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EDITORIAL

In today's fast-paced and ever-changing business environment, the role of management and IT has never been more critical. As organizations face increasing complexity, driven by technological advancements, shifting market dynamics, and evolving workforce expectations, traditional management approaches are being replaced by more agile, collaborative, and forward-thinking business models.

The integration of technology into management processes has further heightened the need for developing new competencies. From data-driven decision-making to leveraging digital platforms for communication and collaboration, leaders must be tech-savvy and capable of guiding their organizations through digital transformations. The ability to harness the potential of emerging technologies while maintaining a human-centered approach to leadership is now a distinguishing feature of successful management.

We are proud to publish the Vol. 22 No: 02, edition of SYNERGY- I.T.S Journal of I.T & Management. The mission of SYNERGY- I.T.S Journal of I.T & Management is to publish empirical research that tests, extends, or builds management theory and contributes to management practice. All empirical methods including, but not limited to, qualitative, quantitative, field, laboratory, meta-analytic, and mixed methods are welcome. Additionally, journals facilitate scholarly communication, peer review, and the exchange of ideas, thereby fostering intellectual discourse and promoting academic excellence.

As we embark on this journey of discovery and exploration, we invite you, our readers, to join us in the pursuit of knowledge and understanding. Together, let us navigate the complexities of modern management with curiosity, humility, and a commitment to excellence.

Editor—Synergy

A Comparative Study of the Effectiveness of Traditional Concept Mapping & Refined Concept Mapping in Science Education

Dr. Anish Kumar

Abstract

This study was conducted to study the effectiveness of concept mapping in Science Education. In this study two forms of concept mapping were compared. These were simple or Traditional concept mapping and refined concept mapping. Experimental research method was used for the study. Result indicated that refined concept mapping is better than Traditional concept mapping in teaching-learning process of science. Students also perceived refined concept mapping as an effective tool in teaching-learning of science.

Keywords: Concept map, refined concept mapping, simple or traditional concept mapping, Meaningful learning

Introduction

Human is inquisitive in nature. He has a tendency to inquire by his birth. Early concepts are acquired by children during the ages of birth to three years, when they begin to observe and recognize regularities in the world around them and start identifying language labels or symbols for these regularities. These perceived regularity (or pattern) in events or objects, or records of events or objects, designated by label can be defined as a concept. (Novak & Cañas,2008).

Further learning takes place by the assimilation of new concepts and propositions into existing concepts and propositional frameworks held by the learner. This knowledge structure as held by a learner is also referred to as the individual's cognitive structure. Based upon Ausubel's meaningful learning principles, Constructivist approach and Information processing theory Novak and Gowin (1984) have developed a theory of instruction that helps learners to organize their cognitive frameworks into more integrated patterns for meaningful learning so that they can apply something learned in one situation to another. This technique of instruction is known as concept mapping which incorporates "concept maps" to represent meaningful relationships

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between concepts and preposition. Concept mapping is a powerful technique for the facilitation of meaningful learning as it helps the learner to organize and structuring his knowledge by arranging the new concepts into meaningful propositional framework after interacting with already existing propositions.

A. Concept map

A concept map is a schematic device for representing a set of concepts meaning embedded in a framework of propositions (Novak and Gowin, 1984). These are graphical tools for organizing and representing knowledge. Novak, (1991) states that concept maps serve to clarify links between new and old knowledge and force the learner to externalize those links. As it is difficult for a teacher to ascertain explicitly what concepts and propositions are being acquired by children. The need to show explicitly how new concepts and propositions were integrated into the learner's cognitive structure led to the development of the concept map tool in the early 1970's (Novak, 1977; Novak & Musonda, 1991). LL.

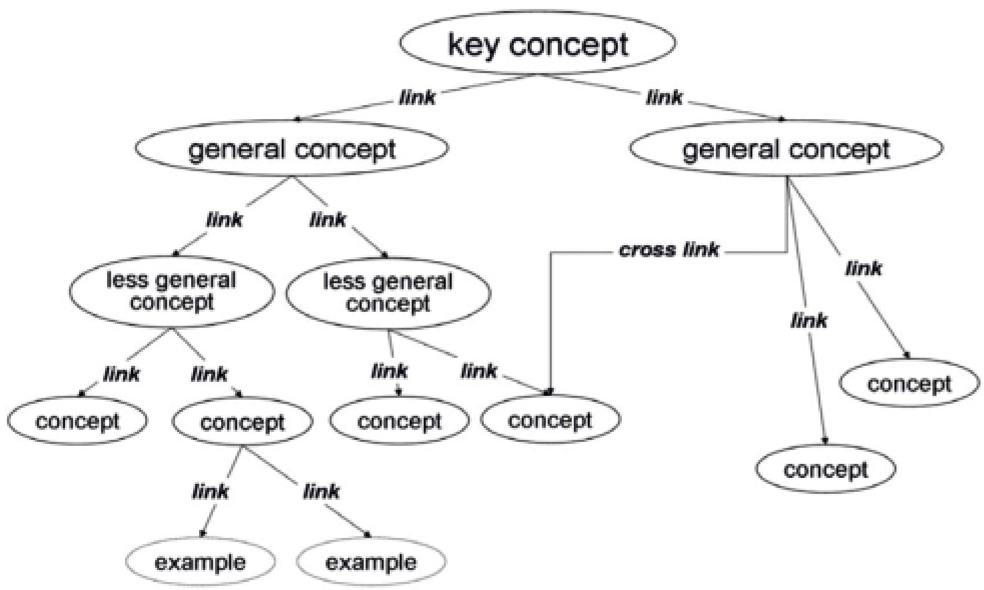

Figure 1. Model of CM (Novak and Gowin 1984 and Kinchin 2000)

