving purchase orders, quality checks, receiving and storing goods.

III.STATEMENT OF THE PROBLEM

The advent of technologies like robotics, IoT, and AI has revolutionized warehouse management, offering unprecedented opportunities for improvement. This study holds significance in exploring how these technologies can be harnessed to create leaner warehouses that are responsive to market dynamics and customer demands. Understanding the intricacies of integrating automation solutions tailored to lean principles is essential for businesses aiming to stay ahead in the race for operational excellence. Furthermore, as global supply chains become increasingly complex, the need for lean warehouses equipped with automation becomes even more pronounced to ensure swift and accurate fulfillment of orders while minimizing waste and lead times.

In addition to this, the societal impact of warehouse automation cannot be overlooked. As automation becomes more prevalent, there are concerns about its implications for the workforce. By addressing these concerns proactively and designing inclusive strategies, businesses can ensure that the transition towards lean, automated warehouses not only boosts operational efficiency but also fosters a conducive environment for sustainable growth, job creation, and employee well-being.

LULU Central logistics is situated at Emmay Logistics (India) Private Limited, located in Asokapuram, Aluva, Ernakulam district of Kerala. The warehouse, with a built-up area of about 120000 square feet, caters for the logistics and inventory needs of various

retail stores of LULU, which include LULU Mall Edappally, Kochi - Y MALL Thriprayar, Thrissur -Thriprayar warehouse - LULU Mall Trivandrum.. It is one of the warehouses with the highest traffic in Kerala, which holds up to 3 months of advance stock of supplies for various LULU retail stores like LULU hypermarket, LULU fashion store, and LULU connect.. Emmay Logistics was established on 05 July 1950 and later shifted operations to Asokapuram. LULU Mall began its operations on10 March 2013, which initiated the need for a warehouse**.** The current warehouse operation, while functional, struggles to maintain efficiency in the face of increasing order volume, rising labor costs. This inefficiency manifests in delays in order fulfillment, high error rates in picking and packing. These issues directly contradict the core principles of a lean warehouse, hindering our ability to eliminate waste and maximize value.

IV.OBJECTIVES OF THE STUDY

- To analyze the current state of warehouse operations at Lulu Central Logistics and the key performance indicators.
- To understand the potential benefits of implementing automation in Lulu Central Logistics.
- To understand the efficiency improvements by the implementation if automated guided vehicle
- To suggest improvisation in warehouse operation

V.METHODOLOGY OF THE STUDY

Firstly, it involves a comprehensive analysis of existing warehouse management processes, including inventory management, order processing, and workflow optimization. This analysis will identify inefficiencies, bottlenecks, and areas for improvement, serving as the foundation for designing and implementing automation solutions. This is then followed by understanding the impact of automation on key performance indicators (KPIs) related to warehouse operations, such as order fulfillment accuracy, cycle times and labor productivity. By conducting before-and-after comparisons, the study aims to quantify the improvements achieved through automation implementation, providing valuable insights into the tangible benefits of adopting lean warehouse practices.

1.Research Design

Explorative research is employed in this study, where the researcher observes and records the events and characteristics without manipulating the variables. The main purpose of this methodology is to provide a detailed understanding of the lean warehousing achieved through the implementation of the AGV. In this study additionally, qualitative data is collected through unstructured interviews conducted with the General Manager in charge of the warehouse operations of lulu central logistics. It helped get a clear picture of how the company was performing prior to the automation implementation and how it improved its performance post the implementation.

2.Sources of Data

- Primary data collection was done through one-on-one interview with the General Manager of the warehouse & through the process of direct observation of the warehouses
- Secondary data is collected by means of digital data of the company records provided by the company

3.Method of Data Collection

a.One-to-One Interviews: One-to-one interviews are a commonly employed data collection method in qualitative research due to their personalized approach. In this technique, the interviewer or researcher directly engages with the interviewee to gather data. The interviews can be informal and unstructured, resembling a conversation.

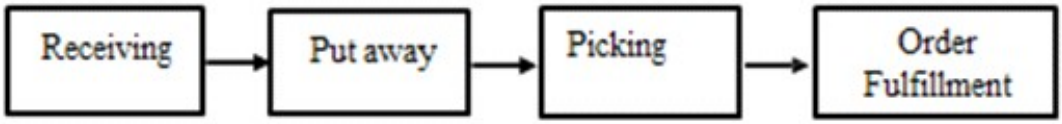
Open-ended questions are often asked spontaneously, allowing the interview to flow naturally and guide the direction of the discussion.

b.Record Keeping: Utilizing existing records and reliable sources of information, the record-keeping method involves accessing and collecting relevant data for research. This approach is comparable to visiting a library, where one can review books and reference materials to gather valuable information that can be applied to the research project. By examining and analyzing these existing records and documents, researchers can leverage the data to support their research objectives effectively.

c.Observational Method: The observational method is a qualitative data collection technique that involves the researcher immersing themselves in the research setting and closely observing the participants. During this process, the researcher carefully watches the participants, takes extensive notes, and documents their behaviors and interactions. In addition to note-taking, various documentation methods such as video recording, audio recording, and photography may also be employed to capture the research context accurately.

4.Warehouse Key Performance Indicators (KPI)

Warehouse performance key indicators for efficiency in receiving, putaway, picking and order fulfillment focus on the speed and productivity of these operations. Receiving efficiency can be measured by the time taken to process incoming shipments and the volume handled per hour. Picking efficiency is evaluated by the rate at which items are retrieved from storage, often calculated as lines picked per hour. Putaway efficiency is determined by the time taken to store items from the receiving area into their designated locations, measured as the number of items or pallets put away per hour. Order fulfillment efficiency assesses the speed of processing customer orders, gauged by the number of orders fulfilled per hour. These indicators help in identifying bottlenecks and optimizing warehouse operations for better throughput.



a.Receiving: The first stage of warehouse operations is the receiving process, which sets the foundation for subsequent processes. Efficient handling of incoming inventory is crucial. The Receiving Efficiency Key Performance Indicator (KPI) is examined in this study, focusing on assessing the productivity of the warehouse staff in the receiving section. This KPI helps identify areas for potential improvement, such as implementing training programs or enhancing procedures. A lower value for the Receiving Efficiency KPI indicates greater room for enhancements that can lead to increased overall efficiency in this crucial stage of warehouse operations. The formula used to calculate this KPI is as follows

Receiving efficiency = Volume of inventory received / Number of staff hours worked

b.Put Away: Following the receipt of products, the warehouse initiates the put away process, where each item is allocated to a designated spot carefully selected for convenient retrieval. Efficient put away operations play a vital role in ensuring a smooth picking procedure and significantly reducing lead time. Put away involves storing the delivered goods in the warehouse, typically in the most suitable practical areas.

Put away efficiency = Volume of inventory put away / Number of staff hours worked

c.Picking: Picking as a Key Performance Indicators (KPIs) focus on measuring the efficiency and productivity of the picking process in a warehouse. Key metrics include the lines picked per hour, which indicates how many individual items or SKU lines are picked by a worker in an hour, and the pick rate, which assesses the speed at which items are retrieved from storage locations.

Picking efficiency = volume of inventory picked/ Number of staff hours worked

d.Order Fulfillment: The processes involved in managing customer orders, from the moment they are received by the warehouse to the point of delivery, are commonly referred to as order management. This includes tasks such as order reception, product selection, packaging, shipping to the designated address, and handling post-sales procedures such as returns and refunds. Key metrics include the order processing time, which measures the total time taken from when an order is placed to when it is shipped. The orders per hour rate indicate how many orders are processed and fulfilled in an hour, providing a clear picture of throughput.

Order Fulfillment efficiency = Orders dispatched/ Number of staff hours worked

VI.DATA ANALYSIS

Table 1: Before & After Comparison of Warehouse Efficiency Implementing AGV in Food Category

PROCESS	ACTIVITI ES	BEFORE IMPLEMENTATI ON (kg/min*worker)	AFTER IMPLEMENTATI ON (kg/min*worker)
RECEIVING	Unloading	4	**42**
	Physical verification	22	**22**
	Uploading in WMS	125	**125**
	Uploading in sap	67	**67**
PUTAWAY	Put away in WMS	500	**500**
	Labeling	100	**100**
	Forklifting	50	**75**
	Manual Racking	12.5	
PICKING	Locating	500	**500**
	Searching	100	**150**
	Picking	9	
	uploading in WMS	100	**100**
DISPATCHI NG	Unloading	4	**42**
	Dispatching in WMS	**125**	**125**

Source: Primary Data

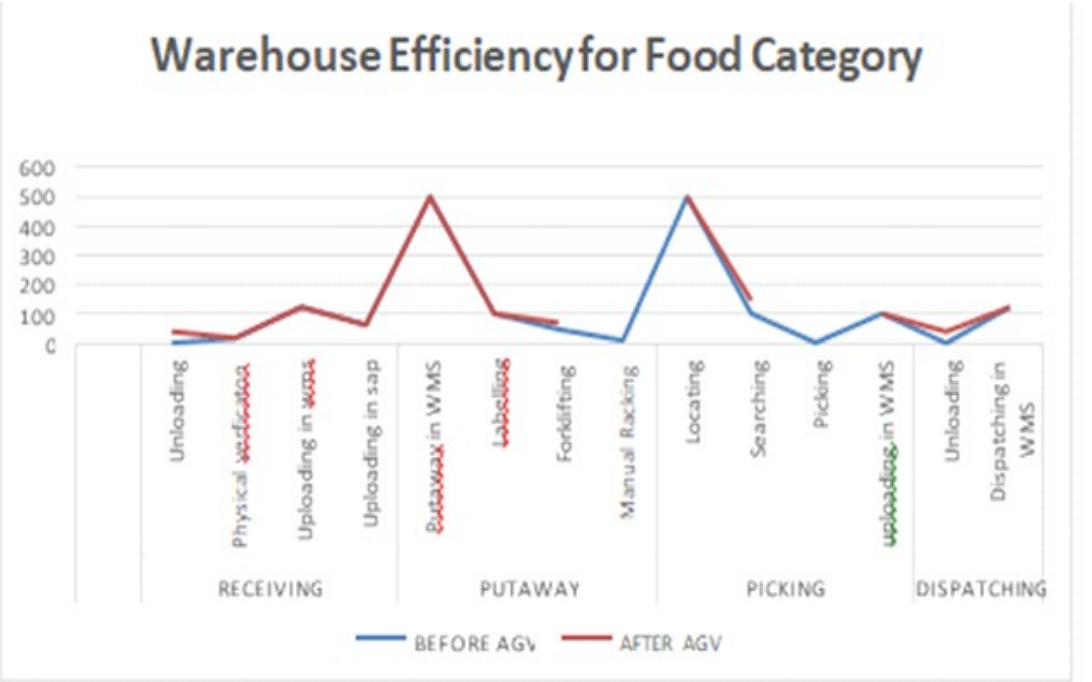


Figure 1: Warehouse Efficiency for Food Category

The graph illustrates comparison of the efficiency (in kg/min) of several processes in warehouse for food category before and after the implementation of AGV. Before implementation (shown in blue) Efficiency for unloading was 4 kg/min; physical verification was 22 kg/min; 125 kg/min for uploading in WMS; and 67 kg/min for uploading in SAP. Following automation (shown in red), efficiency significantly increased. Physical verification stayed at 22 kg/min, uploading in SAP stayed at 67 kg/min, uploading in WMS maintained constant at 125 kg/min, and unloading climbed to 42 kg/min. The unloading process showed the biggest improvement, with efficiency rising by more than ten times, the food category's put away. Process shows that productivity for "put away in WMS" and "Labeling" remained unchanged at 500 kg/minworker and 100 kg/minworker respectively before and after implementation. However, "Forklifting" improved from 50 kg/minworker to 75 kg/mineworker.Data on the food category's picking procedure with the introduction of Automated Guided Vehicles (AGVs) shows a range of productivity effects. Productivity remained constant at 500 kg/min worker for the "Locating" process and 100 kg/min worker for the "Uploading in WMS" process. AGVs optimized the search process, resulting in a considerable improvement in the "Searching" process, which increased from 100 kg/minworker to 150 kg/minworker. Since the "Picking" operation, which had a productivity of 9 kg/min*worker before implementation, has no post-implementation data, it is likely that AGVs have partially replaced this task, which could result in additional efficiency benefits and labor savings. The data indicates that the adoption of AGVs significantly improved unloading

areas, as seen by the increase in unloading efficiency from 4 to 42 units while dispatching efficiency in the WMS remained same

Table 2: Before&AfterComparison of Warehouse Efficiency by Implementing AGV in FMCG Category

PROCESS	ACTIVITIES	BEFORE IMPLEMENTATION (kg/min*worker)	AFTER IMPLEMENTATION (kg/min*worker)
RECEIVING	Unloading	4	**42**
	Physical verification	17	**17**
	Uploading in wms	63	**63**
	Uploading in sap	33	**33**
PUTAWAY	Putaway in WMS	350	**350**
	Labeling	50	**50**
	Forklifting	50	**77**
	Manual Racking	5	
PICKING	Locating	350	**350**
	Searching	100	**150**
	Picking	9	
	uploading in WMS	70	**70**
DISPATCHING	Unloading	4	**42**
	Dispatching in WMS	**63**	**63**

Source: Primary Data

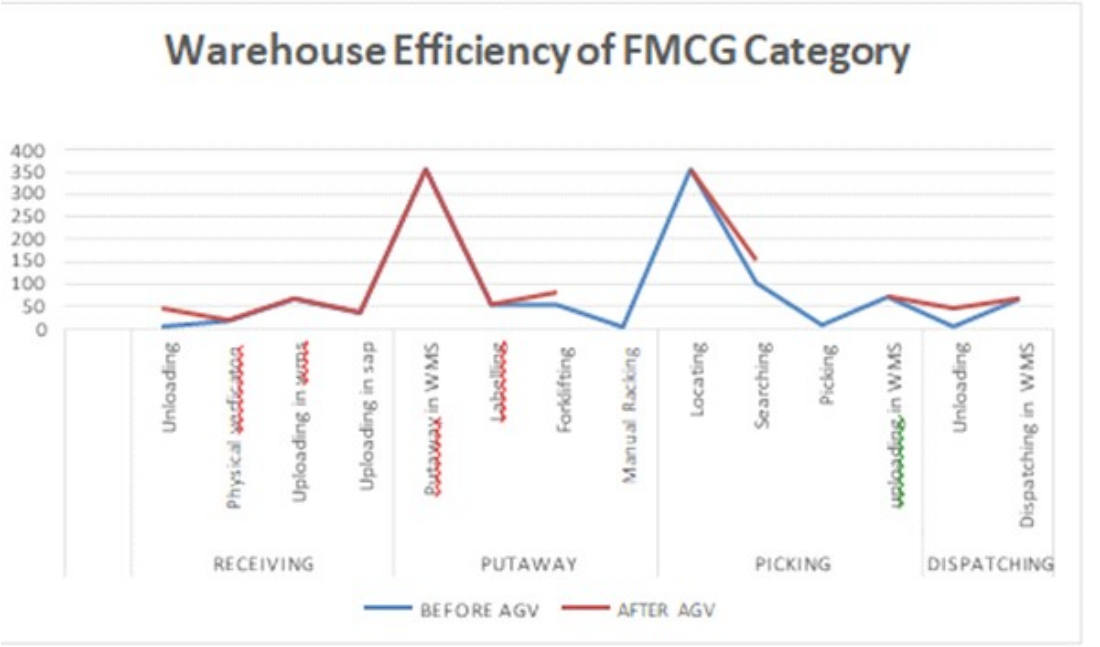


Figure 2: Warehouse Efficiency of FMCG Category

The graph illustrates the efficiency (in kg/min) of several process in warehouse for FMCG category before and after the implementation of AGV.Efficiency was 4 kg/min for unloading, 17 kg/min for physical verification, 63 kg/min for uploading in WMS, and 33 kg/min for uploading in SAP. Following automation (shown in red), efficiency significantly increased. Physical verification stayed at 17 kg/min, uploading in SAP stayed at 33 kg/min, uploading in WMS maintained constant at 63 kg/min, and unloading climbed to 42 kg/min. The put away procedure for the FMCG category in the graph shows that the implementation's effects on productivity varied. Productivity for the "Putaway in WMS" and "Labelling" operations remained constant at 350 kg/min worker and 50 kg/min worker, respectively. However, "Forklifting" improved from 50 kg/minworker to 77 kg/minworker, while no post-implementation data is available for "Manual Racking," which was 5kg/min*worker. Introducing Automated Guided Vehicles (AGVs) will eliminate the need for "Forklifting" and "Manual Racking," suggesting a significant potential for streamlining and improving overall efficiency by removing these labor-intensive processes. Following the introduction of Automated Guided Vehicles (AGVs), the FMCG Category's picking process data reveals the following effects on productivity. Productivity stayed constant at 350 kg/min worker for the "Locating" process and 70 kg/min worker for the "Uploading in WMS" process. The "Searching" process improved significantly as a result of the effectiveness of AGVs in expediting the operation, going from 100 kg/minworker to 150 kg/minworker. For the "Picking" operation, which had a productivity of 9 kg/min*worker initially, post-implementation data is not available. However, it is possible that AGVs have partially replaced manual labour in this task, increasing efficiency even further.

The data indicates that the adoption of

AGVs significantly improved unloading areas, as seen by the increase in unloading efficiency from 4 to 42 units while dispatching efficiency in the WMS remained same.

VII.FINDINGS

The efficiency of certain food category activities was greatly increased in the warehouse with the introduction of Automated Guided Vehicles (AGVs). Interestingly, the unloading procedure showed the biggest benefit. Unloading efficiency prior to automation was only 4 kg/min. It increased by more than ten times to 42 kg/min after AGV.

The pre-automation efficiencies of the physical verification, WMS, and SAP uploading procedures were constant at 22 kg/min, 125 kg/min, and 67 kg/min, respectively, during this time. It is possible that these procedures either achieved maximum efficiency or the implementation of AGVs had no direct effect on them.

Notable modifications were also brought about by the implementation of AGVs in the putaway process for the food category. AGVs reduced the need for "Forklifting" and "Manual Racking," even while some operations, including "Putaway in WMS" and "Labelling," remained constant at 500 kg/minworker and 100 kg/minworker, respectively. "Forklifting" increased from 50 kg/min worker to 75 kg/min worker prior to AGV integration, showing some efficiency advantages.

However, tasks such as "Locating" and "Uploading in WMS" maintained their efficiencies at 500 kg/minworker and 100 kg/minworker, respectively. This stability suggests that these tasks were either already optimized or less influenced by AGV deployment. The absence of post-implementation data for the "Picking" process, which previously operated at 9 kg/min*worker, suggests that AGVs have taken over or significantly assisted in this task, promising further efficiency improvements. Overall, the adoption of AGVs has demonstrated significant potential to enhance productivity and streamline operations, particularly in processes where manual intervention was previously required.

In the FMCG sector, Automated Guided Vehicles (AGVs) have significantly improved the efficiency of many procedures, especially unloading, in the FMCG (fast-moving consumer goods) segment within the warehouse. Unloading was only moderately efficient prior to the introduction of AGVs, averaging 4 kg/min. This efficiency significantly increased to 42 kg/min with automation, a tenfold improvement. This significant improvement demonstrates how well AGVs perform labor- intensive, repetitive activities with increased speed and accuracy

On the other hand, "Forklifting" witnessed a significant improvement, going from 50 kg/minworker to 77 kg/minworker in efficiency. This gain demonstrates the limited advantages that AGVs can offer in manual handling activities prior to their complete replacement. The fact that "Manual Racking," which had an initial efficiency of 5 kg/min*worker, does not have post-implementation data indicates that AGVs have substantially decreased or abolished this duty, indicating a possibility for large labour savings and operational simplification.

The "Searching and picking" process gained greatly with AGV integration, although the "Locating" and "Uploading in WMS" processes maintained their productivity levels at 350 kg/minworker and 70 kg/minworker, respectively. "Searching" became more

efficient, increasing from 100 kg/minworker to 150 kg/minworker. This shows how AGVs may speed up and maximize duties linked to searches in the warehouse.

VIII.RECOMMENDATIONS

The successful implementation of Automated Guided Vehicles (AGVs) has showcased significant potential for enhancing operational efficiency within the dispatching process. With AGVs reducing manual tasks by 50%, there's a clear opportunity to leverage this technology further towards partial automation by integrating it with the Warehouse Management System (WMS). By combining AGVs with WMS functionalities, businesses can achieve a seamless coordination between physical and digital operations, leading to smoother workflows and reduced dependency on manual intervention.

This integration allows for real-time tracking of inventory movements, optimizing storage locations, and ensuring timely dispatches, ultimately enhancing overall warehouse productivity and accuracy

To further advance towards full automation, a viable recommendation would be to explore the implementation of an Automated Mobile Robot Picking System (AMRPS). AMRPS offers an innovative solution to streamline the picking process by utilizing autonomous mobile robots equipped with advanced sensors and navigation capabilities. These robots can efficiently navigate through the warehouse environment, locating and picking items with precision and speed. By deploying AMRPS, businesses can achieve higher picking accuracy, increased throughput, and reduced labor costs, further augmenting the efficiency gains realized through AGV integration. Additionally, AMRPS can adapt to dynamic warehouse environments, making it a versatile solution for warehouses with varying layouts and inventory profiles. Overall, investing in AMRPS complements the existing AGV-WMS framework, paving the way for enhanced automation and competitiveness in the logistics industry. This may further smoothen the conversion to an Industry 5.0 scenario where seamless integration between human and machine driven environments becomes possible.