Constituents of Concept Maps:

Concept: In a concept map, concepts can be key words from the selected topic. These are encircled or enclosed in some type of boxes. The relationships among concepts are represented by connecting two concepts with the help of a connecting line.

linking words: These are the words or phrases to specify the relationship between the two written on the connecting line. These are known as linking words or linking phrases.

proposition: Propositions are complete statements about some object, phenomenon or event in the

universe, either naturally occurring or constructed. These can also be called as units of meaning. Propositions contain two or more concepts connected using linking words or phrases to form a meaningful statement e.g. herbivores feed on plants.

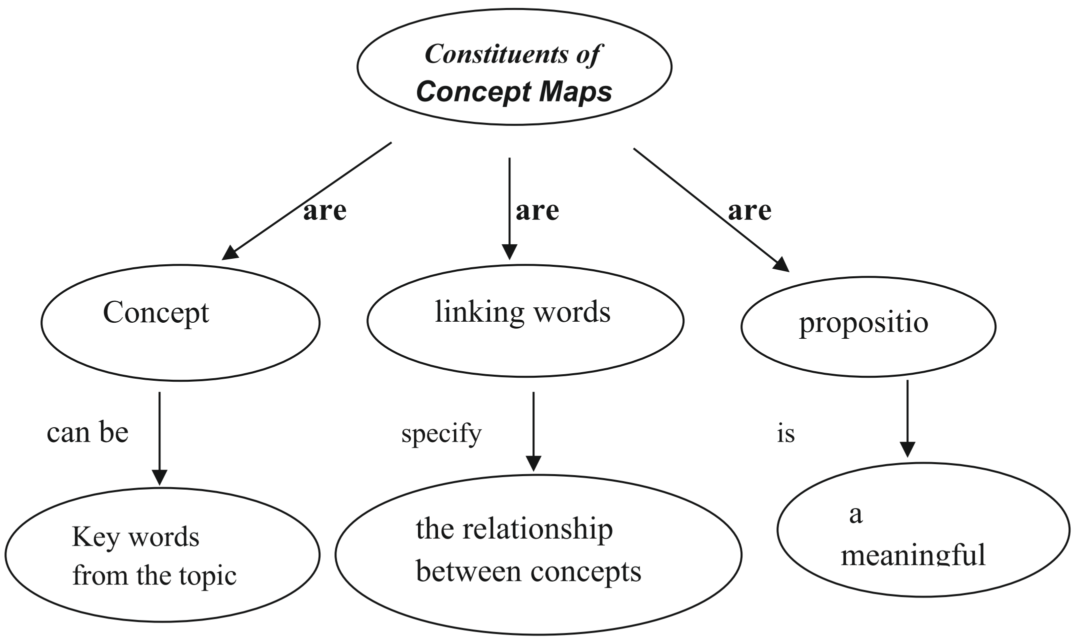

Figure 2: Constituents of Concept Maps

Characteristics of concept maps

Hierarchicy:- In Concept maps the concepts are represented in a hierarchical fashion. Usually Concept maps are read from top to down so the most inclusive and most general concepts are placed at the top of the map and the more specific, less general concepts are arranged hierarchically below.

Focus question:- A concept map consists of many related concepts explaining or representing some situation, event or a phenomenon that we are trying to understand. These situation, event or phenomenon provide the context for the concept map and called as focus question. The whole concept map revolves around the focus question.

Cross-links:- An important characteristic of concept maps is the presence of cross-links.

Concepts in different domains of the concept map are linked by Cross-links. Cross-links help us to see how a concept in one domain of knowledge represented on the map is related to a concept in another domain shown on the map. Inclusion of cross-links in the concept maps shows the holistic understanding and creative thinking of the learner.

Examples:-Specific examples of events or objects always help us to clarify the meaning of a given concept. To differentiate from the concepts usually these are not encircled or enclosed in ovals or boxes.

Above discussed features of a concept map can be seen in the following figure.

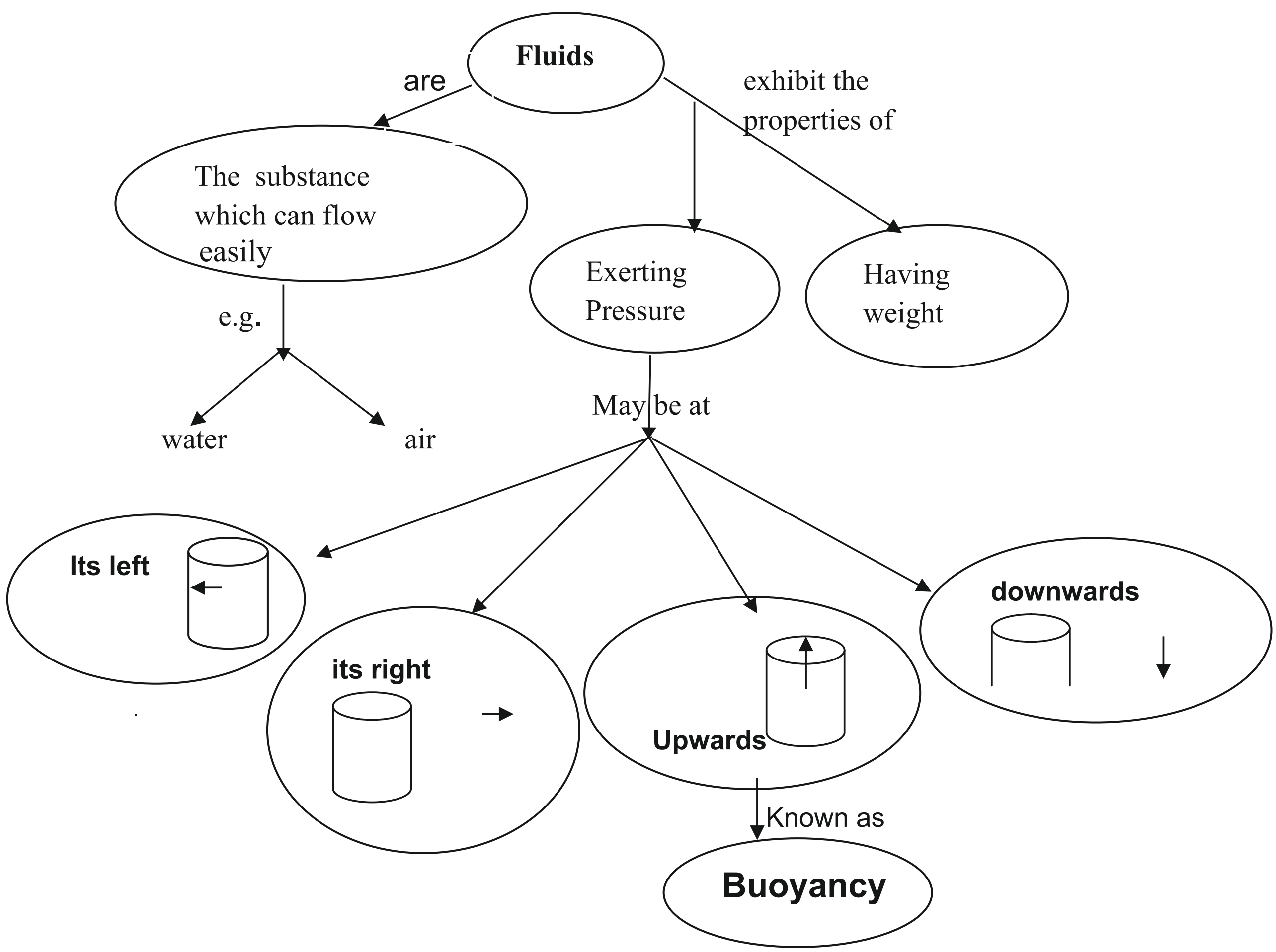

Figure 3: Concept map showing its important features

Types of concept maps

Based on the methodology of concept mapping concept maps can be divided in to following types:-

1. Traditional concept maps
2. Refined Concept Maps
3. Collaborative Concept maps

Traditional Concept Map

In this type of Concept Mapping teacher teach the topic with the help of Concept Maps. After completion of the topic students are given a focus question (topic) for drawing a Concept Map consisting of all related concepts for the topic. Students recall the concepts & connect them with the help of linking words. Students have full freedom to choose the concepts as well as linking words.

Refined Concept Map

Refined Concept Mapping (RCM) is an another type of methodology for representing knowledge in which a fixed set of linking words are selected and used to connect concepts. Any concept map can be turned into an RCM by using well defined and precise linking phrases. One of the main assumptions for this approach is that linking words play an important role in proposition. An incorrect or vague linking word may lead to ambigous meaning of a concept. It is very important to select the linking phrases carefully so that meaning of a concept can be expressed precisely.

Refined concept map (RCM) is comprised of concepts and a well-defined, invariant, minimal set of linking words. Students are given these selected linking words with the help of which concepts are connected. The fixed set of linking phrases helps in representing accurate knowledge without affecting the expression of knowledge. (Kharatmal & Nagarjuna,2006).

Collaborative Concept Mapping

Collaborative concept mapping provides the opportunity for students to draw the Concept Maps in groups. Students of a group articulate and challenge their thoughts when they discuss their maps with each other. In addition, through collaborative concept mapping validation of individual ideas, verbalization of thoughts, multiple perspectives, cognitive restructuring, argumentation and concept conflict resolution can be supported (Steeples & Mayers, 1998).

Objectives of The Study

1. To study the effectiveness of Traditional Concept mapping.

2. To study the effectiveness of Refined Concept mapping.

3. To compare the effectiveness of Traditional and Refined Concept mapping.

4. To study the perception of students about Traditional & Refined Concept mapping.

Hypothesis of the study

A Null hypothesis was formulated for the present study that there is no significant difference between the effectiveness of Traditional and Refined Concept mapping.

Methodology:

Population

Population includes all students of class IX of all schools of Delhi.

Sample

For the present study a Private School situated in west Delhi was selected and all students of any 2 sections of class ix of that school were taken as the sample.

Tools

For the present study three tools were developed by the researcher in consonance with objectives of the study.

Achievement test: -

a. Pre-Test: An achievement test was used as Pre-test to assess the existing achievement level of both the sections before the treatment. This was prepared by researcher which included the objective type questions from the chapters which had been already taught to them.

b. Post-Test: An another test was also prepared by researcher which was administered after the treatment given to the sample. It was to assess the achievement level of both the groups after the intervention.