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ANALYSIS OF WORKING CAPITAL FUNDING BY BANKS FOR MSME UNITS AND A STUDY ON THE CHANCES OF OVER FUNDING/FUND DIVERSION

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ABSTRACT

Micro Small and Medium Enterprise (MSME) Units contributed around 30% of GDP of India during FY 2022-23 which will increase over the years. Hence, MSMEs define the future of India. However, the greatest challenge faced by MSMEs is timely availability of working capital funds. Banks are significant in ensuring timely availability of adequate funds. Banks provide various types of facilities to meet the working capital requirements. Banks employ 3 RBI stipulated methods for assessing the working capital requirements - Turnover, Maximum Permissible Bank Finance (MPBF) and cash flow methods. In all these methods the key component is the Operating Cycle of the business. Operating cycle is the time taken by a business to convert cash back into cash. Estimation of operating cycle is the major challenge faced by Banks as its incorrect calculation will result in over funding or under funding of the units. Over funding is precarious as it may cause fund diversions which will affect the sustainability of the business. In this paper, it is discussed how incorrect calculation of working capital results in over funding in a hypothetical Online E-Commerce business dealing in trendy new-gen Gold and diamond jewellery and the mitigates. The intention of this study is providing aspiring entrepreneurs an insight into the complexities of lending and awareness on potential pitfalls from mismanaging funds.

Keywords: *MSME, Working Capital, Operating Cycle, Fund Diversion*

I.INTRODUCTION

Mahatma Gandhi said, "True economics stands for social justice; it promotes the good of all equally, including the weakest, and is indispensable for a decent life." Mahatma believed that small-scale industries are the way to bridge the gap between rich and poor. His view is still relevant, as the small-scale industries - today's Micro, Small and Medium Enterprises (MSMEs) – contribute significantly to the Indian Economy by way of earnings, employment and empowerment.

As per the Annual Report on MSMEs for FY 2023-24 published by the Ministry of Micro, Small and Medium Enterprise, "The MSMEs contribute to the expansion of entrepreneurial endeavours through business innovations. The MSMEs are widening their domain across sectors of the economy, producing diverse range of products and services to meet the demands

of domestic as well as global markets. The MSMEs in India are playing a crucial role by providing large employment opportunities at comparatively lower capital cost than large industries as well as through industrialization of rural & backward areas, inter alia, reducing the regional imbalances, assuring more equitable distribution of national income and wealth.

1.What is an MSME?

As per MSMED Act 2006 and its subsequent amendments an enterprise shall be classified as a micro, small or medium enterprise based on the following criteria viz.,

- **A micro enterprise**, where the investment in plant and machinery or equipment does not exceed ₹ 1 crore and turnover does not exceed ₹ 5 crore;
- **A small enterprise**, where the investment in plant and machinery or equipment does not exceed ₹ 10 crore and turnover does not exceed ₹ 50 crore; and
- **A medium enterprise**, where the investment in plant and machinery or equipment does not exceed ₹ 50 crore and turnover does not exceed ₹ 250 crore.

As per the statistics published by the Public Information Bureau of Govt. of India, the contribution by MSME's to the GDP (in %) of India over the past few years has been as under.

Figure 1: Contribution of MSMEs to the GDP Share of MSME GVA in All India GDP (%)

From the above, it clear that the role of MSME's is significant and MSME's represent the future of India. India is looking forward to its young tech-savvy generation to bring about innovative ideas and their creative implementation into MSME sector. Government of India has implemented various schemes for empowering MSMEs. Albeit various schemes in place, the major challenge faced by MSME's is timely availability of adequate working capital funds. Banks play a significant role in ensuring that the MSMEs are financially supported.

Banks provide various working capital facilities – Both Fund Based & Non-Fund Based – to MSMEs. Fund Based limits include Cash Credit, Overdraft, Bill Discounting and Non-Fund Based limits include Bank Guarantees, Letters of Credit etc.

Banks assess the working capital requirements and eligibility for the limits mainly based on the business model and operating cycle of the borrower unit.

II. OPERATING CYCLE AND WORKING CAPITAL ASSESSMENT

1. Operating Cycle

Operating Cycle of a business is the time taken by a business to receive the inventory, to sell the inventory and collect the cash from sales. In short it is the time taken to convert cash back into cash. It is also called Working Capital Cycle or Cash Conversion Cycle. The Components of Operating Cycle are:

- Inventory Turnover Period
- Receivables Collection Period
- Creditors Payment Period

Working Capital is the funds required by the Business to meet the operational requirements during the operating cycle. Working Capital Funding is provided by the Banks to bridge the gap in liquidity requirements of the business during the operating cycle.

2. Working Capital Assessment

The Reserve Bank of India has suggested three methods for assessing the working capital requirements of business by the Banks:

- Turnover Method
- Maximum Permissible Bank Finance (MPBF) Method
- Cash Flow Method

a. Turnover Method: Turnover method is adopted for assessment of working capital limits where the limits requested is up to Rs.500L. In this method, the Gross Working Capital requirement of the business is assumed at 25% of Projected Turnover. The limit assessment is made as under: -

Particulars	**Amount**
Gross Working Capital Required (25% of Projected Turnover) (A)	xxx
Less: Promoter's Margin (5% of Projected Turnover) (B)	xxx
Working Capital limit eligible (C = A-B)	**xxx**
Limit Requested by the borrower (D)	**xxx**
Limit Sanctioned by Bank (Lower of C and D)	**xxx**

Turnover Method adopts a fundamental assumption that the operating cycle of the business is 3 months.

b. MPBF Method MPBF method is adopted for assessment of working capital limits where the limit requested is above Rs.500L. In MPBF method, the assessment is made based on Working Capital Gap position at the end of the Financial Year. The limit assessment is made as under:

Particulars	Amount
Total Current Assets as on FY end (A)	xxx
Less: Current Liabilities other than Short Term Bank Borrowings (B)	xxx
Working Capital Gap (C = A-B)	xxx
Margin Requirement:	
25% of Working Capital Gap (D) - xxx	
25% of Total Current Assets (E) - xxx	
Less: Promoters Margin (F = Higher of D & E)	xxx
Maximum Permissible Bank Finance (G = C – F)	**xxx**
Limit Requested by the borrower (H)	**xxx**
Limit Sanctioned by Bank (Lower of G and H)	**xxx**

MPBF method does not consider the interim cash flows or seasonal cash flows of the company. If the nature of business of the company is such that the year-end working capital figures show an inflated position than the average, use of MPBF Method may result in wrong calculation of working capital limits.

c.Cash Flow Method: Cash Flow method mitigates the short comings of the above said methods. Cash Flow method considers the actual cash flow mechanism of the company to assess the operating cycle. Hence, most of the banks supplement Turnover Method and MPBF Method with Cash Flow method to prevent over-funding or under-funding of the unit. Cash Flow method mainly involves usage of the Turnover Ratios (Inventory Turnover, Receivables Turnover and Creditors Turnover ratios) for assessing the working capital cycle.

III.CASE ANALYSIS

The following is a study of a situation based on various practical cases in Credit Underwriting and Credit Monitoring. The financial figures used are hypothetical. Here, the working capital requirements and borrowings of a small company dealing in manufacture and sale of new-gen trendy Gold and Diamond ornaments through Online platform is discussed. In this, four scenarios will be considered.

- Where the Company conducts business in a traditional manner, in which the ornaments are pre-produced and kept in stock before sale.
- Where the company changes its business model from traditional to made-to-order to achieve streamlining and operational efficiency.
- Impact of Funds Diversion due to over funding from Bank/Financial Institution.
- Mitigative Measures in case of Over Funding

1.Case Scenario 1 – The Start-up

Trendy Pvt Ltd is a Company engaged in manufacture and Online Sale of Gold and Diamond Ornaments. They started the business on 01-04-2024. The business model of the company is as under:

a.Target Demographic: They focus on trendy, lightweight, affordable jewelry which is preferred by youngsters (18-35 Age Group) particularly from Urban and Semi-Urban areas who have disposable income but limited budgets for high end jewelry. This

category also tends to prefer the comfort of online platforms.

b. Revenue Model: Primary revenue comes from selling Gold and diamond jewelry directly to the customers through website or mobile app. Product categories include, rings, earrings, pendants, bracelets and lightweight necklaces. Pre-paid and Cash-on-delivery facilities are provided to the customers for better market penetration.

c. Cost Structure: Jewelry production is done at own small-scale unit by employing skilled and trusted artisans. They use cost effective materials like 14K gold or lab grown diamonds to keep prices competitive. Raw Materials are procured in advance through tie ups with reliable suppliers and ornaments are manufactured based on cataloged designs and stored at secure storage facilities. Since, this is a new venture, quick and efficient delivery mechanism was of prime importance and hence, availability of readymade ornaments always was imperative. They approached Helpful Bank Ltd for a Cash Credit limit of Rs.100L for meeting the working capital requirements of the business. They submitted Projected Financial Statements of the company for FY 2024-25 and FY 2025-26 for assessment of working capital. The following is the Projected Income and Expenditure Statement and Balance Sheet of the Company:

Table1: Income and Expenditure Account (Rs. In Lakhs)

Expenditure	Projected		Income	Projected	
	2025	2026		2025	2026
Raw Material	1,200.00	1,500.00	Revenue from Operations	2,000.00	2,500.00
Manufacturing Cost	80.00	100.00	Other Income	8.00	10.00
Cost of Goods Sold	1,280.00	1,600.00			
Marketing and Advertising	125.00	150.00			
Logistics	70.00	80.00			
Salaries and Benefits	110.00	120.00			
Technology Costs	25.00	30.00			
Rent and Utilities	17.00	20.00			
Miscellaneous Expenses	12.00	15.00			
Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA)	**369.00**	**495.00**			
Total	**2,008.00**	**2,510.00**		**2,008.00**	**2,510.00**
Interest	20.00	25.00	EBITDA (c/d)	369.00	495.00
Depreciation and Amortisation	12.00	15.00			
Earnings Before Tax (EBT)	**337.00**	**455.00**			
Total	**369.00**	**495.00**		**369.00**	**495.00**
Tax	95.00	110.00	EBT (c/d)	337.00	455.00
Earnings After Tax (EAT)	**242.00**	**345.00**			
TOTAL	**337.00**	**455.00**		**337.00**	**455.00**

Source: Data Analysis

Table2: Balance Sheet of Trendy Pvt Ltd. (Rs. In Lakhs)

Year/Period ending	Projected (FY)	
Liabilities	**2025**	**2026**
Net Worth		
Equity Share Capital	50.00	50.00
Retained Earnings	270.00	300.00
Total	320.00	350.00
TERM LIABILITIES		
Long Term Borrowings	155.00	150.00
Lease Liabilities	20.00	25.00
Deferred Tax Liabilities	5.00	5.00
Sub Total	180.00	180.00
CURRENT LIABILITIES		
Short Term Bank Borrowings	**100.00**	**100.00**
Trade Payables	350.00	400.00
Provisions	20.00	25.00
Other Current Liabilities	35.00	40.00
Sub Total	505.00	565.00
GRAND TOTAL	**1005.00**	**1095.00**
Assets		
FIXED ASSETS		
Property Plant & Equipment	45.00	50.00
OTHER NON-CURRENT ASSETS		
Intangible Assets (Website, Mobile app)	35.00	30.00
Security Deposits	15.00	15.00
Sub Total	50.00	45.00
CURRENT ASSETS		
Cash and Cash Equivalents	95.00	100.00
Short Term Loans and Advances	25.00	30.00
Inventory	550.00	600.00
Trade Receivables	225.00	250.00
Other Current Assets	15.00	20.00
Sub Total	910.00	1000.00
GRAND TOTAL	**1005.00**	**1095.00**

Source: Data Analysis

Based on the projections submitted, the Bank made the following assessment of working capital. Since, the limit requested for less than Rs.500L, Turnover method is normally used for assessment of working capital.

Table 3: Assessment of Working Capital Requirement Under Turnover Method

Turnover Method	**2025**	**2026**
25% of Projected Turnover	500.00	625.00
Less: Margin @ 5% of Turnover	100.00	125.00
Working Capital Limit Eligible	**400.00**	**500.00**
Working Capital Limit requested	**100.00**	**100.00**

Source: Data Analysis

However, Helpful Bank Ltd, being a prudent lender, they used Cash Flow Method also for assessment of working capital requirements. They computed the actual working capital cycle of the Company and assessed the fund requirement based on that.

Table 4: Calculation of Working Capital Cycle

Working Capital Cycle		
Particulars	**2025**	**2026**
Receivables Turnover Ratio (Months)	1.35	1.20
Inventory Turnover Ratio (Months)	5.16	4.50
Creditors Turnover Ratio (Months)	3.28	3.00
Working Capital Cycle (Months)	**3.23**	**2.70**

Source: Data Analysis

Table 5 : Calculation of Working Capital Under Cash Flow Method

Cash Flow Method	**2025**	**2026**
Projected Turnover (A)	2,000.00	2,500.00
Working capital Cycle (B)	3.23	2.70
Working capital Requirement (A/12 X B)	538.00	562.00
Less: Margin @ 25%	135.00	141.00
Working Capital Limit Eligible	**403.00**	**421.00**
Working Capital Limit requested	**100.00**	**100.00**

Source: Data Analysis

The working capital cycle during the first year of operation is projected at 3.23 months which is in line with fundamental assumption of a 3-month Working Capital Cycle as per Turnover method. Hence, the assessed limit

as per Turnover Method and Cash Flow method is almost the same. However, it is expected to reduce to 2.70 months in the second year due to improved efficiency in operations. For the FY 2026, the eligible limit under Turnover method comes to Rs.500 Lakhs whereas under Cash Flow Method, it is only Rs.421 Lakhs. If the Bank had depended only on Turnover method, it would have resulted in an overfunding of Rs.79 Lakhs (Rs.500L – Rs.421L) in FY 2026.

However, in this scenario, the Company requested only Rs.100L as loan, which is the least of all assessments, there was no over funding from the part of the Bank.

2.Case Scenario 2 – The Disruption

During the first year of operation, the company did well and could penetrate the target market up to their expectations. Hence, to bring about better efficiency and operational streamlining, the company decided to modify its business model. From the traditional Manufacture and Sell model, they changed the business model to Make-to -Order. The payments system was also modified as pre-paid alone and Cash-on-delivery facility was withdrawn. This also allows them to have the ability to introduce more models to the catalogue. Since, the manufacture begins only after getting the order, they can have more flexibility and adaptability.

This change in business model creates a paradigm shift in the way in which working capital requirements are estimated, such as:

- Minimal Inventory – Since production starts only after getting the order, only minimal inventory needs to be maintained. This will also reduce the storage costs.
- No Significant receivables – Since, the payments are made up front by the customers, the receivables would be minimal.
- Credit period from suppliers – The payments to suppliers are often made after receiving customer payments, the need for working capital will be reduced.

The company did a reassessment of its projected financial position. The profound impact that the change in Business Model may cause on the same is expected as under: -

Table 6: Comparison of Projected Balance Sheet For FY 2026 Of Trendy Pvt Ltd Before And After Change In Business Model

Year/Period Ending	Projected for FY 2026	
Liabilities	**Make to Order**	**Traditional Model**
NET WORTH		
Equity Share Capital	50.00	50.00
Retained Earnings	300.00	300.00
Total	350.00	350.00
TERM LIABILITIES		
Long Term Borrowings	100.00	150.00
Lease Liabilities	20.00	25.00
Deferred Tax Liabilities	5.00	5.00
Sub Total	125.00	180.00

CURRENT LIABILITIES		
Short Term Bank Borrowings	**0.00**	**100.00**
Trade Payables	150.00	400.00
Provisions	10.00	25.00
Other Current Liabilities	20.00	40.00
Sub Total	180.00	565.00
GRAND TOTAL	**655.00**	**1095.00**
Assets		
FIXED ASSETS		
Property Plant & Equipment	50.00	50.00
OTHER NON-CURRENT ASSETS		
Intangible Assets (Website, Mobile app)	30.00	30.00
Security Deposits	15.00	15.00
Sub Total	45.00	45.00
CURRENT ASSETS		
Cash and Cash Equivalents	450.00	100.00
Short Term Loans and Advances	30.00	30.00
Inventory	50.00	600.00
Trade Receivables	10.00	250.00
Other Current Assets	20.00	20.00
Sub Total	560.00	1000.00
GRAND TOTAL	**655.00**	**1095.00**

Source: Data Analysis

The impact of change in Business Model is evident in the key figures which determine the working capital cycle – i.e. Inventory, Receivables and Trade Payables, Accordnglyi, the Working Capital Cycle changes as under:

Table 7: Comparison of Working Capital Cycle Before and After Business Model change

Working Capital Cycle	Make to Order	Traditional Model
Receivables Turnover Ratio (Months)	0.05	1.20
Inventory Turnover Ratio (Months)	0.03	4.50
Creditors Turnover Ratio (Months)	0.09	3.00
Working Capital Cycle (Months)	(0.01)	2.70

Source: Data Analysis

With the implementation of the new model, the Working Capital Cycle has reduced to NIL from 2.70 Months. As such the company will not have a working capital gap and does not need working capital funding.

3.Case Scenario 3 – The Folly

After successfully transitioning to a made-to-order business model, Trendy Ltd found itself with surplus funds. The company still had a cash credit limit of ₹ 100 lakhs, which was originally sanctioned based on the traditional inventory-based model. However, the new model had eliminated the need for working capital financing, as customers prepaid for orders, and suppliers provided credit terms. Ideally, the company should have informed the bank and reduced the borrowing facility. Instead, the directors, enticed by a lucrative investment opportunity, diverted the funds into a real estate project proposed by a friend.

The investment seemed promising—quick and high returns were assured. Trusting the proposal, Trendy Ltd diverted ₹ 100 lakhs from its working capital loan into the apartment project, expecting substantial profits in a short span. Unfortunately, legal disputes over the land delayed construction, and the expected sales did not materialize. The company's funds were now locked in a non-liquid asset, leaving it unable to retrieve the capital when needed.

Meanwhile, market dynamics shifted. Competitors introduced new and innovative jewellery designs, forcing Trendy Ltd to revamp its product offerings to maintain its position. This required hiring exclusive designers, investing in new catalogues and prototypes, and ramping up marketing efforts—all of which demanded additional working capital. However, the company had exhausted its financial cushion in the real estate venture.

With liquidity constraints, Trendy Ltd struggled to meet its operational expenses. Suppliers faced delayed payments, leading to strained relationships and tighter credit terms. Employee morale declined, as uncertainty loomed over salaries and incentives. The company's reputation took a hit, affecting customer confidence. When Trendy Ltd finally approached the bank for additional funding, lenders were reluctant, citing fund diversion and financial mismanagement.

What started as a business with a strong foundation and sustainable growth model faced financial stress due to misplaced priorities and greed-driven decisions. Had the company prudently managed its funds, reassessed its borrowing needs, and maintained financial discipline, it could have stayed competitive without liquidity concerns. Instead, chasing quick profits in an unrelated sector led to operational setbacks, forcing Trendy Ltd to fight for survival in an increasingly competitive market.

This case highlights the danger of fund diversion. When a company uses the borrowed funds for purposes other than that for which it was availed, it is called Fund Diversion.

Fund Diversion can happen in various ways such as:

- Investment is an activity, speculative or otherwise, un-related to the core business of the company. E.g. Real Estate, Stock Market, Crypto Currency etc.
- Utilization of such funds for the personal purposes of the promoters. E.g. Education/Marriage of Friends or Family, Making personal investments elsewhere.
- Use of Working Capital funds for purchasing Fixed Assets, even if it is for the use of Business. E.g. Lavish furnishing of the office premises, purchase of luxury cars for business use etc.

- Investments made in segments/ associates/ sister concerns which are engaged in different lines of activity.

Fund Diversion due to over funding from Banks/Financial Institutions will have the following repercussions:

a.Increased Financial Costs: The Company would have to pay the interest on the Cash Credit limit unnecessarily. Diversion of funds into non-core or speculative activities cause funds being blocked in unyielding and sometimes high-risk investments, like Real Estate or Personal Investments. All these will reduce the profitability of the business and reduces its ability to re-invest in core areas like Technology, Marketing etc.

b.Operational and Liquidity Issues: Diversion funds cause financial stress when the company faces unforeseen or sudden operational costs. Delay in payments to suppliers will cause production issues and loss of trust of creditors eventually resulting in tighter credit terms. Production issues will ultimately result in loss of customer base and reputation.

c.Regulatory/Compliance Issues: Diversion of Funds is a violation of covenants and detection of diversion by authorities could result in loss of credibility, penalties etc. This will also affect the ability to secure loans in the future due to loss of lender confidence.

d.Loss of Competitive Edge: Diversion would take away availability of funds for undertaking product innovation, technology upgradation, implementation of new marketing strategies etc. Misallocated funds also affect the company's ability to seek new growth opportunities or business diversification.

e.Dilution of Management's Focus: Diversion often shifts the management's attention from core activities to speculative activities or resolution of issues caused by mismanagement.

f.Loss of Stakeholder's Trust: Production and delivery issues affect the customer's confidence on the Brand. Delay in payments for supplies will affect supplier's trust and employees will be affected by delay in Salary payments.

g.Increased Risk of Insolvency: Excessive reliance on borrowed funds for non-business purposes without corresponding revenue accumulation can result in a debt-trap. Risk is also high, if the diverted investments fail and funds are lost.

4.Case Scenario 4 : The Mitigates

The company has the following corrective measures in front of them to mitigate effect of Over Funding.

a.Inform the Bank: Company shall inform the Bank regarding the change in business model and the need to reassess the working capital requirements.

b.Reassess / Re-evaluate limits: The Company shall request the Bank to reduce the working capital limit in line with the actual working capital requirements.

c.Improve Internal Control and Monitoring: Strict internal control policies shall be implemented to monitor fund flows and prevention of diversion.

d.Regular Audits: Periodic operational and financial audits to be conducted to ensure transparency in utilization of funds.

e.Create a Cash Reserve: If permitted by the Bank, the company can also build up cash reserve to meet unforeseen liquidity issues or re-invest in core business activities.