Perception scale: - A Perception scale was used for the group taught through refined concept mapping to know the perception of students about refined concept mapping in teaching learning process of science.

Procedure for Data Collection

After selection of the school and 2 sections of class IX both sections were compared on their achievement level with the help of Pre-test. After giving both sections an introductory class about concept mapping sec A & sec B were taught the selected 3 chapters of science by the researcher using simple & refined concept mapping respectively. After completion of all the chapters in both sections post-test based upon the taught content was taken. Then a questionnaire was given to the students to know their perception about refined concept mapping.

Data Analysis

A. Analysis of post- test scores of Group A & B:-

The responses of the students of the two groups in 33 questions given in the post-test were compared with the help of the following graph which shows a better performance of experimental group than the control group.

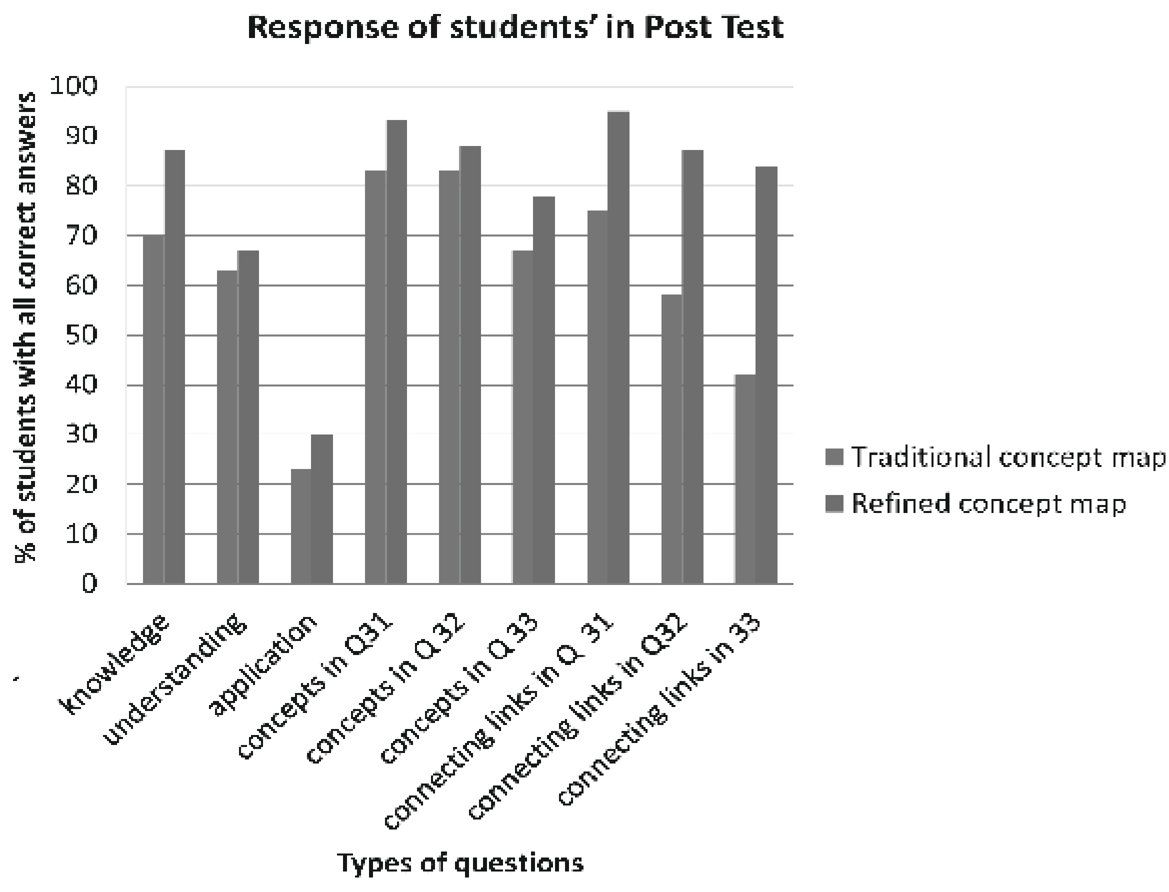

Figure 4: Graph showing responses of students of control and experimental on different types of questions in post test

Post test scores of the students of control group which was taught by using traditional concept mapping and experimental group which was taught by refined concept mapping were compared in the following graph

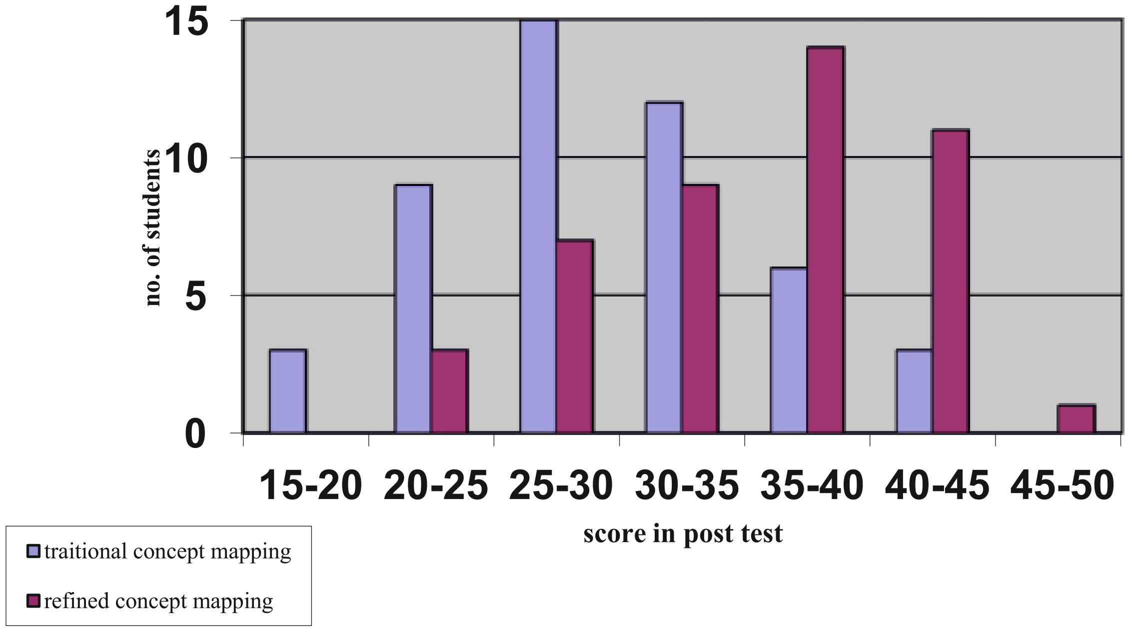

Figure 5: Graph showing scores of students of control and experimental in the post test

The scores of the post-test of the students of the two groups were compared with the help of their means and t-test.

Table 1: Comparison of achievement in Post test between Refined & Traditional concept mapping groups.

S. No.	Group	Number of students	Mean	S.D	Critical Ratio
1.	Traditional Concept Mapping (Group A)	48	29.5	6.34	4.58
2.	Refined Concept Mapping (Group B)	45	35.5	6.28	

B. Interpretation of the calculated data:

The mean score value of group A (Traditional Concept Mapping) is 29.5 whereas mean score value of group B (Refined Concept Mapping) is 35.5. The difference between two means is 6, which seems to be quite large. To test if this difference is due to the error in sampling, Critical Ratio was calculated. The value of Critical ratio comes to be 4.58. As the value of CR is more than 2.58, it can be concluded that the difference between means is significant and null hypothesis can be rejected at the significance level of 0.05 and even at 0.01 level. Therefore it can be said that there is a significant difference in the achievement of the two groups after the treatment. Group B taught by REFINED CONCEPT MAPPING performed better than Group A taught by TRADITIONAL CONCEPT MAPPING in post-test. It indicates that Refined Concept Mapping is better than Traditional Concept Mapping in teaching-learning process of Science.

C. Analysis of data of perception scales

A Perception scale on 3 point scale was prepared by the investigator for Group B to know their perception towards Refined concept mapping. There were 20 statements in it. Every statement has three choices- To great extent, to some extent, and not at all. Students had to tick the option that suits their perception. To score it each choice is assigned a score like 3, 2 &1 to great extent, to some extent & not at all respectively. The maximum score can be obtained in the perception scale is 60 & minimum score is 20. The Score 60-39 indicates favourable perception towards Refined Concept Mapping, Score 40 indicates indifferent perception and score 41-20 indicates unfavourable perception towards Refined Concept Mapping.

The data obtained on this 3 point perception scale is as shown in Table 3:

Table 2: Scores of Section B (Refined concept mapping) in perception scale

Score	X	Frequency (f)	fX	d	d^2	f d^2
20-30	25	8	200	18	324	2592
30-40	35	9	315	08	64	576
40-50	45	12	540	-2	04	48
50-60	55	16	880	-12	144	2304
Total		45	1935			5520

$$\overline{X} = \sum FX / \sum F$$
$$= 1935/45$$
$$= 43$$

Standard deviation (σ) $= \sqrt{\sum fd^2 / \sum f}$

$= \sqrt{5520/45}$

$= 11.3$

Table 3: Mean & Standard Deviation obtained on perception scale

Mean	S.D	No. of Students
43	11.3	45

Average score of the students on perception scale is 43 which indicate a favourable perception towards Refined Concept Mapping.

D. Major Findings of the Study

- Overall performance of group A (refined concept mapping) is better than group B (traditional concept mapping) both in concepts & connecting links.
- Most of the students (80 to 90%) agree that refined concept mapping helps in recalling relationship between concepts.
- They strongly believe that refined concept mapping is a good way to practice the concept, helpful in revising the content, summarizing the concepts in a short time.
- 100% students agree that refined concept mapping helps in retaining the information in long term memory. For them refined concept mapping does not lead to confusion between concepts but it helps in getting overall picture of the concept.
- More than half of the total students agree that refined concept mapping is very much useful for presenting the information in exams as it helps in representing information precisely. Moreover, it is a diagrammatic representation of concepts so with the help of it a large amount of information can be represented in a short time.
- According to about 60% students constructing a refined concept map is an interesting and effortful activity as they think that it is not at all difficult to find appropriate connectors to link the concepts as in refined concept mapping some fixed relation names are already given. It makes easy for them to find out the connecting link to link the concepts. They don't think

it as a limitation to provide a fixed set of concepts & relation names moreover it helps in construction of concept maps.

- 63% students agree that refined concept mapping helps in clarifying the misconceptions in science concepts hence it helps in arousing interest in learning science concepts.