IV.CONCLUSION

Imagine a river – free flowing, provider for many and support for life. What if, due to greed, people began to divert the water for personal gain and the land is left dry and barren. This is like what Fund Diversion does to a business. Something which was meant to be an opportunity and means for growth for all withers away due to man's greed.

Greed has the power to turn success into failure, trust into betrayal and growth into peril. This stands true in all aspects of life – personal, professional, financial or moral. Chasing after success with no regard for ethics and responsibility is a one-way street to destruction. The young generation is the future and they remaining steadfast in ethical business is the key to sustainable growth to all.

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Various practical cases in Credit Underwriting and Credit Monitoring aspects.

NAVIGATING THE LANDSCAPE: A BIBLIOMETRIC ANALYSIS OF ARTIFICIAL INTELLIGENCE IN ENTERPRISE RESOURCE PLANNING SYSTEMS

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ABSTRACT

Enterprise Resource Planning (ERP) systems and artificial intelligence have emerged as pivotal technologies for enhancing organizational efficiency and flexibility. The integration of ERP systems with AI includes operational efficiency, cost reduction, and predictive analytics. Numerous studies have looked into its use and its success in large companies. This study attempts to investigate the current state of research on ERP-AI from the perspectives of publication forms, societal trends, and conceptual frameworks using bibliometric analysis in order to realize the range of earlier research in these two fields. When the terms "Enterprise resource planning" and "Artificial intelligence" and the other related keywords were combined in a search query on the Scopus database, 613academic papers spanning 2009 to 2023 were found. According to bibliometric findings, the number of studies in this area is increasing.

Keywords: *Artificial Intelligence, Business Process,Manageent, Enterprise Resource Management (ERP)*

I.INTRODUCTION

Enterprise Resource Planning (ERP) systems serve as comprehensive information systems managing the entirety of business processes within the supply chain, encompassing activities from purchasing and manufacturing to finance and accounting (Bahssas et al., 2015). This business management software integrates organizational data sources, allowing the real-time tracking of labor, material, energy, and financial resource flows. ERP systems are modular and usually include supply chain, finance, accounting, manufacturing, supply chain, and human resources components. Facilitating the parallel operation of business processes on digital platforms (Bahssas et al., 2015).

With the widespread usage of computers in the 1960s, ERP systems had their start, especially in the form of software for inventory management. ERP systems were first developed as a result of the following development of Material Requirements Planning (MRP) systems in the 1970s and Manufacturing Requirements Planning (MRP-II) systems in the late 1980s, mostly for manufacturing reasons. ERP systems have developed during the 1990s to incorporate accounting, finance, human resources, and customer relationship management (CRM) with MRP and MRP-II (Al-Mashari et al., 2003; Bahssas et al., 2015; Gibson et al., 1999; Jacobs, 2007).

The significance of ERP systems lies in their ability to warrant the integration of business processes, maintain data integrity and security, and enhance overall business productivity. They enable managers to take prompt, well-informed judgments and decisions, positively impacting profitability and competitiveness by facilitating the efficient management of resources and cost reduction (Bahssas et al., 2015; Gavali & Halder, 2020; Katuu, 2020). However, challenges to ERP adoption, as highlighted by Azevedo et al. (2014) in the context of the hospitality industry, emphasize the importance of seamless integration, particularly when it comes to reflecting customer services in invoices. As we explore the past, present, and future of ERP systems through various scholarly perspectives, the intricate evolution of these systems becomes apparent, reflecting their central role in contemporary organizational management.

Artificial Intelligence (AI) is reshaping ERP systems, revolutionizing business operations by integrating advanced analytics, automation, and intelligent decision-making capabilities (Davenport et al., 2018; Myths et al., 2012; Schroeck et al., 2009). This integration enhances ERP systems with machine learning for predictive analytics, natural language processing for improved user interactions, and AI-driven automation to reduce errors and accelerate processes. The fusion of AI and ERP is evident in the evolution of chatbots and virtual assistants, offering a conversational interface for users. Concurrently, AI's impact extends to broader industrial and ethical considerations (Honavar, 2006; Martinez-Lopes & Casillas, 2013; Murphy, 2019; Kazim & Koshiyama, 2021). This transformative synergy empowers organizations to extract valuable insights, streamline operations, and make data-driven decisions, positioning them for success in a competitive business landscape (Goundar et al., 2021; Hairech & Lyhyaoui, 2020; Fujita, 2020).

II.LITERATURE REVIEW

In recent years, the integration AI with ERP systems has emerged as a transformative trend in the business landscape. Scholars have extensively explored the multifaceted impacts and implications of this fusion, shedding light on its potential to reshape organizational processes and decision-making. One prominent facet of this integration is the infusion of advanced analytics into ERP systems. (Davenport et al. 2018) highlight how machine learning algorithms enhance ERP capabilities by enabling predictive analytics, empowering organizations to forecast demand, optimize inventory, and identify trends. This predictive power contributes to improved decision-making and operational efficiency. The integration of Natural Language Processing (NLP) also plays a pivotal role, as discussed by (Schroeck et al, 2009), offering users a more intuitive and interactive interface with ERP systems through voice commands and written queries.

The evolution of chatbots and virtual assistants within ERP systems underscores the growing emphasis on user experience. This is aptly illustrated by the work of (Goundar et al, 2021), who emphasize the significance of conversational interfaces in ERP systems. Such interfaces not only enhance user productivity but also contribute to the overall agility and responsiveness of ERP platforms. Beyond operational enhancements, scholars have delved into the broader implications of AI and ERP integration. (Martinez-López and Casillas, 2013) provide historical insights into the application of AI-based systems in industrial marketing, offering a perspective on

the evolution of AI in organizational contexts. Moreover, ethical considerations in the era of AI are addressed by (Kazm and Kosheyama, 2021), underscoring the importance of responsible AI implementation.

The literature also extends to discussions on the broader landscape of AI, encompassing robotics (Murphy, 2019) and the intersection of AI with industry 4.0 (Hairech & Lyhyaoui, 2020). These perspectives contribute to a comprehensive understanding of how AI-driven advancements are shaping the next generation of ERP systems. The integration of AI with ERP systems indicates a dynamic and evolving field of study. From enhancing operational efficiency to redefining user experiences and addressing ethical considerations, the literature reflects a nuanced exploration of the multifaceted impacts of this transformative alliance.

(Prashar, 2020) used numerical data from 189 studies that were received from the WoS platform to do only common keyword analysis using the parameters of the bibliometric analysis. In order to analyze common citations for articles on big data analytics in management and business that were reviewed in Wos, (Aridity et al, 2019) used the bibliometric technique. (Inacio and Marque, 2018) simply published the findings of their descriptive study rather than performing any bibliometric analyses, such as finding the common author, common citation, or common keyword, on the 57 publications they found on the Scopus platform that were connected to internal control and ERP. Just 191 articles were exposed to common keyword analysis using the VOSviewer software by (Ivanov et al. 2020).

(Aktürk, C. X, 2021) has done a bibliometric analysis in the same area, but in recent years, the development of technology, especially in the AI-ERP area, has been much more identical. There was not enough bibliometric analysis specifically in the area of AI-ERP, and this study's primary objective is to investigate the changes that have occurred recently.

III.RESEARCH QUESTIONS

This study includes descriptive analyses of the works on ERP and AI methods identified in the Scopus database in addition to bibliometric analyses of the articles in the form of these research' articles. The goal of this research is to offer a new roadmap for scholars, managers, academics, and other specialists working on this area to approach the problem-solving from a more comprehensive and methodical standpoint, particularly with regard to AI, which is increasingly being used along with Industry 4.0 to manage business operations. The study aimed to provide answers to the following research questions.

- What is the number of annual ERP publications?
- Which authors have produced the highest publications on ERP-AI?
- Which institutions have the highest related ERP-AI publications?
- Which subject areas have the most number of publications in ERP-AI?
- Whom the most citations in the area of ERP-AI have been made.
- How do co-authors collaborate on articles related to ERP-AI?
- What is the ERP-AI publication collaboration network between the countries of co-authors?
- What keywords are often used in articles about ERP-AI?

IV.DATA COLLECTION

In this study, bibliometric and descriptive analytic approaches were used to investigate international articles that were found in the Scopus database based on search parameters relevant to ERP-AI subjects. The search query contains a variety of terms that represent AI approaches in addition to the keyword "enterprise resource planning." Or "ERP" These keywords are a compilation of methods and vocabulary from literature-based studies on artificial intelligence. The following is a list of keywords used in search queries linked to AI.

"AI" or "artificial intelligence" or "machine intelligence" or "neutral network" or "machine learn" or "deep learn" or "natural language process" or "expert system" or "fuzzy logic".

The "OR" operator was added to the search query in order to use these keywords. To guarantee coexistence, every AI-related term is set in brackets and joined to the phrase "enterprise resource planning" or "ERP" by the operator "AND." Therefore, the goal is to get to the studies that use AI techniques in the ERP studies. Using this search query, 613studies that met the criteria were found. Filter applied to include the publication year from 2009 to 2023, and three more options were excluded from document type, including "book chapter," "retracted," and "review", any criterion, as the search results will mostly be the outcome of descriptive analysis.

V.DATA ANALYSIS

On the data, two dissimilar approaches of analysis were applied. The distribution of publications by kinds, publishing for the analysis, two different methods were used. Firstly, from Scopus website, publications were distributed according to types of articles, languages in which they were published, institutions, sources and years. Furthermore a descriptive analysis was performed on publishing subjects related to writers and organizations that produced the highest number of papers under this category (descriptive studies). After 837 articles had been filtered as per the type of article only; a records file for these articles was imported into VOS viewer program in ".csv" format and bibliometric analyses done. This resulted in carrying out common author-country; common author-writer; common citation-journal; common citation-writer; and common keyword analyses for these outputs. To analyze the data, inside this software were constructed with different characters all the authors, keywords and country names. Software like VOS viewer allows for the download of search results from academic databases in recording formats where it can be used to create bibliometric networks Mohan P and Krishnan (2021). While using VOS viewer however, researchers do not have to code or pre-process prior to analyzing their search results data obtained. It is also good at producing visual network maps swiftly. Therefore the above mentioned VOS viewer program was used in this bibliometric study.

VI.RESULTS

The findings from the descriptive analyses conducted as part of the research projects are effectively presented through the use of tables and graphs. These visual representations serve to illustrate the results derived from the comprehensive analysis of data sourced from the Scopus database. By employing tables and graphs, the research not only enhances clarity but also facilitates a better understanding of the key insights

obtained from the data analysis process.

1. Distribution of Documents by Type

The distribution of ERP-AI research by type is displayed in the following table. Table 1 reveals that 613studies with a focus on ERP-AI individuals were been out. The majority of publications seem to fall under the conference paper category, with 344 conference papers recorded as of this writing. Articles make up around one-third of all document kinds, with 222 being the second-highest number. And 3 more document types including book chapter, review and retracted excluded before analysis.

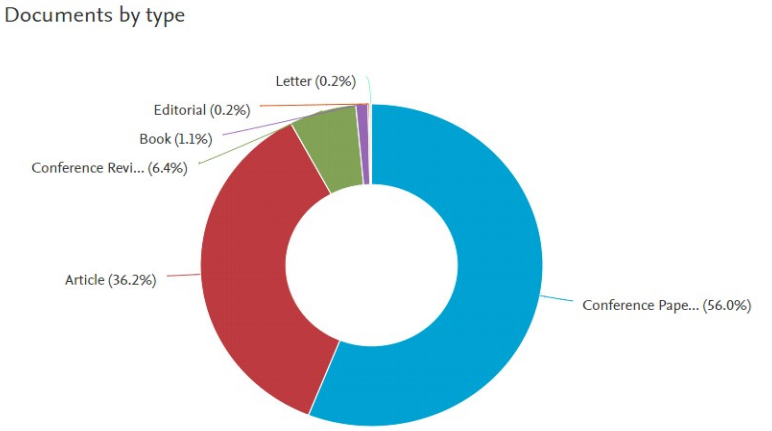


Figure 1: Distribution of Publications According To Type

2.The Distribution of Publication According To Years

Figure 1shows the distribution of the research by year. Figure 1 shows that research on this topic was done between 2009 and 2023. The majority of the publications, totaling sixty, were published in 2021. It has been recognized that the number of studies carried out has significantly increased, particularly after 2014. Figure 1 indicates the rise in interest in ERP-AI research from 2014 to 2021, a decrease in 2022, and a low volume of papers in 2023 due to data collection in November.

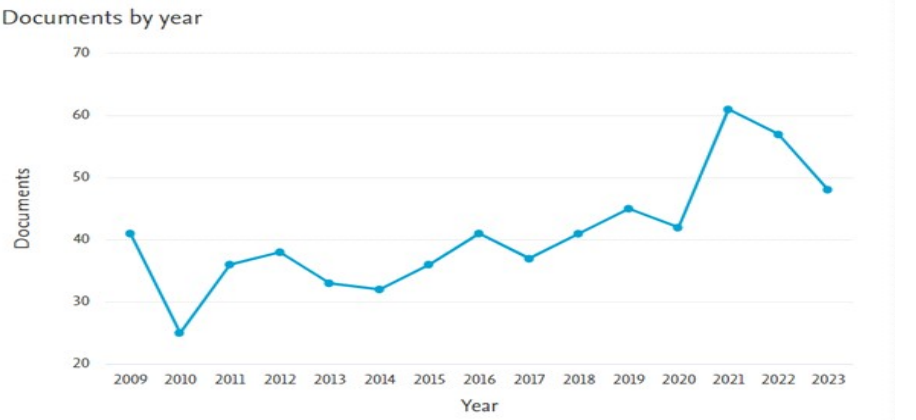


Figure 2: Distribution of Publications According To Years

3.Institutions and Authors

The writers who have written the most on ERP-AI subjects are displayed in Figure 2. The provided information highlights the research contributions of ten prominent authors: Orosz, T., Orosz, I., Selmeci, A., Ravasan, A.Z., Annese, V.F., Chiarini, A., De Venuto, D., Dossou, P.E., Fleig, C., and Komal. Among these, Orosz, T. and Orosz, I. stand out with the highest publication count of 11 each, indicating their active engagement in research. Selmeci, A. and Ravasan, A.Z. also demonstrate significant research output with 10 and 9 publications, respectively. The remaining authors, Annexes, V.F., Chiarini, A., De Venuto, D., Dossou, P.E., Fleig, C., and Komal, have contributed between 6 and 8 publications, showcasing their active involvement in the research domain. While the number of publications serves as an indicator of research productivity, it's crucial to acknowledge that other factors, such as publication quality and citation impact, also play a vital role in assessing a researcher's overall contribution. The information presented underscores the significant research contributions of these ten authors and their dedication to advancing knowledge in their respective fields. Their work undoubtedly plays a valuable role in addressing various challenges and shaping the future of research.

Figure 2 displays the data collection instrument employed in the study as well as the quantity of objective publications based on the institutions along the research borders. In terms of publications according to the institutions, figure 2 displays the top ten publishing institutions. The university with the most publications is Obuda University. The China Academy of Science is ranked third, while the University of Politehnica of Bucharest is ranked second. Table 2 provides further information about the other colleges that are included in the top 10.

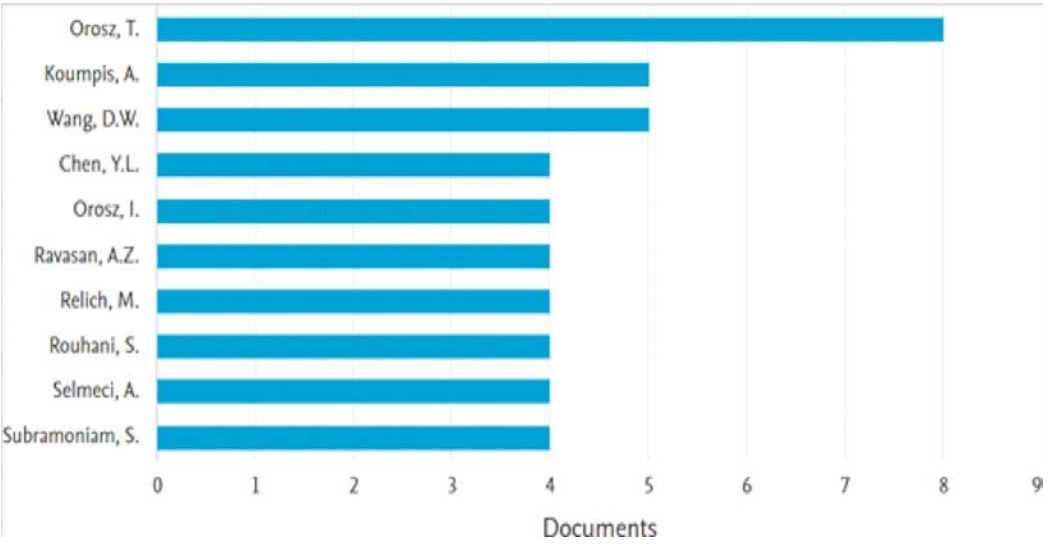


Figure 3: High Publication of Authors

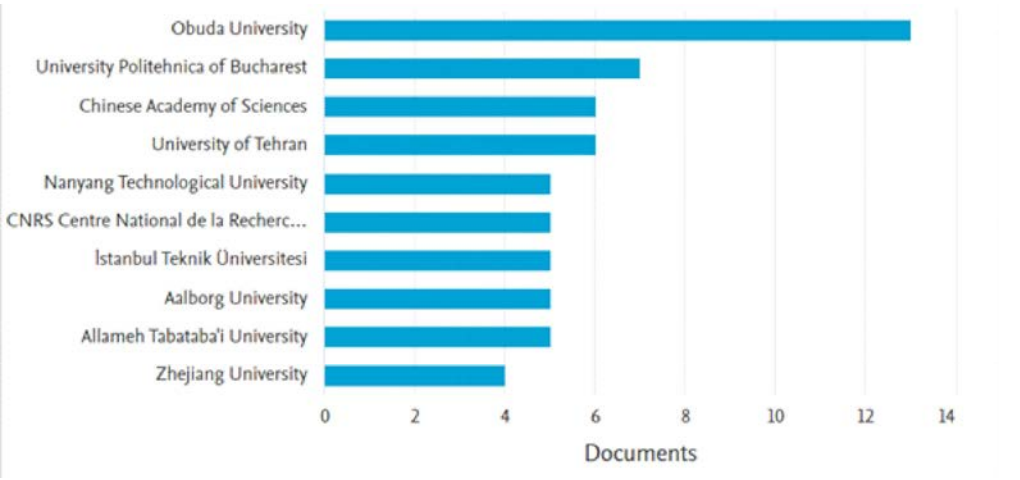


Figure 4: High Publication According To the Institutions on ERP-AI Topics

4.Publications And Distribution According To The Subject Areas

Table 3 displays the publications and distribution by subject categories. According to Table 3, 33% of published works on ERP-AI topics are in the field of computer sciences, and 19% are in the field of engineering. Furthermore, a variety of academic fields, including decision sciences, business management, and mathematics, are covered by these studies. Table 3 demonstrates that research on ERP-AI is also being done in a variety of subject areas, including medicine, social sciences physics, physics, economics, neuroscience, and others.

The distribution of publications by year can be used to determine whether or not scholars are still interested in the topic. This also holds true for the authors' institutional analysis. It's critical to identify the research institutes that are more innovative in a given field, to fund those efforts, and to try and influence global policy on that issue. Furthermore, topics within the purview of a research topic also provide insight for the researchers studying that issue. This is why an image of the ERP-AI research region was captured for the purpose of the study.

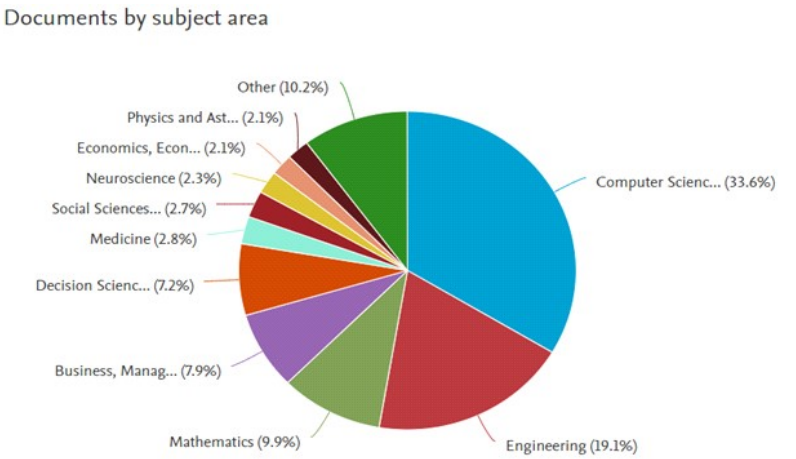


Figure 5: Publications According To the Subject Area

VII.FINDINGS OF BIBLIOMETRIC ANALYSIS

The research's results are displayed in tables, figures, and visual maps along with the findings of a comprehensive bibliometric analysis. The bibliometric analysis included methods for identifying and analyzing common authors, citations, and keywords among 223 carefully selected studies. These 223 studies were filtered from a larger pool of 613 publication studies on the specific topic of ERP-AI. The bibliometric techniques were applied to this curated set of 223 articles, which were chosen to only include publications of a certain type, such as peer-reviewed journal articles or conference proceedings, in order to ensure a high level of quality and relevance to the research topic.