Conclusion

In the light of above findings of the present study it can be concluded that there is a significant difference in the achievement of the two groups after the treatment. In the post test, Group A which was taught by refined concept mapping performed better than Group B which was taught by traditional concept mapping. It indicated that refined concept mapping is better than traditional concept mapping in teaching-learning process of science. Students also perceived refined concept mapping as an effective tool in teaching-learning of science. We are now beginning to see in many science textbooks the inclusion of concept mapping as one way to summarize understandings acquired by students after they study a unit or chapter. Change in school practices is always slow, but it is likely that the use of concept maps in school instruction will increase substantially in the next decade or two.

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Decision-Making Confidence and Risk-Taking Behaviour in Investment Decisions: A Portfolio Optimization Analysis

Dr. Jyoti Khurana

Abstract

This paper presents a study based on primary data collected from a sample of 500 investors to examine the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization in investment decisions. Utilizing correlation analysis and the chi-square test, the research investigates the associations between these factors. The findings reveal a positive correlation between decision-making confidence and risk-taking behaviour, indicating that individuals with higher confidence tend to engage in riskier investment behaviour. Additionally, a positive correlation is observed between decision-making confidence and portfolio optimization, suggesting that greater confidence is associated with better portfolio performance. The results highlight the significance of decision-making confidence and risk-taking behaviour in shaping investment outcomes and provide practical implications for portfolio optimization strategies. This research underscores the importance of developing decision-making skills and cultivating a positive mindset to enhance investment outcomes. The insights gained from this study can assist individual investors and financial practitioners in making more informed decisions and optimizing their portfolios.

Key words: Decision-making confidence, risk-taking behaviour, investment decisions, portfolio optimization, risk management.

Introduction

In the realm of finance and investment, decision-making confidence and risk-taking behaviour play vital roles in shaping investment outcomes. Investors face the constant challenge of

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evaluating risks and potential returns to make informed investment decisions. Understanding the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization is crucial for investors, financial practitioners, and researchers alike. This paper aims to delve into the impact of decision-making confidence and risk-taking behaviour on portfolio optimization within the context of investment decisions, shed light on the underlying mechanisms that drive investment performance, and provide valuable insights for enhancing portfolio optimization strategies.

Investment decisions are inherently complex and involve navigating uncertainties and trade-offs. The decision-making process is influenced by various factors, including an individual's confidence in their ability to make sound decisions. Decision-making confidence refers to an investor's belief in their own judgement and capability to make successful investment choices. This confidence not only affects an investor's willingness to take risks but also influences their ability to process information effectively and make rational investment decisions. Higher levels of decision-making confidence may lead to more assertive and calculated investment choices, while lower levels of confidence may result in indecisiveness and hesitation.

Risk-taking behaviour is another crucial aspect of investment decision-making. It refers to an investor's willingness to take calculated risks in pursuit of higher returns. Risk and return are inherently intertwined in investment decisions, with higher potential returns often associated with higher risks. The degree to which an individual is willing to take on risks depends on various factors, including their risk appetite, financial goals, and tolerance for uncertainty. Understanding the dynamics of risk-taking behaviour and its impact on investment outcomes is crucial for effective portfolio optimization.

Portfolio optimization involves the process of constructing an investment portfolio that maximizes returns while managing risks. It requires careful consideration of various investment options, asset allocation strategies, and risk management techniques. The ability to optimize a portfolio relies on making informed decisions based on a thorough analysis of available information, assessing potential risks, and evaluating potential returns. The interplay between decision-making confidence and risk-taking behaviour significantly influences portfolio optimization outcomes.

By conducting this study, we aim to provide valuable insights and practical implications for investors and financial practitioners. Understanding the dynamics between decision-making confidence, risk-taking behaviour, and portfolio optimization can guide investors in managing risks effectively and maximizing returns. Financial practitioners can leverage these insights to develop strategies and tools that support investors in making informed decisions. Ultimately, this study contributes to the existing body of knowledge in finance and provides practical recommendations for enhancing investment decision-making and portfolio optimization.

In the subsequent sections of this paper, we will delve into a comprehensive analysis of the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization. We will present the methodology used, analyze the collected data, and discuss the findings in detail. Additionally, the limitations of the study will be acknowledged, and suggestions for future research will be provided. Through this research, we aim to advance our understanding of decisions.

Literature Review

The literature on decision-making confidence, risk-taking behaviour, and portfolio optimization in investment decisions provides valuable insights into the factors that influence investment outcomes and portfolio performance. This section reviews key studies and theories that contribute to our understanding of these concepts.

Studies have consistently highlighted the role of decision-making confidence in investment decision-making. Research by Kahneman and Tversky (1979) suggests that individuals' confidence levels can influence their risk preferences, with higher confidence leading to a greater willingness to take risks. Moreover, studies by Barber and Odean (2001) and De Bondt and Thaler (1995) demonstrate a positive relationship between overconfidence and excessive trading, resulting in suboptimal portfolio performance.

The literature also emphasizes the importance of risk-taking behaviour in investment decisions. Markowitz's modern portfolio theory (1952) suggests that investors can optimize their portfolios by balancing risk and return. Behavioural finance studies, such as those by Shefrin and Statman (1985) and Baker and Wurgler (2007), emphasize the role of investor sentiment and risk appetite in shaping investment decisions and subsequent portfolio performance.

Portfolio optimization strategies have been extensively studied in the literature. Studies by Sharpe (1964) and Black and Litterman (1992) propose various techniques, including mean-variance analysis and asset allocation models, to optimize portfolio returns while managing risk. Additionally, studies by Fama and French (1992) and Carhart (1997) explore factors that contribute to the performance of diversified portfolios.