1.Analysis of Co-authors (countries, author)

A total of 1600 authors were identified in the co-author analysis of the publications. Writers were enumerated in the "VOSviewer" program tool according to the number of citations, and this information was acquired from the table shown below, out of all the authors, Tanqermann

Michael received the most references (218). While Chiarini Andrea came in second with 128. The author that garnered the third-most references, with 82, is Pantetto Herve. With four papers, Oroasz T. and Selmeci A. have the highest published studies on ERP and AI.The co-author-country analysis identified a total of 79 nations that hosted the article studies. The relationship network of 12 countries is depicted in the above table, and those countries were chosen

Table1: Relationship Network of Countries

Author	Documents	Citations	Total link strength
orosz, t.	4	13	4
selmeci, a.	4	13	4
fleig, christian	3	21	3
maedche, alexander	3	21	3
chiarini, andrea	3	128	0
komal	3	13	0
orosz, tamas	3	5	0
orosz, tamás	3	8	0
panetto, hervé	3	82	0
ravasan, ahad zare	3	44	0
relich, marcin	3	56	0
tanqermann, michael	3	218	0

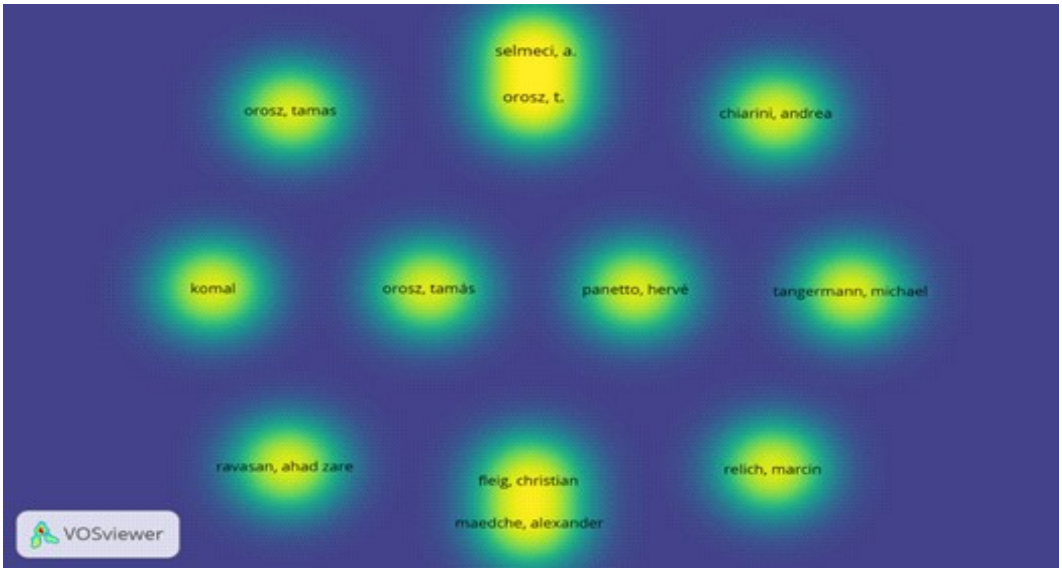


Figure 4: The Density Map of Co-Authors

Based on the analysis of at least three studies. Depending on how cooperative they are, countries are grouped in three different hues. On visual collaboration maps, all elements in the same group are displayed in the same color. The clusters follow this pattern: there are five items in the first and second clusters, and there are two items (France and Poland) in the final cluster.

Based on the quantity of links, the United States and China have the largest linking forces, United Kingdom and China, respectively, (16, 14, and 10) in Figure 5. In addition, France, Canada, and Italy have average of 9 linkings.

2.Co-Citation Analysis (Source, Author)

When the numerical findings from Figure 6 were analyzed, Devenuto D was the co-author who received the most citations,

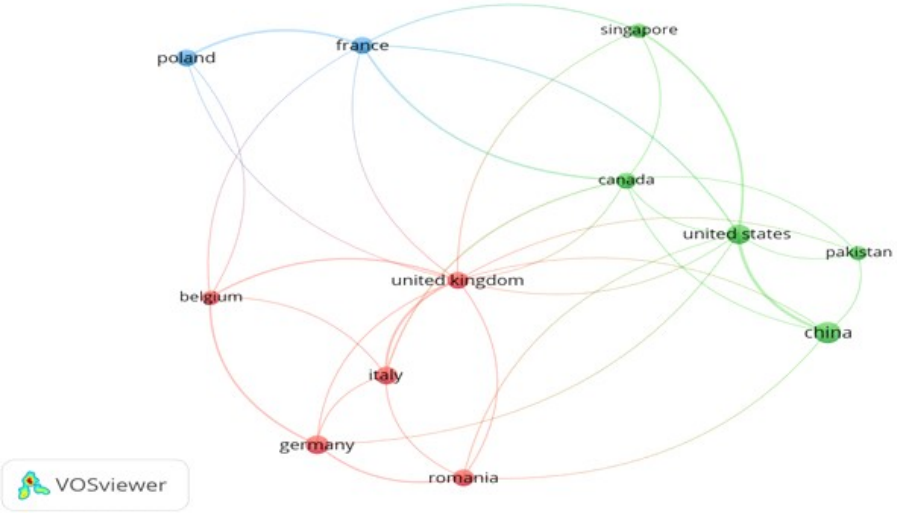


Figure 5: Co-Authors' Countries Cooperation Map

totaling 60. Zhang Y is cited 53 times. The other writers in the list are Wang and Blankertz B., who have 52 and 49 references, respectively, placing them first and second in terms of linking force and citation count. Conversely, Devenuto D came in first for both linking force and citation count. This indicates that despite receiving a large number of references, the author collaborates extensively with other writersA Figure 7 presents a visual representation of the authors' collaboration network, which was generated through a common citation-writer analysis. This analysis revealed the existence of four distinct clusters within the network. The largest of these clusters, highlighted in red, consists of 12 authors who have collaborated extensively with one another. The green cluster contains four authors, while the blue and yellow clusters each have two authors. Upon closer inspection of Figure 7, it becomes evident that two authors, Lij and Wang J, stand out from the rest due to their strong connecting force, which is more pronounced compared to the other writers in the network. The image also illustrates the numerous linkages and connections between the various authors within the collaboration network.

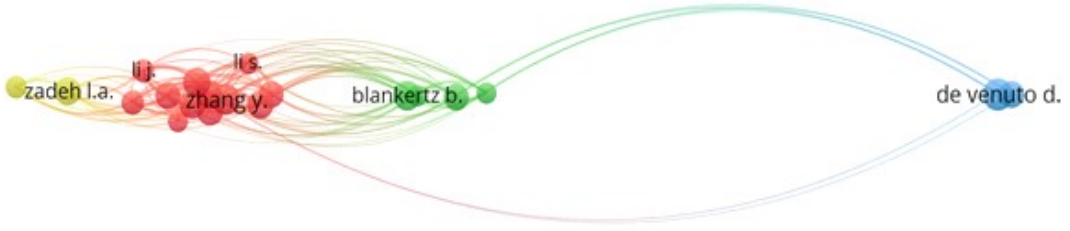
Table 2: Co-Citation Author Analysis, High Author's Citation (Screen Capture).

Author	Citations	Total link strength
de venuto d.	60	920
annese v.f.	41	901
blankertz b.	49	368
tangermann m.	26	272
muller k.-r.	27	248
donchin e.	41	210
zhang y.	53	177
wang x.	40	174
li y.	47	129
wang j.	52	103
li s.	26	95
li x.	45	67

Table 2 presents a visual representation of the most frequently cited sources, specifically focusing on the journals that have been referenced in the research on ERP-AI topics. Upon closer examination of Figure 8, it becomes evident that the journal with the highest number of citations is the "European Journal of Operational Research." This prestigious journal has been cited a total of 119 times within the research articles analyzed. Following closely behind is the "Expert Systems with Applications" journal, which has garnered 112 citations. The information provided in Figure 8 clearly demonstrates that as the number of citations for a particular journal decreases, the connecting force or strength of the citation linkages also tends to diminish proportionally. This observation highlights the correlation between the frequency of citations and the significance or impact of the cited journal within the research landscape. Figure 9 displays the visual map illustrating the journals' partnership. It is recognized that the sources are grouped into three groups, each represented by a distinct hue on Figure 9's journal network map. It can be observed that "Expert Systems with Applications" is the journal with the most number of links. In terms of collaboration, this publication is followed by "Nuroimage," "International Journal of Production Research," "Clinical neurophysiology," and "Journal of operational management."

Table3: Co-Citation Author Analysis, High Author's Citation (Screen Capture).

Source	Citations	Total link strength
european journal of operational research	167	119.30
expert systems with applications	190	112.24
international journal of production economics	136	100.41
international journal of production research	118	82.07
decision support systems	107	77.96
computers in industry	77	54.22
information & management	59	50.11
business process management journal	61	42.44
harvard business review	46	35.56
mis quarterly	57	32.91
psychophysiology	93	31.60
neuroimage	115	29.60



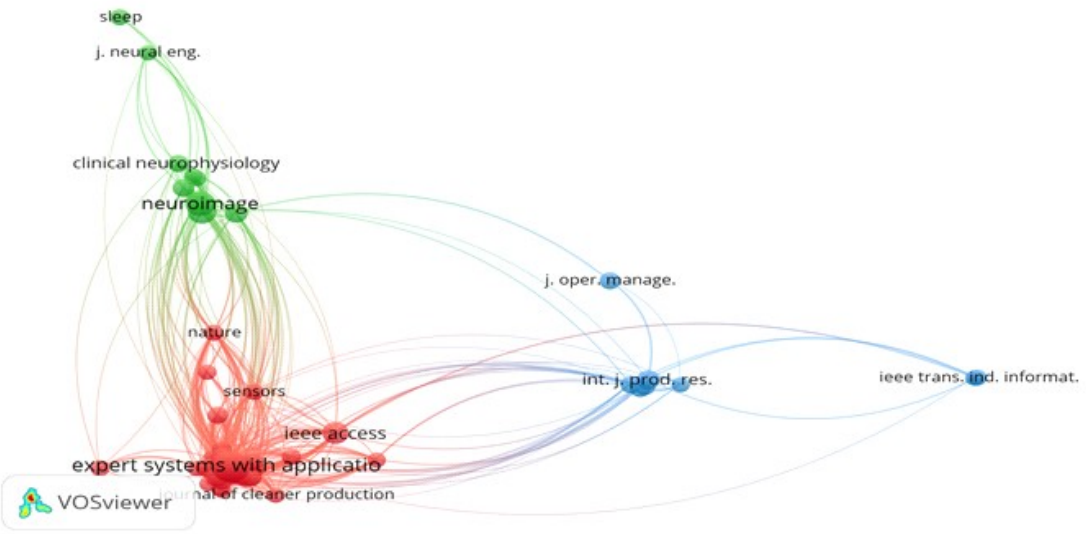


Figure 6: Co-Citation - Source Analysis and Journal-To-Journal Citation Network

3.Co-Occurrences Analysis (Keywords)

After analyzing the data for common keywords in the first place, 5237 common keywords were found. Subsequently, the same meaning was altered by removing typos and replacing certain words. "Enterprise resource planning," "fuzzy logic," and "automation" were the most often utilized terms.

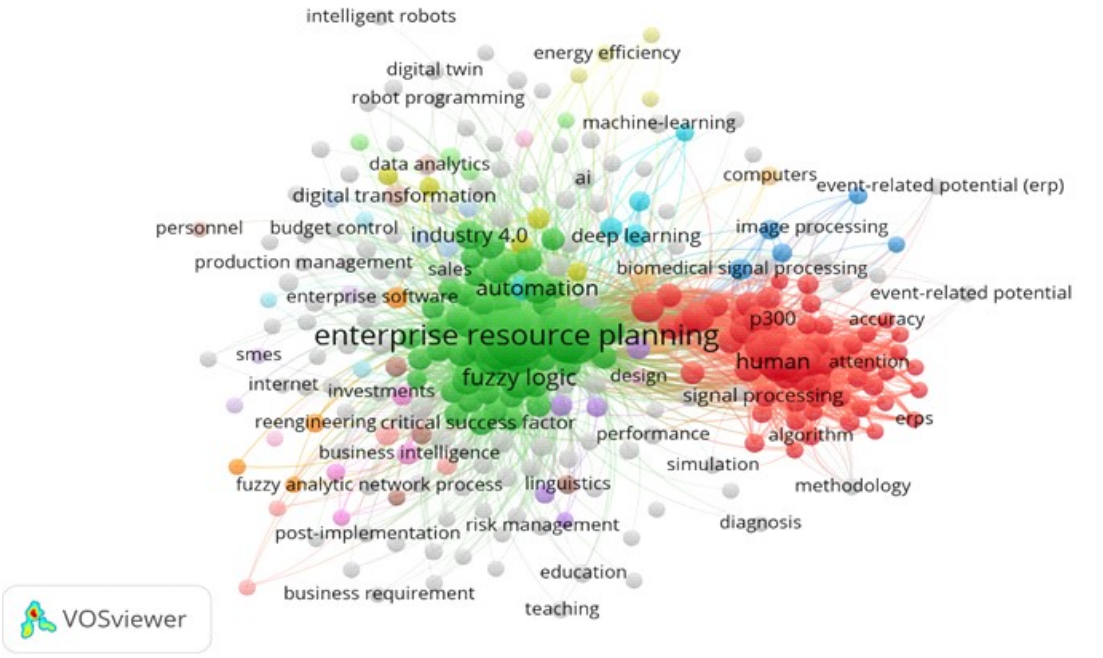


Figure 7: The result of Co-occurrence Keyword Analysis

VIII.CONCLUSION

A total of 613academic papers were examined to determine the present research landscape in the domain of ERP-AI. A descriptive analysis and bibliometric analysis of research articles were performed for the period from 2009 to 2023.Through this study, the most significant players in this domain were revealed. 2021 is a productive year for ERP-AI publishing. Orosz T. is the most productive author in terms of the number of publications, while Obuda University is the most productive institution in terms of academic publications. The United States has the largest number of academic papers on this topic. Computer science has the highest percentage of distribution by subject area. "Fuzzy logic," "automation," and "enterprise resource planning" are the most often utilized terms. In summary, this paper proposes a possible future workline in ERP-AI.

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TRANSFORMATIONAL LEADERSHIP AND THE WORK-FAMILY-CREATIVITY NEXUS: A CORRELATIONAL STUDY IN HEALTHCARE ADMINISTRATION IN KERALA

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ABSTRACT

Transformational leadership plays a crucial role in shaping workplace outcomes, yet its relationship with work-family enrichment and creative problem-solving remains underexplored. This study examines the relationships between transformational leadership, work-family enrichment, and creative problem-solving among administrative professionals in private and government healthcare institutions in Kerala. A total of 380 participants were surveyed using the Multifactor Leadership Questionnaire (MLQ) for transformational leadership, the Work-Family Enrichment Scale (WFES) for work-family enrichment, and the Creative Problem-Solving Attributes Inventory (CPSAI) for creative problem-solving. Results indicate a significant difference in work-family enrichment between private and government healthcare professionals, with government employees reporting higher enrichment levels. However, no significant difference was found in transformational leadership and creative problem-solving across the two sectors. Correlation analysis revealed strong positive relationships among all three variables, suggesting that transformational leadership is associated with higher work-family enrichment and enhanced creative problem-solving. These findings contribute to leadership research by emphasizing the connections between transformational leadership, work-family dynamics, and problem-solving abilities in healthcare settings. Future research could explore potential mediators and moderators, such as job satisfaction and organizational culture, to gain deeper insights into these relationships. Findings offer valuable implications for healthcare administrators aiming to implement leadership strategies that support both employee well-being and innovation.

Keywords: *Transformational Leadership, Work-Family Enrichment, Creative Problem-Solving, Healthcare Administration, Leadership Dynamics*

1.INTRODUCTION

Leadership plays a pivotal role in shaping workplace dynamics, influencing not only employee performance but also personal well-being. Transformational leadership, a concept introduced by Bass (1985), is a leadership style that inspires and motivates employees to exceed expectations by fostering a shared vision, intellectual stimulation, and individualized support. Leaders who exhibit transformational qualities tend to enhance their employees' engagement, creativity, and overall job satisfaction (Bass & Riggio,

2006). Recent studies (Nguyen et al., 2021; Ali et al., 2022) suggest that transformational leadership is crucial in promoting psychological safety and fostering innovation within organizations. While transformational leadership has been extensively studied in relation to job performance and motivation, its influence on work-family enrichment and creative problem-solving remains underexplored, particularly within healthcare administration.

Work-family enrichment is the positive transfer of resources, skills, and experiences between work and family domains (Greenhaus & Powell, 2006). It suggests that a fulfilling work environment can enhance family life and vice versa. When employees feel that their work complements their personal lives, they experience greater job satisfaction, reduced stress, and increased creativity. In high-pressure environments such as healthcare administration, where employees juggle complex tasks and responsibilities, understanding the impact of leadership on work-family dynamics is crucial. Recent research (Zheng et al., 2023) indicates that supportive leadership styles contribute significantly to employee resilience and well-being, reinforcing the importance of transformational leadership in work-life balance.

Creativity in problem-solving is another essential aspect of professional success, particularly in administrative roles within healthcare. Creative problem-solving refers to an individual's ability to develop innovative solutions to complex challenges (Mumford et al., 2002). Given that healthcare administration requires strategic thinking, adaptability, and innovation to manage resources effectively, fostering creative problem-solving abilities in employees is vital for improving institutional efficiency. Recent findings (Park et al., 2022) highlight that transformational leadership is associated with higher levels of workplace creativity, particularly when employees experience psychological empowerment and autonomy.

Despite existing literature on transformational leadership, there is a significant gap in understanding its interplay with work-family enrichment and creativity, especially within the healthcare sector. This study aims to address this gap by exploring how transformational leadership influences these two critical factors among healthcare administrative professionals in Kerala, India. By examining these relationships, we can provide insights into how leadership styles shape workplace outcomes and employee well-being, ultimately offering recommendations for effective leadership strategies in healthcare administration.

11.METHODOLOGY

1.Sample

The study involved a total of 380 administrative professionals working in both private and government healthcare institutions across Kerala, India. Participants were selected through stratified random sampling to ensure balanced representation from both sectors. The sample included individuals from various administrative roles, such as hospital managers, HR personnel, finance officers, and operational staff, who directly influence institutional efficiency and workforce policies.

2.Data Collection Procedure

Data was collected through structured questionnaires distributed both online and in person. Participants were informed about the study's purpose and assured of confidentiality before providing consent. The survey took approximately 20–25 minutes to complete.

3.Instruments

a.Multifactor Leadership Questionnaire (MLQ): Developed by Bass and Avolio (1995), the MLQ measures transformational leadership across dimensions such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. The instrument is widely validated and has been used extensively in leadership studies.

b.Work-Family Enrichment Scale (WFES): The WFES, developed by Carlson et al. (2006), assesses the extent to which experiences in one domain (work or family) enhance the other. It includes subscales measuring both work-to-family and family-to-work enrichment.

c.Creative Problem-Solving Attributes Inventory (CPSAI): The CPSAI evaluates an individual's ability to generate innovative solutions. It measures attributes such as originality, flexibility, and problem sensitivity, which are critical in high-stakes environments like healthcare administration.

III.ANALYSIS

Statistical analyses were performed using SPSS. Independent samples t-tests were conducted to compare the mean scores of transformational leadership, work-family enrichment, and creative problem-solving between private and government healthcare professionals. Pearson correlation analysis was used to examine relationships among these variables.

1.Results

Table 1: Comparison of Mean Scores Between Private and Government Sectors

Variables	Private Sector (n=190)	Government Sector (n=190)	t-value	p-value
Transformational Leadership	3.45 (SD=0.56)	3.50 (SD=0.60)	-0.89	0.37
Work-Family Enrichment	3.20 (SD=0.65)	3.60 (SD=0.70)	-5.71	0.001**
Creative Problem-Solving	3.75 (SD=0.50)	3.80 (SD=0.55)	-1.00	0.32

*Source: Primary Data *Note: *p < 0.01*

Results indicate a significant difference in work-family enrichment between private and government healthcare professionals ($p < 0.001$), with government employees reporting higher enrichment levels. However, no significant differences were observed in transformational leadership and creative problem-solving across the two sectors.

Table 2: Pearson Correlation Coefficients Among Variables

Variables	1	2	3
1. Transformational Leadership	1		
2. Work-Family Enrichment	0.65**	1	
3. Creative Problem-Solving	0.60**	0.55**	1

*Source: Primary Data *Note: *p < 0.01*

The correlation analysis reveals strong positive relationships among all three variables. Transformational leadership is positively correlated with work-family enrichment ($r = 0.65$, $p < 0.01$) and creative problem-solving ($r = 0.60$, $p < 0.01$). Additionally, work-family enrichment is positively correlated with creative problem-solving ($r = 0.55$, $p < 0.01$).

IV.DISCUSSION

The findings suggest that transformational leadership is significantly associated with higher levels of work-family enrichment and enhanced creative problem-solving among healthcare administrative professionals. This aligns with previous research indicating that transformational leaders foster a positive organizational culture, promoting employees' work-life balance and innovative capacities (Bass &Riggio, 2006). Transformational leaders encourage autonomy, provide intellectual stimulation, and support employees on an individual level, all of which contribute to a work environment conducive to both professional and personal enrichment (Nguyen et al., 2021).

The significant difference in work-family enrichment between private and government sector employees may be attributed to variations in organizational policies, workplace flexibility, and institutional support systems. Government healthcare institutions may offer more structured work-life balance programs, job security, and employee benefits that facilitate higher levels of work-family enrichment compared to the private sector, where work demands and job expectations may be more stringent (Zheng et al., 2023). These differences underscore the role of institutional support in shaping employees' experiences at the intersection of work and family life.

Moreover, the strong correlation observed between work-family enrichment and creative problem-solving highlights the importance of a supportive work environment that acknowledges the dynamic interplay between personal and professional domains. Employees who experience positive spillover effects from work to family and vice versa tend to exhibit greater cognitive flexibility, resilience, and innovation—factors crucial for problem-solving in healthcare administration (Park et al., 2022). Thus, organizations aiming to enhance creativity and problem-solving capabilities should consider policies that promote work-family balance.

V.IMPLICATIONS

Given the study's findings, healthcare administrators should prioritize leadership development initiatives that cultivate transformational behaviors among managers and supervisors. Training programs focused on transformational leadership can equip leaders with the skills to inspire, mentor, and support employees, fostering an environment that enhances work-family enrichment and creative problem-solving abilities. In turn, this can lead to improved organizational performance, higher job satisfaction, and greater innovation in healthcare administration. Furthermore, organizations should invest in supportive work-life policies, such as flexible work arrangements and wellness programs, to further strengthen the positive outcomes associated with transformational leadership.

VI.LIMITATIONS

Despite the valuable insights provided by this study, certain limitations must be

acknowledged. The cross-sectional research design restricts the ability to establish causal relationships among the variables. While significant associations were identified, it remains unclear whether transformational leadership directly enhances work-family enrichment and creative problem-solving, or if other mediating factors contribute to these relationships. Future research should employ longitudinal designs to examine the causality and long-term effects of transformational leadership on work-family dynamics and innovation.

Additionally, the study relied on self-reported measures, which may be subject to biases such as social desirability and subjective interpretation. Participants may have overestimated or underestimated their experiences, potentially influencing the findings. Future research could incorporate multi-source data collection methods, including supervisor and peer evaluations, to validate the observed relationships more comprehensively.

Furthermore, the study focused exclusively on healthcare administrative professionals in Kerala, limiting the generalizability of findings to other geographic regions or occupational contexts. Future research could explore similar relationships in different cultural or organizational settings to determine whether the patterns observed in this study hold across diverse populations and industries.

CONCLUSION

This study provides valuable insights into the relationship between transformational leadership, work-family enrichment, and creative problem-solving among healthcare administrative professionals. The findings highlight the significant role of transformational leadership in fostering a supportive work environment that enhances employees' personal and professional growth. The observed sectoral differences in work-family enrichment emphasize the importance of organizational policies and institutional support in shaping employees' experiences. Given the strong correlation between work-family enrichment and creative problem-solving, healthcare institutions should prioritize leadership strategies and policies that promote work-life balance and innovation. By investing in leadership development programs and supportive workplace initiatives, organizations can enhance both employee well-being and organizational effectiveness.

Future research should address the study's limitations by employing longitudinal designs, incorporating multi-source data collection methods, and exploring these relationships in diverse cultural and professional settings. A deeper understanding of these dynamics can inform more effective leadership practices and organizational policies that support both employee development and institutional success.

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THE IMPACT OF ETHICAL CLIMATE ON EMOTIONAL ENGAGEMENT IN HANDLOOM INDUSTRY-A STUDY WITH REFERENCE TO THIRUVANANTHAPURAM

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ABSTRACT

The handloom industry in Kerala holds a significant place in the socio-economic and cultural fabric of the state. Renowned for its rich tradition and heritage, Kerala's handloom sector is celebrated for its unique designs, superior quality, and intricate weaving techniques that have been passed down through generations. This industry primarily operates in a decentralized manner, involving numerous small-scale and household weavers who contribute to a diverse range of products. The impact of ethical climate on emotional engagement has emerged as a critical area of study in organizational behavior, reflecting the intersection between moral principles and employee well-being. Ethical climate refers to the shared perceptions of what constitutes appropriate behavior within an organization, shaping the moral framework and guiding ethical decision-making. This abstract synthesizes findings from various research studies to explore how different types of ethical climates influence emotional engagement among employees. The main objectives of the study are to examine how ethical behavior affects employee's emotional attachment to the organization. To study the employee collaboration and cooperation in executing business activities and making decisions. To study the impact of ethical climate on emotional engagement. The data was collected through survey responses using a closed structured questionnaire in which the sample comprised of 50 employees working at Hantex, Trivandrum. Data was analyzed by using descriptive statistics, Correlation and Regression Analysis. The finding shows that there is a strong positive relationship between Ethical climate and Emotional Engagement. The relationship between ethical climate and emotional engagement is mediated by several factors, including perceived organizational support, leader-member exchange, and the alignment of personal and organizational values. Moreover, the ethical climate's impact on emotional engagement is moderated by individual differences, such as moral identity and resilience, indicating that personal attributes can either amplify or mitigate the effects of the ethical climate. In conclusion, fostering a positive ethical climate is pivotal for enhancing emotional engagement, which in turn drives organizational performance and employee well-being. Organizations are encouraged to cultivate ethical practices, promote ethical leadership, and ensure alignment between stated values and everyday actions to build a robust ethical climate. Future research

should continue to explore the nuances of this relationship, particularly in diverse cultural and organizational contexts, to develop comprehensive strategies for nurturing ethical and emotionally engaging workplaces.

Keywords: *Handloom Industry, Ethical Climate, Emotional Engagement*

I.INTRODUCTION

The handloom industry, known for its rich cultural heritage and significant economic contributions, particularly in regions like Thiruvananthapuram, is a critical sector in India. It is characterized by the intricate craftsmanship of weavers and the unique traditional textiles produced. However, in recent times, the sustainability and growth of this industry have faced numerous challenges, including competition from mechanized production, changing consumer preferences, and socio-economic issues. Amid these challenges, the ethical climate within the handloom industry emerges as a pivotal factor influencing various organizational outcomes, including emotional engagement among workers. Ethical climate refers to the shared perception of what is ethically correct behavior and how ethical issues should be handled within an organization. It encompasses the policies, procedures, and practices that promote ethical behavior and decision-making. In the context of the handloom industry, which often involves small-scale, family-run enterprises and cooperative societies, the ethical climate can significantly impact worker morale, satisfaction, and emotional engagement.

Emotional engagement in the workplace is a crucial element that drives productivity, innovation, and overall job satisfaction. It is defined as the emotional and psychological attachment an employee has towards their organization and its goals. For handloom weavers, who often work in environments marked by physical labor, intricate skill requirements, and economic uncertainty, emotional engagement can be deeply influenced by the ethical standards and practices observed by their employers.

In Thiruvananthapuram, the handloom sector holds a special place due to its historical and cultural significance. The region's weaving traditions are not only a source of livelihood for many but also an embodiment of local identity and heritage. Understanding the impact of ethical climate on emotional engagement within this context is vital for several reasons. Firstly, it can provide insights into how ethical practices can enhance worker satisfaction and retention in an industry that is struggling to attract and retain skilled labor. Secondly, it can help identify strategies to foster a positive work environment, thereby improving productivity and the overall quality of the handloom products. Lastly, this understanding can contribute to the broader discourse on sustainable development in traditional industries, balancing economic viability with social and ethical responsibilities.

This research aims to explore the nuanced relationship between ethical climate and emotional engagement in the handloom industry of Thiruvananthapuram. By examining this relationship, the study seeks to shed light on how ethical practices can be leveraged to create a more emotionally engaging work environment for handloom

weavers. It will also consider the broader implications for policy-making and industry practices, with the goal of fostering a sustainable and ethically responsible handloom sector that honors its cultural legacy while adapting to contemporary challenges. Through this study, we hope to contribute valuable insights to the ongoing efforts to revitalize the handloom industry and enhance the well-being of its artisans.

II.OBJECTIVES OF THE STUDY

- To study on how ethical behavior affects employees emotional attachment to the organization.
- To study the employee collaboration and cooperation in executing business activities and making decisions.
- To study the impact of ethical climate on emotional engagement.

III.NEED & SIGNIFICANCE OF THE STUDY

Ethical climate within the workplace is a key determinant of employee behavior, satisfaction, and overall well-being. In the context of the handloom industry, where workers are often engaged in labor-intensive tasks and operate in close-knit community settings, the ethical standards upheld by organizations can profoundly impact their emotional engagement. There is a pressing need to explore this relationship to identify ways to foster a positive and motivating work environment.

IV.LIMITATIONS OF THE STUDY

- The cost and time were the limiting factor in this project work.
- The study was based on questionnaire method. Hence it is limited to the data collected.
- The entire population could not be covered due to time constraints.
- The usual hindrances in data collection like non-response, error in consistent response are being faced.
- The validity of the study makes changes according to the prevailing situation.

V.STATEMENT OF THE PROBLEM

The statement of the research problem of the study is the Impact of Ethical Climate on Emotional Engagement of the employees. The study was conducted in the "Kerala State Handloom Weavers Co-Operative Society Ltd, Thiruvananthapuram" with a view to analyse how ethical behavior affects employees' emotional attachment to the organization and their collaboration and cooperation in executing business activities and making decisions. Hence it is relevant to analyse the impact of ethical climate on emotional engagement provided by the organization to know about the satisfaction of employees regarding the ethical climate opted by the organisation..

VI.LITERATURE REVIEW

1.Ethical Climate

Ethics is basically to distinguish the good from the bad, the right from the wrong, and always to act as per the good and the right (Miesing and Preble, 1985). Conceptually the ethical climate is a type of organizational work climate.

Victor and Cullen are the first researchers who introduce the construct of ethical climate in 1987 and are known as the "fathers" of ethical climate. It is believed that just like individuals corporates have their own sets of ethics help define their characters. The sociocultural environment, organizational

form, and organization specific history are identified as determinants of the ethical climates in organizations. Victor and Cullen (1988) developed a typology of nine theoretical ethical climate types, and after a factor analysis of the nine types, discovered five ethical climate factors emerging from the data. Theoretically, all nine types are possible in organizations, but five types occur most often (Simha & Cullen, 2012). These five climate types have been studied by a number of authors and results show that a positive ethical climate is negatively related to ethical problems involving human resource management (Bartels, Harrick, Martell & Strickland, 1998), is positively related to job satisfaction (Tsai & Huang, 2008; Wang & Hsieh, 2012) and organizational commitment (Bulutlar & Oz, 2009; Shafer, 2009), and is negatively related to absence frequency (Shapiro Lischinsky & Rosenblatt, 2009). The five ethical climate types are labeled caring, law and code, rules, instrumental and independence. The caring climate is characterized by the organization being concerned about the good of all people in the company as a whole, and expecting each person to do what is right for the customers and the public. The law and code climate type is depicted as a climate in which people are expected to strictly follow legal and professional standards over and above other considerations. The rules climate type emphasizes company rules and procedures. Employees are expected to strictly obey company policies. The instrumental climate type is characterized by employees who are expected to do whatever it takes to further the company's interests, regardless of the consequences. Generally, people in the instrumental climate protect their own interests above all else. The last ethical climate type is independence. This climate type allows employees to decide for themselves what is right and wrong; thus, people are guided by their own personal ethics. Taking the right action in an organization when faced with a decision that influences other people is related to the work climate of the organization. This work climate determines what constitutes ethical behavior at work (Victor and Cullen, 1988).

In 1988, Martin and Cullen have created an ethical climate model they based Ethical Climate Theory (ECT) both on ethical philosophy and sociological theory of reference groups. The ethical philosophical dimension is inspired from Koh1984) moral development study. The locus of analysis which constitutes the sociological dimension of ECT completes the classification of ethical climate types. Victor and Cullen (1988) based the sociological dimension of ECT on sociological theory of Merton (1968) and its application to organizational contexts.

According to Schneider (1975). In psychological perspective, work climate means the status that people are willing to characterize a system's practice and procedure. And the same author described the ethical climate as a concept that describes the stream of an organization concerning the norms, the values, and the behavior itself. Ethical climate, introduced into the literature by Victor and Cullen (1988), in an organization refers to the behaviors that are perceived to be ethically correct and how issues regarding deviations away from those expected behaviors are handled in the organization. Hence, the ethical climate is a type of organizational climate that refers to behaviors perceived to be satisfactory or generally accepted in a given environment

(Moore and Moore, 2014). If the employees are supposed to work in a caring climate, the employees will also care about the well-being of others and the organization; if employees are supposed to work in a rules climate, the employees are expected to obey the rules and regulations (Fu et al., 2020).

2.Employee Engagement

The emotional aspect of employee engagement concerns how employees feel about each of the employee engagement factors and whether they have positive or negative attitudes toward the organization and its leaders (Kahn, 1990). According to May et al. (2004), employee engagement is related to emotional experiences and well-being. Employees feel emotionally engaged with each other as well as with the work (Cleland et al., 2008). Engaged employees are emotionally attached to their organization and highly involved in their job with great enthusiasm for the success of their employer, going the extra mile beyond the employment contractual agreement.Frank (2004) although it is acknowledged and accepted that employee engagement is a multi-faceted construct, as previously suggested by Kahn (1990). Goddard (1999) describes engagement with the organization and the task to be associated with time use. Difference in skills ,abilities and disposition variables are also expected to impact the levels of employee engagement .Gender difference have been found to impact employee engagement, personal values, culture and climate of organizations also influence employee engagement. climate includes aspects such as systems and satisfaction with organization while culture includes accepts such as community .there also exists a strong correlation between complex feeling and emotions. The focus should be on personality, cognition and environment forces that determine an individual behavior in organization

Kahn (1990) demonstrated that work engagement, emotional connection to other organizational members, and task performance are all interrelated, where functionality in relationships is dependent upon members feeling emotionally bound to each other, "experiences of feeling themselves joined, seen and felt, known, and not alone" in the context of work. Towers-Perin (2003) suggested that "the emotional factors tie to people's satisfaction and the sense of inspiration and affirmation they get from their work and being part of their organization". Engagement has been studied as a multidimensional construct consisting of three subtypes: behavioral, cognitive, and emotional (Fredricks et al., 2004). More specifically, engaged employees are also more likely to display discretionary behavior. Engagement has been found to be closely linked to feelings and perceptions around being valued and involved, which in turn generates the kinds of discretionary effort that lead to enhanced performance (Konrad, 2006).

Fox (1974) argued that despite an elaborate external controlling structure being in place,no role can be totally diffuse or totally specific; even in jobs which are tightly controlled, some outstanding element of discretion always remains. In cases where employees have been given some control over how they do their jobs, positive benefits have appeared to merge. For example, previous research in the UK has looked at job redesign and the impact this has had on engagement. In 1990 research was carried out by the University of Sheffield on factory workers and

the number of injuries they reported given the differing levels of control over their work.

VII.RESEARCH METHODOLOGY

1.Type of Research

Descriptive research was used to study the impact of Ethical behaviour on Emotional Engagement of employees of Handloom industry in Trivandrum District and will include surveys and fact finding enquiries of different kinds.

2 Methods of Data Collection

a.Primary Data:was collected from the employees working in the Handloom Industry. Primary data was collected through Questionnaires

b.Secondary Data:was collected from published/ unpublished literature on Ethical climate in the handloom industry, emotional engagement of employees, latest references available from the journals, newspapers, research publications and magazines, past records and training reports of the handloom industry, and other relevant sources like internet.

c.Questionnaire: Design and Implementation: The questionnaire design was done with the aid of experts in statistical techniques and taking into account the measurement needs & objectives of the study. The questionnaire was administered to the sample population and sample size.

d.Sampling Techniques: For this study different level of employees was taken into consideration. The categories of employees considered were: Manager Level Employees and Associate Level Employees. The sample was based on the number of employees working in Handloom. This involves a total of 50 samples from both the occupational level of the respondents from handloom units of Trivandrum city including male and female.

VIII. DATA ANALYSIS & INTERPRETATION

The data collected was analysed using basic and advanced analytical tools. Also includes the detailed analysis of the data which was conducted with the purpose of attaining the objectives of the research. Mentioned below is the analysis which is presented in tabulated form for better interpretation. The interpretation of the collected data was done by drawing inferences from the collected facts after the analysis of the study.

Table 1: Percentage Analysis

Demographic Variable	Category	Percentage
Gender	Male	56
	Female	44
Age	Below 25	8
	26-35	44
	36-45	40
	Above 46	8
Tenure	Less than 1 year	16
	Between 1-3 years	20
	Between 3-5 years	32
	More than 5 years	32
Education Level	SSLC	32
	Higher Secondary	40
	Graduate	20
	Post Graduate	8

Source: Primary Data

Out of the total 50 respondents 56 % of the respondents are female and 44% of the respondents are male. The respondent's age below 25 is 8%. 44% of the respondents are having age between 26-35, 40% of the respondents have age between 36-45 and 8% of the respondents have age above 45.

From the above table it is cleared that 16% of the respondents have tenure less than one year, 20% of the respondents has tenure between 1 to 3 years, 32% of the respondents have tenure between 3 to 5 years, and 32% of the respondents have tenure above 5 years. The above table reveals that 32% of the respondents have SSLC, 40% of the respondents have secondary, 20% of the respondents have graduate, and 8% of the respondents have post-graduation..

Table 2: Factors contributing Ethical Climate and Emotional Engagement

Factors	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
No room for Employee Morals and Ethics	20	28	40	8	4
Employee Interest	24	28	28	12	8
Employees Expectations	12	40	28	12	8
Employees rules and procedures	8	12	40	28	12
Employees work and company's interest	12	16	44	16	12
Company's interest & employee's benefits	8	20	40	24	8
Employee work efficiency	4	4	36	40	16
Employer expectations of employees work efficiency	4	4	36	40	16
Employees reaction towards company policy	8	8	40	24	20
Consideration of Law and Ethical code of conduct	12	12	40	20	16
Consideration of professional standard and Law	12	12	40	16	20
Employees emotional attachment towards company	4	4	24	36	32
Sense of belonging	4	4	12	44	36
Connection between employee values and company values	4	8	24	36	28
Consideration of employee by employer	4	4	24	36	32
Importance of company success through employee	4	4	16	36	40

Source: Primary Data

From the above table, it is revealed that 20% of the respondents are strongly disagreeing and 40% of the respondents moderate on the opinion that there is no room for employee's personal morals or ethics in the company.It is clear that majority of the respondents (28%) are disagreeing and moderate on the opinion that people are guided by their own personal ethics. Majority of the respondents (36%) are agreed to the opinion that, they feel emotionally attached to the strategic choices of the company.

1.Correlation Analysis

Table 3: Employee Morals & Ethics and Connection Between Employee Values and Company Values.

		EMPLOYEE MORALS AND ETHICS	CONNECTION BETWEEN EMPLOYEE VALUE AND COMPANY VALUES
EMPLOYEE MORALS AND ETHICS	Pearson Correlation	1	.470*
	Sig. (2-tailed)		.018
	N	25	25
CONNECTION BETWEEN EMPLOYEE VALUE AND COMPANY VALUES	Pearson Correlation	.470*	1
	Sig. (2-tailed)	.018	
	N	25	25

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Primary Data

The above table shows that the correlation between employee morals and ethics and the connection between employee value & company value is 0.470 at 0.05 significant level.This means, there is a strong positive relationship between them.

Table 4: Employee's Reaction Towards Company Policy and Importance of Company Success Through the Employee

Correlations

		EMPLOYEE'S REACTION TOWARDS COMPANY POLICY	IMPORTANCE OF COMPANY SUCCESS THROUGH EMPLOYEE
EMPLOYEE'S REACTION TOWARDS COMPANY POLICY	Pearson Correlation	1	.735**
	Sig. (2-tailed)		.000
	N	25	25
IMPORTANCE OF COMPANY SUCESS TROUGH EMPLOYEE	Pearson Correlation	.735**	1
	Sig. (2-tailed)	.000	
	N	25	25

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

Source: Primary Data

The above table shows that the correlation between employee's reaction towards company policy and importance of company success through employee is 0.735 at 0.01 significant levels. This indicates that, there is a strong positive relationship between them.

2.Regression Analysis

Table 5: Importance Of Company Success Through Employee and Employee's Reaction Towards Company Policy

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.735[a]	.541	.521	.734

a. Predictors: (Constant), EMPLOYEE'S REACTION TOWARDS COMPANY POLICY

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.580	1	14.580	27.087	.000[b]
	Residual	12.380	23	.538		
	Total	26.960	24			

a. Dependent Variable: IMPORTANCE OF COMPANY SUCESS TROUGH EMPLOYEE

b. Predictors: (Constant), EMPLOYEE'S REACTION TOWARDS COMPANY POLICY

Source: Primary Data

The above table shows that the R is 0.735 and adjusted R square is 0.521. Which means that, the 52% of importance of company success through employee is explained by employee's reaction towards company policy.

Table 6: Overall means of Emotional Engagement and Overall means of Ethical Climate

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.787[a]	.619	.348	.37887

a. Predictors: (Constant), OVERALL MEANS OF ETHICAL CLIMATE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.270	10	.327	2.278	.047[b]
	Residual	2.010	14	.144		
	Total	5.280	24			

a. Dependent Variable: OVERALL MEANS OF EMOTIONAL ENGAGEMENT

b. Predictors: (Constant), OVERALL MEANS OF ETHICAL CLIMATE

Source: Primary Data

The table indicates that overall means of emotional engagement and overall means of ethical climate R is 0.787 and the adjusted R square is 0.619. Which implies that only 61% of the overall means of emotional engagement is explained by the overall means of ethical climate.

IX.RECOMMENDATIONS AND SUGGESTIONS

This study identified that there is a strong positive relationship between ethical climate and emotional engagement. So, in order to enhance employee emotional engagement, the company should concentrate on ensuring ethical climate. If there is a good ethical climate, the employees' team orientation attitude also will increase. There are some ways to improve an organization's ethical climate on emotional engagement. One way to improve the ethical climate of organization is to give employees more power over their work. The other one is improve communication policies and procedures. Make a regular practice of celebrating employee's successes. In addition to that, the management should work to build an ethical climate of benevolence focusing on friendship, team work, and social responsibility. According to this study, those efforts may lead to more emotionally engaged and team-oriented employees.