However, the literature on the specific relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization is relatively limited. This study aims to fill this gap by examining the correlations between decision-making confidence, risk-taking behaviour, and portfolio optimization outcomes using primary data from a sample of 500 investors. By building upon existing literature and incorporating empirical evidence, this research contributes to a deeper understanding of the role of decision-making confidence and risk-taking behaviour in portfolio optimization.

Overall, the literature suggests that decision-making confidence and risk-taking behaviour play crucial roles in investment decisions and can significantly impact portfolio performance. Understanding the interplay between these factors can inform the development of effective portfolio optimization strategies and assist investors in making informed decisions. The present study seeks to contribute to this body of knowledge by providing empirical evidence on the relationships between decision-making confidence, risk-taking behaviour, and portfolio optimization outcomes.

Objectives of the study

The essential objectives of the research are as follows:

- To examine the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization in investment decisions.

- To assess the influence of decision-making confidence and risk-taking behaviour on investment outcomes, including risk management and return generation.

- To investigate the role of external factors, such as market conditions and economic indicators, in the decision-making process and their impact on portfolio optimization.

- To provide practical implications and recommendations for investors and financial practitioners to enhance their decision-making processes and achieve better portfolio optimization.

Methodology

This study utilizes a quantitative research approach to investigate the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization in investment decisions. A sample of 500 individuals actively engaged in investment decision-making was selected to gather primary data. A structured questionnaire was developed, consisting of Likert scale items to measure decision-making confidence and risk-taking behaviour. Participants' responses were collected and recorded for further analysis. A correlation analysis was conducted to examine the relationships between decision-making confidence, risk-taking behaviour, and portfolio optimization. Correlation coefficients were calculated to determine the strength and direction of these relationships. To test the hypotheses, the chi-square test was employed. This statistical test evaluated the significance of the relationship between decision-making confidence, risk-taking behaviour, and portfolio optimization. The observed frequencies were compared with the expected frequencies to determine if there was a significant association between these variables. The data analysis was conducted using statistical software, ensuring the accuracy and reliability of the results. Ethical considerations were taken into account throughout the study, ensuring participant anonymity and confidentiality. The limitations of the study, such as sample size and generalizability, were also acknowledged.

Analytical Insights

This table presents the data collected from a sample of 500 individuals for the study on decision-making confidence and risk-taking behaviour in investment decisions.

Table: 1 Data Collected

Question	1 - Strongly Disagree	2 - Disagree	3 - Neutral	4 - Agree	5 - Strongly Agree
1. Feel confident in my decision-making abilities.	50	100	150	150	50
2. Thoroughly consider the potential risks before making a decision.	30	70	100	200	100
3. Carefully evaluate the potential returns before making an investment decision.	40	60	100	200	100
4. Seek advice or input from experts or financial advisors before making major financial decisions.	80	100	120	150	50
5. I am willing to take calculated risks to achieve higher returns.	60	80	100	200	60
6. Base my decisions on a thorough analysis of available information.	30	70	100	200	100
7. Carefully consider the impact of external factors (economy, market conditions, etc.) on my decisions.	40	80	100	180	100
8. Review and reflect on past decisions to learn and improve my decision-making skills.	40	80	100	150	130
Total	**370**	**640**	**870**	**1430**	**690**

Correlation Analysis

The following table displays the correlation coefficients between decision-making confidence, risk-taking behaviour, and portfolio optimization variables. These coefficients disclose the strength and direction of the relationships between these variables.

Table: 2 Correlation Coefficients

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8
Q1 Decision -making confidence	1.00	0.85	0.99	0.90	0.87	0.74	0.78	0.79
Q2 Thorough consideration of potential risks	0.85	1.00	0.78	0.74	0.85	0.71	0.83	0.81
Q3 Careful evaluation of potential returns	0.99	0.78	1.00	0.86	0.92	0.86	0.89	0.83
Q4 Seeking advice or input from experts or financial advisors	0.90	0.74	0.86	1.00	0.98	0.87	0.81	0.61
Q5 Willingness to take calculated risks	0.87	0.85	0.92	0.98	1.00	0.76	0.92	0.70
Q6 Baseline decisions on thorough analysis of available inform ation	0.74	0.71	0.86	0.87	0.76	1.00	0.87	0.73
Q7 Consider the impact of external factors on decisions	0.78	0.83	0.89	0.81	0.92	0.87	1.00	0.84
Q8 Review and reflect on past decisions for learning and improvement	0.79	0.81	0.83	0.61	0.70	0.73	0.84	1.00

By analysing the correlation coefficients in the above table, we can say that

Decision-making confidence (Question 1) is strongly correlated with thorough consideration of potential risks (Question 2), careful evaluation of potential returns (Question 3), and seeking advice or input from experts or financial advisors (Question 4). This indicates that individuals who feel more confident in their decision-making abilities tend to also consider risks, evaluate potential returns, and seek advice from experts.

Thorough consideration of potential risks (Question 2) is moderately correlated with careful evaluation of potential returns (Question 3), seeking advice or input from experts or financial advisors (Question 4), and willingness to take calculated risks (Question 5). This suggests that individuals who thoroughly consider risks are also more likely to evaluate potential returns, seek advice, and exhibit a willingness to take calculated risks.