X.CONCLUSION

The study was conducted in Kerala state handloom weavers co-operative society ltd, Thiruvananthapuram. The findings of the study clearly show that the ethical climate, emotional engagement are at a high level among the samples, based on the findings of correlations analysis, there is a strong positive relationship between ethical climate and emotional engagement in the selected sample and this is consistent with the findings of the analysis that indicated that the perceived work place ethics climate were significantly and positively related to their level of employee engagement. The results of the regression analysis interpreted that the ethical climate has a significant positive impact on emotional engagement individually of the selected respondents. The results of the present study are supported by a previous study by Young (2012) that stated that the positive perceived culture and ethical workplace climate have a positive influence on employee engagement levels.

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TALENT MANAGEMENT PRACTICES AT IT SECTOR IN KERALA A SPECIAL FOCUS TO EMPLOYEES JOB STAY INTENTION

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ABSTRACT

In the contemporary business scenario, talent management is known as a wide spread retention strategy for talented employees, but how talent management leads to greater employee retention is an unexplored terrain. Based on an academic inquiry, the present article suggests a framework that introduces various variable for exploring how talent management practices influence employee's intention to stay. In addition, it discusses the effect of talent management practices on various dimensions of job stay intention. The multiple propositions suggested provides H.R practitioners with insights to strive for retention of talented employees through talent management, by focusing on various initiatives adopted in the talent management practices.

Keywords: *Talent Management, High potential employees, Employee retention*

I.INTRODUCTION

Job Stay Intention is an employee's intention to remain with their current employer for a certain period. In the context of talent management in IT companies, job stay intention is an important factor that organizations need to consider when developing their talent management practices. In the highly competitive IT industry, retaining talented employees is crucial for business success. High levels of turnover can be costly for organizations, both in terms of recruitment and training expenses, as well as lost productivity and knowledge transfer. Therefore, IT companies need to develop effective talent management practices to ensure that their employees remain engaged, motivated, and committed to their organization. By implementing effective talent management practices, IT companies can enhance job stay intention among their employees and retain their top talent. This can help to ensure that the organization has the necessary skills and expertise to succeed in a competitive industry .

II.LITERATURE REVIEW

1.Employee Recruitment, Retention and Engagement

Organizational commitment leads an employee's psychological balance in an equilibrium state. The effort taken by Hughes & Rog (2008) through their study tried to clarify what is meant by talent management and why it is important as well as to identify factors that are critical to its effective implementation. This commitment branches in part from the widely shared belief that human resources are the organization's primary source of competitive advantage, an essential asset that is becoming an increasingly

short supply. This article is expected to be valuable to anyone seeking to better understand talent management or to improve employee recruitment, retention, and engagement (Hughes & Rog, 2008).

2.Talented Employees are Assets to the Organization

The talented employees are an asset to the organization and their development and retention are the main functions of talent management. The examination conducted by Deery (2008) on her paper is the literature relating to retention of good employees and the role that Work Life Balance (WLB) issues in an employee's decision to stay or leave an organization. These recommendations include the need for legislation on maximum as well as minimum working hours, good role models at the workplace, flexible working hours and arrangements, sound recruitment and training opportunities and company family friendly work policies (Deery, 2008)

3.The Role of Talent Management is Remarkable

Talent management is an area where deep research is essential. The inquiry conducted by Collings & Mellahi (2009) revealed that despite a significant degree of academic and practitioner interest, the topic of talent management remains underdeveloped. This study suggests that key positions are not necessarily restricted to the top management team but also include key positions at levels lower than the top management team and may vary between operating units and indeed over time. This study gives descriptions regarding strategic management (Collings & Mellahi, 2009)

4.War for Talent

The systematic management of human capital plays a pivotal role in organizations' wellbeing. The investigation conducted by Tarique & Schuler (2010) quoted that the environment for most organizations today is global, complex, dynamic, highly competitive, and extremely volatile, and is likely to remain so for years to come. The main objectives of this study are to understand the major challenges of organizations today. In this article we review academic work and attempt to organize that literature by creating an integrative framework for understanding and advancing further research in global talent management. A discussion of possible criteria of global talent management effectiveness completes the framework. Through this study the 24 Review of Literature authors reveled war for talent, high potentials, and globalization (Tarique & Schuler, 2010).

5.Corporate HR Function and GTM

The talent management is related with international equal by its competition for talent. We currently know very little about the role of the corporate human resource function in multinational companies regarding global talent management, according to the critical study of Farndale et al., (2010). The objectives of this study are to analyze the role of the corporate human resource function in multinational corporations regarding global talent management. We then advance our standing of GTM theory and practice by considering the major challenges facing corporate HR (Farndale et al., 2010).

6.Turnover, Value Addition and TM

The employee engagement, turnover avoidance and value addition are positively related to talent management. The paper handled by Bano et at., (2011) aims to integrate research on talent management with employee attitudinal outcomes and organizational effectiveness. The study reveals that talent management has positive significant influence on employee attitudinal outcomes and organizational 25 Review of Literature

effectiveness e.g., employee work engagement, turnover avoidance, and value addition. They conclude that organizations, which are enthusiastic for gaining competitive advantage over their business rivals, need to manage their talent in vigilant and effective ways. (Bano et al., 2011)

7.Retention of Employees Reduces Turnover Costs

The retention of employees in the organization is a great task for management. The study conducted by Irshad (2011) described the relationship between human resource practices and employee retention in each organization. The review of the related literature unanimously acknowledges that successful organizations share a fundamental philosophy of valuing and investing in their employees as fundamental mean of achieving competitive advantage amongst organization (Irshad, 2011).

8.Talent Management and Employee Retention

The talent management and the proper employee retention have positively influenced the organization's success. The study administered by Dave (2012) reveals talent management and retention strategies with special reference to pharmaceutical industry. The important objectives of the study are to investigate and better understand talent management and retention practices in the context of pharmaceutical industry, to quantify trends in retaining talent by understanding the pattern of turnover, it assesses the causes of attrition in Indian context in general and in pharmaceutical industry in particular, as well as its consequences over the production and productivity of the industry (Dave, 2012).

III.OBJECTIVE OF THE STUDY

- To evaluate the Job, stay intention at IT companies practicing Talent Management.

H1: There is difference in the Job stay intention at IT companies practicing Talent Management

IV.Methodology

The work is descriptive in nature.HR Managers and employees working in IT companies in Kerala are taken as the sample population for the study. Researcher distributed questionnaires to one HR Manager and 10 employees are selected conveniently from 50 companies. The sample constitutes 50 HR managers and 500 employees based on purposive sampling. Primary data were collected from HR managers and Employees of IT sectors situated at Technopark and Infopark in Kerala through a structured questionnaire. Besides primary data, secondary data are also used. This article follows the same methodology as per my PhD research.

V.DATA ANALYSIS AND INTERPRETATION

Table 1: Job Stays Intention at IT Companies - Final Cluster Centre's

Job Stay Intention	Cluster	
	Employees	HR Manager
Personal Reasons	5	3
Job Morale	5	4
Available Opportunity	5	3
Quality Supervision	4	3
Sufficient Working Time	4	3
Satisfaction With Company	4	4
Convenient Retirement	3	4
Total	30	24

Source: Primary Data

Table 1, explains according to the Employees perspectives, the score assigned for Job stay intention at IT companies practicing Talent Management is Personal Reasons (Strongly Agree), Job morale (Strongly Agree), Available opportunity (Strongly Agree), Quality supervision (Agree), Sufficient working time (Agree), Satisfaction with company (Agree), Convenient retirement (Moderately Agree).

According to the HR manager, the score assigned for Job stay intention at IT companies practicing Talent Management is Personal Reasons (Moderate Agree), Job morale (Agree), Available opportunity (Moderate Agree), Quality supervision (Moderately Agree), Sufficient working time (Moderately Agree), Satisfaction with company (Agree) and Convenient retirement (Agree).

Table 2: Job Stays Intention at IT Companies - Anova

Job Stay Intention	Cluster		Error		F	P value
	Mean Square	Df	Mean Square	df		
Personal Reasons	143.110	1	.327	549	437.076	.001
Job Morale	109.320	1	.269	549	407.066	.001
Available Opportunity	161.206	1	.301	549	514.488	.001
Quality Supervision	90.407	1	.872	549	128.647	.001
Sufficient Working Time	31.863	1	.853	549	37.376	.001
Satisfaction With Company	1.375	1	.840	549	1.637	.202
Convenient Retirement	28.042	1	1.132	549	24.765	.001

Source: Primary Data

Table 2 shows the statistical significance of the cluster effect on the various *Job stay intention at IT companies* was further evaluated with the support of the Anova test. In all the cases, the p value obtained is lower than 5percent (level of significance), except the Satisfaction with company (P value 0.202). Hence the null hypothesis formulated is rejected. *The* level of awareness/familiarity of the *Job stay intention at IT companies is dissimilar (*Cluster means are unequal).

Table 3: Group Stat::istics: Job Stay Intention

Job Stay Intention	Gender	N	Mean	Std. Deviation	Std. Error Mean
Personal Reasons	Male	381	4.16***	804	.041
	Female	169	4.11***	.824	.063
Job Morale	Male	381	4.31***	.718	.037
	Female	169	4.30***	.730	.056
Available Opportunity	Male	381	4.23***	.805	.041
	Female	169	4.18***	.807	.062
Quality Supervision	Male	381	3.80***	1.042	.053
	Female	169	3.77***	1.107	.085
Sufficient Working Time	Male	381	3.84***	.944	.048
	Female	169	3.82***	.968	.074
Satisfaction with company	Male	381	3.64***	.867	.044
	Female	169	3.61***	.920	.071
Convenient retirement	Male	381	3.33***	1.100	.056
	Female	169	3.36***	1.065	.082
Job stays intention	Male	381	3.9034***	.48375	.02478
	Female	169	3.8811***	.55463	.04266

Source: Primary Data

The mean value assigned by the respondents of Male to the variable personal reasons the Mean score of 4.16; std. deviation .804 and the respondents of Female assigned a mean score of 4.11; std. deviation .824 both are found high effect. The mean value assigned by the respondents of Male to the variable job morale the Mean score of 4.31; std. deviation .718 and the respondents of Female assigned a mean score of 4.30; std. deviation .730, both are found high effect. The mean value assigned by the respondents of Male to the variable available opportunity the Mean score of 4.23; std. deviation .805 and the respondents of Female assigned a mean score of 4.18; std. deviation .807, both are found high effect. The mean value assigned by the respondents of Male to the variable the quality supervision the Mean score is 3.80; std. deviation 1.042 and the respondents of Female assigned a mean score of 3.77; std. deviation 1.107, both are found high effect. The mean value assigned by the respondents of Male to the variable sufficient working time is 3.84; std. deviation .944 and the respondents of Female assigned a mean score of 3.82; std. deviation .968, both are found high effect. The mean value assigned by the respondents of Male to the variable satisfaction with company the Mean score is 3.64; std. deviation .867 and the respondents of Female assigned a mean score of 3.61; std. deviation .920, both are found high effect. The mean value assigned by the respondents of Male to the variable the convenient retirement the Mean score is 3.33; std. deviation 1.100 and the respondents of Female assigned a mean score of 3.36; std. deviation 1.065, both are found high effect. From the study it found that the Male respondents have awarded a high score (3.9034±.484) and the Female respondents also awarded a high score of (3.8811.555) for the job stay intention.

Table 4: Job Stay Intention- Independent Samples Test

Job Stay Intention	t	df	Sig. (2-tailed)	Mean Difference
Personal Reasons	.751	548	.453	.056
Job Morale	.158	548	.874	.011
Available Opportunity	.674	548	.501	.050
Quality Supervision	.319	548	.750	.031
Sufficient Working Time	.295	548	.768	.026
Satisfaction With Company	.379	548	.705	.031
Convenient Retirement	-.268	548	.789	-.027
Job Stays Intention	.477	548	.633	.02235

Source: Primary Data

Table 4 shows the mean value assigned by the Male respondents and Female on the Job Stay Intention related statements was tested with the help of t-test for Equality of Means. It noted that all the statements were statistically not significant based on the score assigned by the Male respondents and Female on the Job Stay Intention as the p values are greater than 5 percent.

VI.FINDINGS

The level of awareness/familiarity of the Job stay intention at IT companies is dissimilar. The study observed that there are significant differences found in the statements of job stay intention among HR managers and Employees. In all these statements p values obtained are lower than 5 percent. These statements were mainly six they are Personal reasons (p value 0.001), Job morale (p value 0.001), Available opportunity (p value 0.001), Quality 209 Observations, Findings, Suggestions and Conclusion supervision (p value 0.001), Sufficient working time (p value 0.001) and convenient retirement (p value 0.001). In job stay intention the employees strongly agreed that personal reasons lead to employees quit. Hence, the study found that lack of education opportunities and lack of remuneration and benefits are the common personal reasons for employees quit. The study also found that job morale impacts cause the employees to quit from the organization. In job stay intention the statement job morale factors are the reason behind employee's turnover, it is strongly agreed by the employees. When employees become unhappy with the company, they may tent to quit from the organisation. The employees strongly agreed to the fact that lack of career development is the reason for employees leaving their job. In the case of quality supervision, the employee strongly agreed that disciplined job will help the organisation to reduce employee turnover. The study also found that effective supervision of the management by overseeing

the performance of the members of the organisation will reduce employees quit. The statement sufficient working time by the agreement of employees, the study found that flexible working time and easy retirement plans will also reduce employees job quit from the organisation.

VII.SUGGESTIONS

Based on the findings of the study, the following suggestions are put forward, which could be adopted by organizations to gain maximum benefits from their talent management practices. The major suggestion is that HR managers should effectively manage talent management system and employees should effectively follow it. The study shows that the employees' attitude towards job stay intention has great impact on employee turnover. The employee's intention to quit can be reduced by hiring the right people, offering good salary packages, closely monitoring toxic employees and prioritizing work life balance in the organization. Improving employees' attitude towards job retention requires a multifaceted approach that addresses both the underlying causes of job dissatisfaction and motivators for job satisfaction.

VIII.CONCLUSION

Talent management practices are crucial for the success of IT companies in Kerala, which is a rapidly growing hub for the IT industry in India. Effective talent management practices can help IT companies attract, develop, and retain top talent, which is essential for staying competitive in a rapidly evolving industry. Such practices may include initiatives for recruitment, training and development, performance management, and employee retention. In addition, IT companies in Kerala can benefit from focusing on diversity and inclusion, as these practices can lead to a more inclusive workplace culture, improved creativity and innovation, and increased employee satisfaction and retention. The result shows that IT companies in Kerala follow excellent Talent Management Practices but not in an orderly form. Hence the creation of an orderly Talent Management Practices with proper aim and monitoring will help to create a positive work environment. Overall, effective talent management practices are essential for the success of IT companies in Kerala, and ongoing efforts should be made to develop and implement such practices to stay competitive in the industry

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MOONLIGHTING AMONG EDUCATORS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Moonlighting among educators has been a subject of academic inquiry for decades, yet the volume of high-quality research in this area remains limited. This study presents a comprehensive review of the existing literature on moonlighting among educators by summarizing key studies and identifying prevailing themes. The review is based on articles retrieved from Scopus and Web of Science databases, revealing a scarcity of scholarly publications on this topic within these reputed sources. This observation underscores the need for more rigorous academic contributions to understand the complexities of moonlighting in the education sector. Initially, research on moonlighting among educators predominantly focused on demographic factors, the culture of private tuition, and financial necessity as primary drivers of secondary employment. However, more recent studies have shifted attention toward organizational and psychological factors, such as commitment levels, ethical climate, job satisfaction, and institutional policies, in influencing moonlighting behaviors. The review systematically categorizes commonalities and contradictions in the existing literature, shedding light on the diverse perspectives which scholars have taken to analyze this phenomenon. Additionally, this paper highlights emerging keywords and research approaches to provide future researchers with a clearer direction for further study. By mapping the progress and identifying underexplored areas, this review aims to encourage scholars to investigate new dimensions by identifying the gap areas such as the impact of technological advancements, educational transitions, evolving institutional frameworks, and geographically significant studies pertinent to the state of Kerala. This study serves as a valuable resource for researchers looking to contribute fresh insights into the ongoing discourse on moonlighting among educators.

Keywords: *Moonlighting, Educators, Financial Difficulties, Ethical Climate, Educational Transitions*

I.INTRODUCTION

Moonlighting, the practice of working in a secondary job during free time after one's primary employment, traces its origins back to the early 20th century, when employees took on additional work, often at night, to supplement their income. During the Great Depression (1929–1939), moonlighting became a crucial survival strategy for many workers struggling financially to meet their needs. By the mid-20th century, the practice

extended beyond blue-collar jobs, to teachers, engineers, and office workers. The late 20th and early 21st centuries witnessed a robust increase in moonlighting opportunities, driven by technological advancements and the rise of freelance and gig works.

Teaching is among the leading professions where moonlighting is increasingly considered a necessity (Brown et al., 2019). As educators juggle multiple responsibilities, including mentoring, advising, and conducting research, balancing their primary duties with secondary employment becomes even more challenging. Examining the factors that drive moonlighting intentions among higher education teachers is crucial, as it significantly affects the quality of education. It can lead to higher teacher turnover (Raffel & Groff, 1990; Winters, 2010) and may also result in conflicts of interest, potentially impacting lecturers' productivity and academic integrity (Ara et al., 2016). Educators prefer moonlighting for various reasons, including financial stability, safeguarding against future uncertainties, leveraging available opportunities, expanding professional networks, and enhancing their intellectual capabilities (Kisumano & Wa-Mbaleka, 2017). Educators in India, especially those working in private sector institutions, are not paying adequately to meet their needs. The rise in living expenses and the urge to improve the standard of living, force the majority of them to think about moonlighting. The growing demand for private tuition, driven by a shortage of qualified teachers in schools and colleges, along with the opportunity to earn additional income, has prompted many educators to moonlight after the class hours. In response, several states, including Kerala, have imposed restrictions to curb moonlighting among educators in the government sector, to prohibit their secondary jobs in private tuition centers. By doing a comprehensive review of existing literature, this paper aims to explore the factors that influence moonlighting among educators and its impact on both professional and personal well-being. It also helps to identify the areas that have been explored well and uncover gaps in the existing literature that warrant further research.

II.RESEARCH METHODOLOGY

The Systematic Literature Review (SLR) is a vital tool for doing a comprehensive analysis of publications in a particular area of research. It evaluates and summarizes all the relevant literature on a topic to identify the trends, patterns, and gaps. Data can be sourced from various databases such as Scopus, Google Scholar, Dimension, Web of Science, IEEE, etc. In this study, the data was sourced from Scopus and Web of Science for the detailed analysis. The Web of Science is considered one of the most valued databases based on indicators like citation indexes, broad coverage, and high-impact journals (Zhu and Liu, 2020). Scopus is a popular choice for bibliometric analysis due to its extensive coverage, data reliability, and advanced analytical capabilities (Mongeon & Paul-Hus, 2016). The search query used to find the article is "Moonlighting AND Teachers OR Moonlighting AND Educators". Detailed information on the selection process is exhibited in Figure 1. 31 articles from Scopus and 11 articles from Web of Science were extracted and 20 papers were finally considered. The detailed information about the articles considered for the study is provided in.

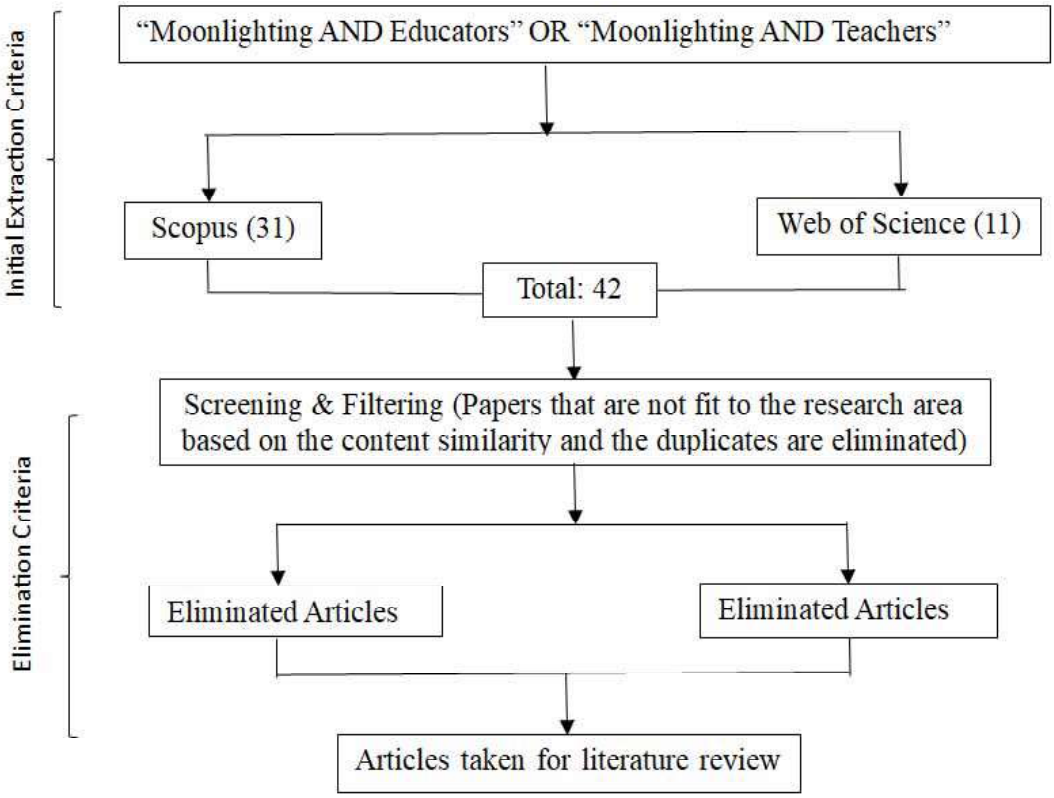

Figure 1: Inclusion and Exclusion Criteria of Articles

Figure 2: Year-Wise Publications

III.DISCUSSION

1.Factors Influencing Moonlighting Among Educators

The first study in the area, conducted in 1985, examined whether job dissatisfaction among educators is correlated with psychological factors such as locus of control, stress, and moonlighting intentions. It found that, among school teachers, job dissatisfaction was more strongly linked to psychological variables like external locus of control and subjective stress levels than to demographic factors and moonlighting intentions (Santangelo & Lester, 1985).

In an article on teacher moonlighting using data from the US Current Population Survey, it is seen that 21% of moonlighting teachers stated they would continue moonlighting even with a substantial salary increase, suggesting intrinsic value in their secondary jobs are beyond financial incentives (Pearson et al., 1994). A nationwide survey conducted in the 1980s, concludes that moonlighting among teachers is relatively unaffected by salary levels, cost of living, or local labour market conditions, suggesting it is often undertaken to address temporary cash flow issues rather than permanent income needs (Ballou, 1995).

Moonlighting teachers can be distinguished from non-moonlighters based on gender, age, education level, and salary dissatisfaction, with moonlighters being slightly younger, better educated, predominantly male, and more dissatisfied with their salaries. However, no significant differences were observed in job satisfaction, workload, job stress, or attitudinal perceptions (Pearson et al., 1994). In a study that explores the factors influencing teacher moonlighting and its impact on the hours teachers dedicate to their primary job, it is shown that male teachers and those with advanced degrees are more likely to engage in moonlighting, while teacher salaries have minimal influence on the likelihood of moonlighting and are not affecting the hours they are working for the primary job (Winters, 2009). It is pointed out that increased demand for science teachers increases the moonlighting practice among educators and it doesn't influence their efficiency in multiple jobs (Urwick & Kisa, 2013).

Further studies in the later years have replaced the initial findings. They indicated that demographic factors, including marital status, gender, professional experience, and subject specialization, also influence moonlighting behaviors among educators (Fitchett et al., 2016; V. Stastny et al., 2021). The source of additional income is a prime motivating factor the other factors are to broaden the work experience and to reduce the monotony (Timothy & Nkwama, 2017). Teachers who began their careers with multiple jobs maintained this practice throughout their professional lives. Others held additional jobs temporarily to meet short-term financial or social needs (Teder & Mikser, 2019). A research work that explores how policy-induced school calendar changes, such as shifts from nine-month to year-round schedules, impact teachers' engagement in supplementary employment, reveals that teachers significantly increase school-based supplementary employment, such as substitute teaching when schools adopt year-round calendars, however, there is no corresponding increase in non-school-based supplementary

employment. Males and mid-career teachers seemed to be the most affected by these calendar changes (Gilpin, 2019).

In a study conducted among private school teachers in the Kanchipuram district, the main factor influencing moonlighting is financial reasons then comes personal reasons and organizational aspects (Nafeesa et al., 2020). The ethical climate in higher education institutions influences faculty members' intentions to pursue secondary employment, a positive ethical climate, characterized by fairness, support, and transparency, significantly reduces the intention to engage in moonlighting. When institutions foster a culture of trust, recognition, and professional growth, faculty members are less inclined to seek additional jobs, as their financial, social, and professional needs are better met within their primary roles (Bommakanti & Tnvr, 2023). To reduce the moonlighting among educators Higher Education Institutions can foster a positive work environment that enhances organizational commitment. Strengthening affective and normative commitments significantly lowers moonlighting intentions (Manogna & Swamy, 2023).

Faculty with higher qualifications and extensive experience are also engaged in moonlighting to secure better-paying secondary jobs (Jehan, N, 2024). Financial difficulties were identified as one of the primary reasons for taking on additional employment, with participants expressing concerns about their economic stability and their children's future. However, secondary jobs often divert teachers' attention from their primary roles, negatively impacting their intellectual responsibilities. These findings highlight the need for targeted reforms to ease teachers' financial burdens, reducing their dependence on secondary employment and allowing them to fully commit to their educational responsibilities (Demirdis et al., 2024).

2.Impact of Moonlighting

Teachers who moonlight do not seem to reduce time, effort, or quality in their primary job, such as preparing lessons, grading papers, or assigning homework. The potential effects of the energy and enthusiasm moonlighting teachers bring to their interactions with students remain unexplored, presenting a valuable direction for future research. (Ballou, 1995). Moonlighters are performing better than non-moonlighters. Non-moonlighters experienced.

In the study to find out differences in job stress and well-being between college teachers in Canada who moonlight and those who do not. Other factors such as burnout, job satisfaction, job involvement, turnover intention, and job performance are also considered. greater job stress, higher levels of burnout, increased turnover intention, and reduced course preparation per semester (Jamal et al., 1998). An article on teacher moonlighting using data from the US Current Population Survey says that holding_a secondary job reduces teachers' time in preparation for their primary job by approximately one hour per week (Winters, 2009).

Moonlighting often leads to time constraints, limiting opportunities for collaboration and professional growth. For

instance, teachers in this study had little time to engage with peers or participate in leadership activities, both of which are crucial for fostering professionalism and improving teaching practices. Moonlighting impacted not only teachers' professional lives but also their well-being, including family, social life, and health.

Despite these challenges, financial necessity kept them from quitting their secondary jobs. To address moonlighting and retaining teachers in the profession, paying and treating them as professionals is essential. Beyond increased pay, schools must foster an environment of open communication, trust, and respect. Teachers need manageable workloads and sufficient resources, including time, to fulfill their responsibilities effectively (Parham & Gordon, 2011).

Later on, it is said that many educators view holding multiple jobs as a means to achieve long-term stability and fulfill their self-actualization needs. Teachers who held multiple temporary jobs and found self-actualization outside the school environment frequently brought those experiences back to their teaching. They leveraged and incorporated the skills and insights gained from their external work to shape and enhance the learning environment. Teachers with multiple temporary jobs who achieved self-actualization at school gained self-confidence and enriched their teaching through these roles. Their experiences strengthened their personality traits and inspired students to build self-confidence. Leveraging their potential effectively requires offering them more challenges and diverse tasks (Teder & Mikser, 2019). In a study on juggling multiple jobs and family responsibilities, gender differences in Work-family conflict were evident. Both genders experience Work-family conflict, yet women face more acute challenges due to entrenched traditional gender roles. This underscores the global issue within academia, where the prevailing culture of long work hours and moonlighting complicates the work-family balance (Magadley, W, 2019).

Despite these ongoing debates, moonlighting is considered as a medium for creating and engaging in faculty writing groups and it is getting increased attention among educators. Research on faculty writing groups focused on scholarly work has consistently demonstrated their positive impact, including increased research productivity, enhanced collaboration, and a stronger sense of community among participants. Consequently, several universities and colleges have started implementing initiatives to support and encourage faculty writing groups (Piller E, 2022).

3.Commonalities and Contradictions In The Existing Literature

While reviewing the existing literature several commonalities and contradictions are found. The table below summarizes the consistent themes and conflicting perspectives. These insights will guide researchers to understand the evolving nature of moonlighting among educators and highlight the areas that warrant elaborate studies.

Table 1:Commonalities and Contradictions

Commonalities	Contradictions
A1: Job satisfaction in the primary job is not related to moonlighting. A2: Moonlighting is not influenced by job satisfaction, stress, workload, and attitudinal perceptions	A9: Dissatisfaction from challenging working conditions influences moonlighting, particularly outside the education sector.
A3: Moonlighting doesn't affect the professional standard in teaching.	A20: Affective and normative commitment is negatively associated with moonlighting.
A4: There is no difference in job stress and well-being among moonlighters and non-m moonlighters.	A6: Moonlighting impacts well-being and it affects educators both physically and mentally. A11: Work-family conflict is increasing among moonlighting educators, especially among female educators
A5: Salary has a minimal influence on moonlighting.	A2, A10 & A15: Poor salary and the need for additional income are the prime motives.
A8 & A15: The increased demand for science subjects and the rise in private tuition have led to a growth in moonlighting.	A9: Moonlighting outside the educational sector also increased among single male educators.
A2&A9: Gender is strongly related to moonlighting among educators.	A17: Gender has no significant relation whereas, the ethical climate of the organization influences moonlighting intention
A15: Educators with less work experience are more likely to engage in moonlighting.	A18: Experience is not a limiting factor to be engaged in moonlighting

Source: Author

The existing literature presents a mix of commonalities and contradictions, indicating the complexity of factors influencing moonlighting behavior. Among the research works conducted in the earlier period, there exists a consensus that job satisfaction in the primary job does not significantly impact moonlighting among educators, conflicting findings suggest that dissatisfaction due to challenging working conditions may still be a motivating factor, particularly for moonlighting outside the education sector. Similarly, while some studies downplay the role of salary, others highlight financial necessity as a primary driver of moonlighting, especially among those with lower incomes and work experience.

The relationship between moonlighting and well-being also remains inconclusive. While some studies argue that moonlighting does not affect educators' professional standards, job stress, or well-being, others suggest that it negatively impacts both physical and mental health and even leads to work-family conflict, particularly among female educators. Moreover, demographic factors like gender and experience yield mixed results. Some research emphasizes the influence of gender on moonlighting, while

others believe that there is no significant relationship. Similarly, less experienced educators are often cited as more likely to engage in moonlighting as compared to that of experienced ones but opposing studies suggest that experience does not limit moonlighting intentions. These contradictions between the findings may happen because of the varying nature of the target population based on country, institutional policies, economic conditions, and individual circumstances. Hence further research is necessary to reconcile these disparities and to provide a more comprehensive understanding of moonlighting among educators.

4.Emerging Keywords

Based on the analysis of existing literature, the emerging areas of research focus on moonlighting among educators are identified. Recent studies have introduced newer research domains and keywords to this area. To highlight these emerging trends, keywords such as demographic factors, private tuition, and additional income, which were predominantly used from the initial stages of research have been excluded.

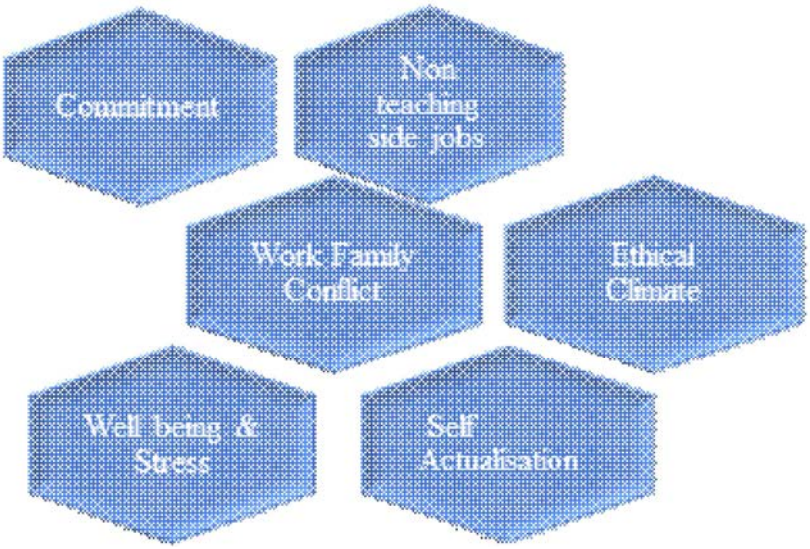

Figure 3: Emerging Keywords

IV.SCOPE FOR FUTURE RESEARCH

Educators aspiring for a bright career are facing several challenges, including job security, inadequate salaries, uncertain career prospects, and declining full-time teaching opportunities. These challenges have led many to explore alternative career paths alongside teaching, reshaping the traditional perception of teaching as a lifelong vocation.

Most of the research that has already been done focused on how demographic characteristics like gender, age, income level, and experience affect moonlighting, as well as how the practice of private tuition is a significant motivator for teachers looking for extra money. However, recent trends have shown a shift, with the rise in educators taking up non-teaching secondary jobs for moonlighting. Researchers can explore how

this transition influences their perceived professional identity and the Academic Citizenship Behaviors (ACB) among educators. Additionally, it can also explore how recent policy changes, such as the implementation of the National Education Policy (NEP), University Grants Commission (UGC) norms, the transition to Education 5.0, and shifts in institutional policies, influence educators' decisions to engage in moonlighting. Another critical area of study could be to explore whether educators view these secondary jobs as temporary sources of income or as potential full-time career alternatives. Future research could explore moonlighting behaviors across various categories of educators, spanning from lower primary levels to higher educational institutions. The majority of the existing research was conducted among educators in foreign countries and only limited studies were conducted within the state and nation. Furthermore, investigating how technology developments like e-learning, remote work, and the gig economy affect teachers' moonlighting practices may yield insightful information.

V.CONCLUSION

The comprehensive analysis of existing literature on moonlighting among educators revealed various factors that prompt and influence educators to take up secondary jobs and its impact on their personal and professional lives. However, the findings contain many contradictions that warrant further elaborated studies. Recent research trends and the emerging keywords in the area underscore deeper underlying issues and significant consequences that must be addressed. However, the literature remains limited, leaving significant gaps and opportunities for in-depth and quality research. Moving forward, it is crucial to address these challenges comprehensively because the well-being of educators is essential for societal progress, as they play a vital role in shaping future generations.

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Appendix: Details of Selected Articles

Sl: No	Year	Authors	Title
A1*	1985	Santangelo & Lester D	Correlates of job satisfaction of public-school teachers: moonlighting, locus of control, and stress.
A2*	1994	Pearson L.C., Carroll D. & Hall B.W.	Analysis of demographic, perceptual, and work-related factors in teacher moonlighting.
A3*	1995	Ballou D.	Causes and consequences of teacher moonlighting.
A4*	1998	Jamal M., Baba V.V & Rivière R.	Job stress and well-being of moonlighters: The perspective of deprivation or aspiration revisited
A5*	2010	Winters J.V.	Teacher moonlighting: Evidence from the US current population survey
A6*	2011	Parham J.N & Gordon S.P.	Moonlighting: A harsh reality for many teachers
A7*	2011	Molyneaux K.J.	Uganda's Universal Secondary Education policy and its effect on 'empowered' women: How reduced income and moonlighting activities differentially impact male and female teachers
A8*	2014	Urwick J.; Kisa S	Science teacher shortage and the moonlighting culture: The pathology of the teacher labor market in Uganda
A9*	2016	Fitchett P.G., Heafner T.L & Harden S. B	Characteristics and working conditions of moonlighting teachers: Evidence from the 2011-2012 schools and staffing survey
A10*	2017	Timothy V.L& Nkwama S.	Moonlighting among teachers in urban Tanzania: A survey of public primary schools in Ilala District
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A14*	2020	Nafeesa S & Uthra R.	A study on precedents of employee moonlighting intention among private school teachers in Kanchipuram District
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A17*	2023	Bommakanti S.M.; TNVR. S.	Breaking the moonlighting cycle: How ethical climate in higher education can curb secondary employment intentions among teachers
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Note: A1–A20 *denotes the numbering assigned to each article, which is arranged in ascending order based on the year of publication.*

Source: Scopus & Web of Science

TRENDS AND CHALLENGES IN RETIREMENT PLANNING: A STUDY ON THE NATIONAL PENSION SCHEME (NPS) IN INDIA

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ABSTRACT

A standard retirement plan serves to ensure that individuals can sustain their life standards without being dependent on others and without having to compromise on their standard of life during their post-retirement period. The majority of working population in India expects to have better quality of life at least to maintain the current living standards after retirement. This is the prime reason for the relevance of the pension plans. National Pension Scheme is a mandatory for all central and state government employees who joined in services after 2004. Although the scheme is implemented in 2004, most of the government employees are unknown about the benefit of the same scheme. The scheme is regulated by Pension Fund Regulatory and Development Authority (PFRDA). The prime objective of the scheme is to provide social security to all citizens of India with an attractive long term savings avenue to plan for retirement through safe and reasonable market based returns. The majority of respondents believed that the restrictions on the withdrawal limit or NPS lockout period were the most significant drawback or disadvantage of NPS. There is a strong association between the sort of employment and the demerit or problem on NPS. NPS is a voluntary retirement savings scheme designed to allow subscribers to make specified contributions towards planned savings, insuring their future in the form of a pension. It is an attempt to find a long-term solution to the challenge of providing appropriate retirement income for all Indian citizens. Based on the findings of this study, there are both advantages and disadvantages of NPS. The fundamental advantage of a national pension scheme is safety, whereas the main disadvantage is the restrictions on withdrawal limits or locking periods.

Keywords: *Retirement Planning, NPS, Taxation Benefits, Advantages and Opinion of NPS, Problems of NPS.*

I.INTRODUCTION OF THE STUDY

Pension is very important for senior citizens to maintain and improve their quality of life, through greater independence in their decisions, improved status in the family and greater self-confidence. When people do not enjoy a regular and steady source of income, it becomes more significant to have a pension plan study. A standard retirement plan serves to ensure that individuals can sustain their life standards without being dependent on others and without having to compromise on their standard of life during their post-retirement period. The majority of working population in India expects to have better quality of life at least to maintain the current living standards after retirement. This is the prime reason for the relevance of the pension plans. National pension system is a voluntary retirement savings scheme laid out to allow the subscribers to make defined contribution towards planned savings thereby securing the future in the form of pension. It is an attempt towards a sustainable solution to the problem of providing adequate retirement income to every citizen of India. NPS started with the decision of the government of India to stop defined benefit pension for all its employees who joined after 1-4-2004 and from 01-04-2013 onwards in Kerala. So this study has been made to analysis the National Pension Scheme in India by providing overall view of state government employee's perception towards NPS.

II.OBJECTIVES OF THE STUDY

- To know the advantages enjoyed by state government employees from NPS.
- To study the opinion of state government employees on NPS.
- To the problems faced by state government employees on NPS.

III.RESEARCH METHODOLOGY

The methodology may include survey and other research technique and could include the process used to collect information and data for the purpose of making decision both present and historical information. Research design is descriptive nature. The respondents for this study are 150. The survey included questions ondemographics, job characteristics, perception and opinion towards NPS. The questionnaire was prepared and the primary data was collected through sampling method. Secondary data is not an original data that has been collected by the researchers from various sources. Besides secondary data is the second-hand information, has been published, get it has been changed or altered by human beings. Therefore, its validity is lesser than primary data. The secondary data can be obtained from published reports, text book, magazines and internet.

Data Validation on Working Function Details:

The survey included questions on working function details such as:

- Advantages about NPS
- Opinion of NPS features
- Problem with NPS

The responses were validated using Cronbach's alpha to check the reliability of the scales, factor analysis to check the validity of the scales and descriptive statistics to check the distribution of the responses

IV.RESEARCH GAP

Research gaps related to the perception of state government employees in Kerala towards the National Pension System (NPS) include:

- Lack of studies: There is a scarcity of studies that investigate the perceptions and attitudes of state government employees in Kerala towards the NPS.
- Limited scope: Existing studies may have focused on specific aspects of the NPS, such as its financial implications, without exploring the broader social and psychological impacts on employees.
- Methodological limitations: Research in this area may have relied on small sample sizes or limited data collection methods, which can restrict the generalizability and depth of findings.
- Need for comparative analysis: There is a need for comparative studies that examine the perceptions of NPS among different categories of state government employees in Kerala, such as teachers, healthcare workers, and administrative staff.
- Impact on retirement planning: The NPS has altered the retirement planning landscape for state government employees in Kerala. Research is needed to understand how employees perceive and prepare for retirement under this new system.
- Communication and awareness: The effectiveness of communication and awareness campaigns about the NPS among state government employees in Kerala is unknown. Research could investigate the information needs and preferred communication channels of employees.
- Comparison with other states: A comparative study of the perceptions and experiences of state government employees in Kerala with those in other states could provide valuable insights into best practices and areas for improvement.
- Longitudinal studies: Longitudinal studies that track the perceptions and attitudes of state government employees in Kerala towards the NPS over time could provide valuable insights into how opinions evolve as the system matures.
- Intersection with other policies: Research is needed to understand how the NPS intersects with other policies and schemes affecting state government employees in Kerala, such as the Old Pension Scheme (OPS) or other social security programs.

V.LIMITATIONS OF THE STUDY

- Lack of awareness: Many employees may not fully understand NPS features and benefits.
- Limited coverage: NPS may not cover all state government employees, leaving some without a pension plan.
- Investment risks: Market-linked returns may be subject to fluctuations, affecting employee confidence.
- Limited flexibility: Withdrawal restrictions and penalties may deter employees from opting for NPS.

VI. FUTURE CHALLENGES OF THE STUDY

- Increasing awareness: Educating employees about NPS benefits and features to improve participation.
- Expanding coverage: Extending NPS to all state government employees, including those in rural areas.

- Addressing investment concerns: Providing guarantees or assurances to mitigate market risk concerns.
- Enhancing flexibility: Relaxing withdrawal rules and penalties to make NPS more attractive.
- Keeping pace with inflation: Ensuring NPS returns keep pace with inflation to maintain purchasing power.
- Meeting evolving expectations: Adapting NPS to meet changing employee expectations and retirement needs.
- Strengthening governance: Ensuring transparent and efficient management of NPS funds integrating with other social security schemes: Coordinating NPS with other schemes, like health insurance, to provide comprehensive social security.

VII.NATIONAL PENSION SCHEME (NPS)

It is a government sponsored retirement savings scheme regulated by Pension Fund Regulatory and Development Authority (PFRDA) of India

1.Objectives of The National Pension System

- A substantial corpus creation for one's retirement phase is an essential aspect to take care of during financial planning.
- It not only allows individuals to fulfill their expenditure requirements but also allows them to sail through their post-retirement life with their least hassles.
- To address this concern of the growing senior citizen demography in the country, the Indian government thus introduced schemes like the National Pension System or NPS.
- The scheme allows for systemized savings during one's working years, thus inculcating a financial discipline among individuals to save for the future.

2.Importance of NPS

- The current method refers to the National Pension System (NPS) in India, which is a defined contribution-based pension scheme. This method was selected for the study due to its growing importance and relevance in India's pension landscape.
- Reforms in pension sector: NPS represents a significant shift from traditional defined benefit pension schemes to a defined contribution-based system.
- Increased coverage: NPS aims to cover a larger portion of India's workforce, including the unorganized sector.
- Market-linked returns: NPS offers market-linked returns, potentially providing higher returns than traditional pension schemes.

3.Comparison with Traditional Methods

- Defined benefit vs defined contribution: NPS is a defined contribution scheme, unlike traditional defined benefit schemes like the Old Pension Scheme (OPS).
- Funding: NPS is funded by employee and employer contributions, whereas OPS was funded solely by the employer.
- Investment: NPS investments are market-linked, whereas OPS returns were fixed.
- Portability: NPS is portable across jobs and locations, whereas OPS was specific to the employer.

- Flexibility: NPS offers flexibility in investment choices and contribution amounts, unlike OPS.

The study likely aims to assess the effectiveness of NPS in providing retirement benefits, its acceptance among employees, and its comparison with traditional pension schemes like OPS. By evaluating NPS, the study can inform policy decisions and improvements to the pension system in India.

VIII.TOOLS FOR ANALYSIS

- Percentage Analysis
- Weighted Average Method
- Chi – Square

IX.ANALYSIS AND INTERPRETATION

1. Weighted Average Method

Table1: Weighted Average Method - Advantages of NPS

	Highly Agree	Agree	Neutral	Disagree	Highly Disagree	Total	Weighted Average	Rank
Highly liquid	80	28	30	8	3	149	9.9	8
Highly profitable	115	56	24	8	1	204	13.6	1
Reduced tax burden	45	76	48	6	2	177	11.8	4
Peaceful post retirement life	120	40	18	14	3	195	13	3
Low investment	15	84	60	10	3	172	11.5	5
Easy documentation	25	64	51	20	2	162	10.8	6
Wide coverage	20	56	60	18	3	157	10.5	7
Safety	135	32	24	8	3	202	13.5	2

Source: Primary Data

From the above table, it shows the highest rank is given to the factor highly profitable for merits on NPS. The other factors are ranked by this way; safety, peaceful post-retirement life, reduced tax burden, low investment, easy documentation, wide coverage and the least rank is given to highly liquid.

Table2: Weighted Average Method - Awareness on NPS

	High	Good	Medium	Low	Not Aware	Total	Weightedd Average	Rank
NPS is being administered & regulated by PFRDA	125	32	36	10	1	204	13.6	1
There are 3schemes; SBI pensionfund scheme,UTI retirementsolution pension fund scheme, LIC pension fund scheme.	10	100	33	18	3	164	10.9	3
Employees /government make a monthly contribution at 10% of their salary.	125	36	33	4	2	200	13.3	2

Source: Primary Data

The above table shows the respondents are highly aware about NPS is administered and regulated by PFRDA and they are least aware of the schemes for NPS such as SBI pension fund scheme, UTI retirement solution pension fund scheme and LIC pension fund scheme.

Table3: Weighted Average Method- Objectives of NPS

	Extremelyy Important	Some what Impor tant	Neu-tral	Quiet Impor tant	Not at all Important	Total	Weig hted Average	Rank
Safety	180	36	3	2	2	223	14.9	1
Liquidity	95	84	18	4	2	203	13.5	4
Profitability	140	40	12	12	2	206	13.7	3
Tax benefit	115	56	12	12	3	198	13.2	5
Guaranteed income	150	52	3	8	2	215	14.3	2

Source: Primary Data

The above table shows most of the respondents are ranked safety for the objective of NPS. They are ranked other factors in this way; guaranteed income, profitability, liquidity and tax benefit.

Table 4: Weighted Average Method – Demerits/ Problems on NPS

	Highly Agree	Agree	Neutral	Disagree	Highly Disagree	Total	Weighted Average	Rank
Restrictions in the withdrawal limit/ NPS locking period	135	48	12	4	5	204	13.6	1
Account opening restrictions	45	104	27	8	2	186	12.4	3
Tax liability at the time of retirement	75	56	48	6	2	187	12.5	2

Source: Primary Data

The above table shows the highest rank is given to the withdrawal limit restrictions on NPS, then tax liability at the time of retirement and the least rank is given to the account opening restrictions on NPS

2.Chi – Square

H1: There is significant difference between nature of employment and benefits or problems on NPS

Table 5: Chi – Square – Demerits/Problems on NPS

	Highly Agree	Agree	Neutral	Disagree	Highly Disagree	Total
Restrictionsin the withdrawal limit/ NPS locking period	27	12	4	2	5	50
Accountopening restrictions	9	26	9	4	2	50
Tax liability at the time ofretirement	15	14	16	3	2	50
Total	51	52	29	9	9	150

O	E	O-E	$(O-E)^2$	$(Oi - Ei)^2/ Ei$
27	16.99	10.01	100.20	5.90
9	16.99	-7.99	63.84	3.76
15	16.99	-1.99	3.96	0.23
12	17.33	-5.33	28.41	1.64
26	17.33	8.67	75.17	4.34
14	17.33	-3.33	11.09	0.64
4	9.67	-5.67	32.15	3.32
9	9.67	-0.67	0.45	0.05
16	9.67	6.33	40.07	4.14
2	2.99	-0.99	0.98	0.33
4	2.99	1.01	1.02	0.34
3	2.99	0.01	0.00	0
5	2.99	2.01	4.04	1.35
2	2.99	-0.99	0.98	0.33
2	2.99	-0.99	0.98	0.33
Total				26.7

Source: Primary Data

The chi- square formula is $\div^2 = \text{“}(O_i - E_i)^2/E_i$ = 26.7 DOF = (r-1) (c-1) = (3-1) (5-1) = 2×4 = 8

LOS = 5%

Table value = 15.57

Calculated value greater than Table value, so we reject the null hypothesis. Here accepts the alternative hypothesis. There is significant relationship between nature of employment and the problems on NPS.

IX.FINDINGS

The NPS has caused insecurity among government employees in Kerala. The Kerala government has taken steps to address the concerns of state government employees regarding the NPS. A revised pension scheme is being considered to provide security to state government employees. The government plans to increase its contribution to the scheme, provide death-cum-retirement gratuity and offer ex-gratia pensions to those with less than 10 years of service. The contributory pension scheme was launched in Kerala since 2013, but the government has yet to provide its full benefits to employees. The state government's share in the scheme is 10%, lower than the 14% contributed by the central government. Majority of respondents are ranked highly profitable is the merit of NPS. Most of the respondents are aware about NPS is administered and regulated by PFRDA. Safety is the main objective of NPS. Restrictions in the

withdrawal limit is the demerit on NPS. Most of the respondent are not aware of the schemes for NPS such as SBI pension fund scheme, UTI retirement solution pension fund scheme, LIC pension fund scheme. Most of the respondents opinioned that the restrictions in the withdrawal limit or NPS locking period is the main problem or demerit on NPS. There is significant relationship between nature of employment and the demerit or problem on NPS.

X.RECOMMENDATIONS

Financial literacy educates employees about the benefits and features of NPS. Most of the respondents are not aware of the various schemes for NPS. So an awareness program can be provided for the state government employees. Increase the employer's contribution to the NPS to encourage employees to invest more. It could be seen that there are specified withdrawal limits applicable to NPS scheme. These withdrawal limits could be increased to facilitate easy withdrawal of funds. The tax liability applicable to retired employees may be revised, so that it could be of greater convenience for pensioners. Training programs can be conduct to make the state government employees to more aware about the NPS. An application software can be developed for avoid account opening restrictions in NPS. Regularly review and enhance the scheme to address employee concerns.

XI.CONCLUSION

National Pension Scheme is a mandatory for all central and state government employees who joined in services after 2004. Ultimately, whether NPS is better for you depends on your individual financial situation, risk tolerance, and goals. It's essential to evaluate your options carefully and consider consulting a financial advisor before making a decision. NPS is a voluntary retirement savings scheme laid out to allow the subscribers to make defined contributions towards planned savings thereby securing the future in the form of pension. It is an attempt towards a sustainable solution to the problem of providing adequate retirement income to every citizen of India. From the results of this research, there are some merits and demerits on NPS. The main merit on national pension scheme is safety and the main demerits on NPS is the restrictions in the withdrawal limit or its locking period. Overall, employee perception and attitude towards NPS depend on their understanding, financial goals, and experience. Encourages people to invest in a pension account at regular intervals during the course of their employment. NPS offers market-linked returns, potentially higher than traditional pension schemes. Has low fund management charges, ensuring more of the investment goes towards the retirement corpus. It allows flexibility in investment choices and contribution amounts. It is beneficial for those who want to plan for their retirement early on and have a low-risk appetite. NPS offers returns that are much higher than other traditional tax-saving investments like the PPF. It allows the option to change the fund manager if the investor is not happy with the performance of the fund. NPS is regulated by PFRDA with transparent investment norms, regular Performance Reviews, And Monitoring Of Fund Managers By NPS Trust. Employers Can Play A Crucial Role In Educating Employees About NPS Benefits And Features To Improve Their Attitude Towards It.

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PULL MOTIVATIONAL FACTORS INFLUENCING WOMEN ENTREPRENEURS: A COMPARATIVE STUDY OF MANUFACTURING AND SERVICE SECTORS IN KERALA

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ABSTRACT

Entrepreneurship is a multifaceted, active method of generating additional income and customizing valuable items. It provides a wide range of products and services to society while also promoting economic growth. Women are now being considered as a comprehensible part of the struggle for a stable economy. Women have recently become a symbol of change in India. Women are more respected in Kerala than any other Indian state. Traditionally, entrepreneurship has been born, but better training intervention is now accepted to be essential to select, develop, support and feed entrepreneurial talents in order to advance our nation's industrial development. Women can contribute significantly in the economy as entrepreneurs in Kerala if they receive better care, training and support. Women choosing entrepreneurship because of several reasons, if the motive of entrepreneurship is clear it is easy for arranging proper training and development for them. There are mainly two motivational factors that induce women to start a business namely pull motivational factors and push motivational factors. The present study deals with the pull motivational factors influencing women entrepreneurs in the manufacturing and service sectors in Kerala. This is a quantitative study by using primary data collected from women entrepreneurs who are doing manufacturing and service business. This study aims to analyse the pull motivational factors influence the women entrepreneurs in Kerala and whether there is a significant difference in their motivations for starting a business.

Keywords: *Women Entrepreneurs, Manufacturing Sector, Service Sector, Pull Motivational Factors*

1.INTRODUCTION

Indian women have competed against men and attested to be equal to men in all spheres, including entrepreneurship. Women-owned businesses are defined by the Government of India as "entities in which a woman or group of women owns at least 51% of the capital and provides 51% of the generated employment to women." It is widely assumed that the majority of women in India are economically inactive because they are not involved in financially rewarding activities. They are burdened with household chores, but this trend is changing. Today's women in India are pursuing more professional and technical degrees in order to meet market demands, and they are thriving as entrepreneurs in designing, interior

decoration, exporting, food processing, publishing, garment marketing and other areas of economic participation.

According to the 2017–2018 gender statistics published by the Department for Economics and Statistics of the Government of Kerala, 52.02% of the female inhabitants and men are over performing in literacy, but the performance of women in the economy is poor. In Kerala in 2020–2021, about 67% of the population was economically active, with only 28% of economically effective female population. In 2022–2023, 68% of the total units for MSME registered in Kerala were male, with 32% being female. Their needs are improved and a stable society is sure if women are empowered. Women are empowered to eradicate poverty; entrepreneurial activity is one of the best ways to empower women. In Kerala MSME women entrepreneurs have played a crucial role in creating major jobs for other unemployed women at a lower cost of capital. MSME has also been active in helping to raise rural and backward communities through industrialization and contribute to poverty eradication and the economic development of women. MSME also contributes to social growth. The success of women entrepreneurs in Kerala will depend on a number of factors, including financial availability, marketing and infrastructure, socio-cultural establishments in Kerala, female entrepreneurship, family supports and various government supports.

II.OBJECTIVE

To analyse the pull motivational factors influencing women entrepreneurs in the manufacturing and service sectors in Kerala and examine whether there is a significant difference in their motivations for starting a business.

III.HYPOTHESES

H1: There is a significant difference between women entrepreneurs in the manufacturing and service sectors regarding their motivation to bring novelty through business.

H2 : There is a significant difference between women entrepreneurs in the manufacturing and service sectors regarding their motivation to attain high social status and recognition.

H3 : There is a significant difference between women entrepreneurs in the manufacturing and service sectors in their motivation to enjoy financial freedom.

H4 : Women entrepreneurs in the manufacturing and service sectors significantly differ in their motivation to start a business due to government subsidies and concessions.

H5: There is a significant difference between women entrepreneurs in the manufacturing and service sectors in their motivation to achieve a balance between family and work life.

H6 : There is a significant difference between women entrepreneurs in the manufacturing and service sectors in their motivation to provide employment to unemployed women.

H7 : There is a significant difference between women entrepreneurs in the manufacturing and service sectors in their motivation to prove that as women, they can make a positive impact on society.

IVRESEARCH METHODOLOGY

This is an analytical study based on both primary and secondary data. Secondary data collected from various websites, thesis and journals. Five point Likert's Scale Questionnaire was developed for data collection. The scale ranging from point 5 representing highly agree to point 1 which signifies highly disagree. Primary data collected from 377 micro women entrepreneurs having a turnover up to 5crores and who belong to fourteen districts of Kerala. The women entrepreneurs who are engaged in manufacturing of food items, candles, matchboxes, papads, sanitary napkin, incense stick, soft drinks manufacturing, flour and oil manufacturing, hollow bricks manufacturing and paper bags making are considered as respondents. Further the women entrepreneurs who are providing services like beauty parlours, photo copying, internet browsing, tailoring and boutiques, ladies stores, provisional stores, restaurants, catering services, printing press, typing and DTP and medical shops also included in this study The questionnaire consists of three parts. First part focusing on demographic information of respondents, second part includes details on business profile of respondents and the final part consists of questions that aimed to examine the perceptions regarding pull motivational factors of women entrepreneurs in Kerala. The data collected were suitably classified and analysed with regard to the objectives of the study. The primary data collected were subjected to appropriate statistical an mathematical analysis using SPSS to draw suitable conclusions. Mathematical tool like percentage and statistical techniques like mean, standard deviation and one-way Brown–Forsythe robust test were used for the analysis of primary data

V.DATA ANALYSIS

Table1: Demographic Profile of the Respondents

Variables	Category	Frequency	Percentage
Age	21-30	18	4.77
	31-40	135	35.80
	41-50	148	39.25
	51-60	47	12.46
	61-70	25	6.6
	71-80	4	1.06
Religion	Hindu	188	49.86
	Christian	99	26.25
	Muslim	84	22.28
	Others	6	1.59
Educational Qualification	Primary	54	14.32
	Secondary	142	34.5
	Graduation	68	18.03
	Post Graduation	61	16.18
	Professional degree	52	13.79
Marital Status	Single	34	9.0
	Married	244	64.7
	Widowed/Divorced	99	26.3

Source: Primary Data

Table 1 depicts the demographic profile of respondents; it is evident that most of the women entrepreneurs belong to age of 41-50. While considering the religion most of them belong to Hindu religion. While observing the educational qualification of women entrepreneurs it is found that most are qualified with secondary education. When consider the marital status of respondents it is found most are getting married.

Table 2 Business Profile of Respondents

Variables	Category	Frequency	Percentage
Locality	Rural	143	37.9
	Urban	133	35.3
	Semi urban	101	26.8
Nature of activity	Manufacturing	234	62.1
	Service	143	37.95

Source: Primary Data

Table 2 represents the business profile of respondents it is found that most of the respondents are belong to rural area and while considering nature of activity it is noted that most are doing manufacturing business.

Table 3: Descriptive Analysis of Pull Motivational Factors

Perceptions On Pull Motivational Factors	Nature of Business	*N*	Mean	Standard Deviation
I wish to bring novelty by doing the business	Manufacturing	234	**2.92	0.986
	Service	143	**2.94	1.047
	Total	377	2.93	1.008
Started business for attaining high social status and recognition	Manufacturing	234	***3.65	1.042
	Service	143	***3.85	0.864
	Total	377	3.73	0.982
Doing business for enjoying more financial freedom	Manufacturing	234	***3.73	1.092
	Service	143	***3.92	0.931
	Total	377	3.80	1.037
I was attracted to this business because of subsidies and concessions given by government	Manufacturing	234	*1.64	0.889
	Service	143	*1.50	0.768
	Total	377	1.58	0.847
I chose this business for brining balance in family and work	Manufacturing	234	***3.05	0.870
	Service	143	***2.96	0.963
	Total	377	3.01	0.906
I was attracted to this venture because it gives jobs to other unemployed women	Manufacturing	234	***2.95	0.804
	Service	143	***3.07	0.819
	Total	377	3.00	0.810
I wanted to prove, as a woman I can make a positive impact in the society through this business	Manufacturing	234	***3.03	0.844
	Service	143	***3.23	0.719
	Total	377	3.10	0.804

Source: Primary Data. (Opinion level: <2.93 - high***, 2.79–2.93 - moderate**, >2.79 - low*.)

Ambition to start a business unit varies by woman Table 3 depicts descriptive analyses of expectations, that is, pull factors that affect respondents' decision to start a business. When assessing the impression 'I want to add novelty by doing business,' respondents in the manufacturing sector received a mean score of 2.92 (SD 0.986) and respondents in the service sector received a mean score of 2.94 (SD 1.047). This indicates that respondents are split on whether or not they want to bring new ideas to their business. The perception of starting a company to achieve high social status and respect received a mean score of 3.65 (SD 1.042) from respondents in the manufacturing sector, and received a mean score of 3.85 (SD 0.864) from respondents in the service sector. As a result, it is clear that respondents from both sectors strongly believe that entrepreneurship provides them with a higher social status and appreciation. Respondents from both the manufacturing and service sectors firmly agreed that they switched to entrepreneurship to achieve more financial independence, with a mean score of 3.73 (SD 1.092) for manufacturing-sector respondents and a mean score of 3.92 (SD 0.931) for service-sector respondents.

In addition, manufacturing-sector respondents gave the impression 'I was drawn to this company because of government incentives and discounts' a mean score of 1.64 (SD 0.889), whereas service sector respondents gave it a mean score of 1.50 (SD 0.768). It is clear that respondents from both the manufacturing and service sectors strongly disagree that they choose their venture because of government incentives and concessions. Respondents from both the manufacturing and service sectors strongly agreed with the opinion 'I chose this company for bringing balance in my family and work,' with mean scores of 3.05 (SD 0.870) and 2.96 (SD 0.963), respectively. According to many reports, women start businesses in order to provide employment for other unemployed women. Next, respondents from the manufacturing and service sectors received a mean score of 2.95 (SD 0.804) and 3.07 (SD 0.819) for the impression 'I was drawn to this venture because it provides employment for other unemployed women.' So that found true. Respondents in the manufacturing sector received a mean score of 3.03 (0.844), indicating that they strongly agree with this interpretation, while respondents in the service sector received a mean score of 3.23 (SD 0.719), indicating that they strongly agree with the same.

Table4: Brown–Forsythe Robust Tests of Pull Motivational Factors

Perceptions On Pull Motivational Factors	Statistic	df1	df2	Sig.	Result
I wish to bring novelty by doing business	0.037	1	286.495	0.847	Not significant
Started business for attaining high social status and recognition	4.030	1	342.039	0.045	Significant
Doing business for enjoying more financial freedom	3.078	1	336.428	0.080	Not significant
I was attracted to this business because of subsidies and concessions given by the government	2.622	1	333.485	0.106	Not significant
I chose this business for brining balance in family and work	0.814	1	277.011	0.368	Not significant
I was attracted to this venture because it gives jobs to other unemployed women	1.835	1	295.784	0.177	Not significant
I wanted to prove, as a woman I can make a positive impact in the society through this business	6.322	1	336.398	0.012	Significant

Source: Primary Data.

Brown–Forsythe rigorous experiments of pull motivating variables were used to measure equality of means. With a *p* value of 0.045 and 0.012, respectively, there was a statistically significant difference in respondents' perceptions relating to respondents starting the venture to achieve high social status and recognition, as well as respondents wanting to prove as women they can make a positive impact in society through the company, as shown in Table 4. At the same time, there was no statistically significant difference in respondents' opinions about bringing innovations through business, with a *p* value of 0.847, doing business for enjoying more financial freedom with a *p* value of 0.80, attracted to the business by the respondents because of subsidies and concessions provided by the government for encouraging women into entrepreneurship with a *p* value of 0.106, next respondents chose the business to bring balance in family life and work life with a *p* value of 0.368, finally considered perception related to respondents attracted toward the venture to provide employment to other unemployed women with a *p* value of 0.177. All of these yielded a *p* value greater than 0.05. It is concluded that women entrepreneurs in Kerala are drawn to the venture not only to gain social status or recognition, but also to demonstrate that as women, they can make a positive impact in society through their business. They are also drawn to the venture because of the increased financial freedom, the ability to balance work and family life, to bring novelty by running the enterprise, getting subsidies and concessions by government and also with the aim of providing jobs to other unemployed women.

VI.HYPOTHESES TEST RESULTS AND FINDINGS

Significant differences were found for the motivation factors related to attaining high social status and recognition ($p = 0.045$) and proving that, as women, they can make a positive impact in society ($p = 0.012$). Thus, HO_2, and HO_7 are rejected, meaning that these motivations vary significantly between the manufacturing and service sectors.

No significant differences were found for the other pull factors ($p > 0.05$), so HO_1, HO_3, HO_4, HO_5 and HO_6 are not rejected.

This suggests that while financial independence, work-life balance and employment generation motivate women entrepreneurs in both sectors similarly, social recognition and societal impact motivations differ between the groups.

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