Careful evaluation of potential returns (Question 3) is strongly correlated with decision-making confidence (Question 1), seeking advice or input from experts or financial advisors (Question 4), and willingness to take calculated risks (Question 5). This implies that individuals who carefully evaluate potential returns are more likely to be confident in their decision-making, seek advice, and be willing to take calculated risks.

Seeking advice or input from experts or financial advisors (Question 4) is moderately correlated with decision-making confidence (Question 1), thorough consideration of potential risks (Question 2), careful evaluation of potential returns (Question 3), and consideration of the impact of external factors (Question 7). This suggests that individuals who seek advice from experts are more likely to feel confident in their decisions, consider risks, evaluate potential returns, and take external factors into account.

Willingness to take calculated risks (Question 5) is moderately correlated with thorough consideration of potential risks (Question 2), careful evaluation of potential returns (Question 3), and considering the impact of external factors (Question 7). This indicates that individuals who are willing to take calculated risks are also more likely to consider risks, evaluate potential returns, and take external factors into account.

Baseline decisions based on thorough analysis of available information (Question 6) are moderately correlated with thorough consideration of potential risks (Question 2), careful evaluation of potential returns (Question 3), seeking advice or input from experts or financial advisors (Question 4), and consideration of the impact of external factors (Question 7). This suggests that individuals who base their decisions on thorough analysis tend to also consider risks, evaluate potential returns, seek advice, and take external factors into account.

Consideration of the impact of external factors (Question 7) is moderately correlated with thorough consideration of potential risks (Question 2), careful evaluation of potential returns (Question 3), seeking advice or input from experts or financial advisors (Question 4), and reviewing and reflecting on past decisions (Question 8). This implies that individuals who consider external factors are more likely to also consider risks, evaluate potential returns, seek advice, and reflect on their past decisions.

Reviewing and reflecting on past decisions (Question 8) is moderately correlated with seeking advice or input from experts or financial advisors (Question 4) and consideration of the impact of external factors (Question 7). This suggests that individuals who review and reflect on their past decisions are also more likely to seek advice and consider external factors.

Hypothesis Testing

The hypothesis to be tested using the chi-square test is as follows:

Null Hypothesis (H0): decision-making confidence and risk-taking behaviour have not a significant impact on portfolio optimization

Alternate Hypothesis (H1): decision-making confidence and risk-taking behaviour have a significant impact on portfolio optimization.

By conducting the chi-square test, we aim to determine if the observed relationship between these variables is statistically significant, or if it could be attributed to random chance. The test will assess the degree of association between decision-making confidence, risk-taking behaviour, and portfolio optimization, and provide evidence to either accept or reject the null hypothesis.

Table 3: Chi-Square Value

Observed frequency (f_o)	Expected frequency (f_e)	(f_o - f_e)	$(f_o - f_e)^2$	$(f_o - f_e)^2/ f_e$
370	800	-430	184900	231.12
640	800	-160	25600	32.00
870	800	70	4900	6.12
1430	800	630	396900	496.12
690	800	-110	12100	15.12
Total $\chi 2$				**780.50**

The Chi-Square value is 780.5. The p-value is < .00001

Since the p-value is less than .05 at the 5% significance level , we reject the null hypothesis. This means that there is evidence to suggest that decision-making confidence and risk-taking behaviour have a significant impact on portfolio optimization based on the analyzed data. In conclusion, the findings from the analysis indicate that decision-making confidence and risk-taking behaviour play a significant role in portfolio optimization.

Challenges and Future Scope of Portfolio Optimization

The challenges and future scope of portfolio optimization are vast and constantly evolving. Here are some major issues and recommendations for the field's future.

- **Data Availability and Quality:** Portfolio optimization relies on accurate and reliable data. However, obtaining high-quality and comprehensive data can be a challenge. Future efforts may focus on improving data collection methods and leveraging new sources of data, such as alternative data and unstructured data.

- **Incorporating Non-Traditional Assets:** Traditional portfolio optimization techniques primarily focus on traditional asset classes like stocks and bonds. The future scope lies in incorporating non-traditional assets such as cryptocurrencies, real estate, commodities, and alternative investments. Developing models and frameworks to incorporate these assets effectively will be crucial.

- **Handling Uncertainty and Risk:** Portfolio optimization models often assume a static and predictable environment. However, real-world financial markets are dynamic and subject to uncertainty and risk. Future research may focus on incorporating risk management techniques, such as downside risk measures and stress testing, into portfolio optimization frameworks.

- **Considering Transaction Costs:** Transaction costs, such as brokerage fees and market impact, can significantly affect the performance of a portfolio. Future work may involve integrating transaction costs into optimization models to generate more realistic and practical investment strategies.

- **Incorporating behavioural Factors:** Traditional portfolio optimization models assume rational and consistent investor behaviour. However, investors often exhibit behavioural biases and emotions that impact their decision-making. Future research may explore integrating behavioural finance principles into portfolio optimization models to capture the cognitive biases and sentiment-driven behaviour of investors.

- **Dynamic Portfolio Optimization:** Traditional portfolio optimization typically assumes a static asset allocation over a specified time period. Future advancements may involve developing dynamic portfolio optimization models that adapt to changing market conditions and investor objectives. These models can incorporate techniques such as dynamic asset allocation, market timing, and tactical asset allocation.

- **Machine Learning and Artificial Intelligence:** The use of machine learning and artificial intelligence techniques in portfolio optimization is an area of active research. These techniques can help analyze large and complex datasets, identify patterns, and generate more accurate and efficient portfolio strategies. Future developments may focus on integrating machine learning algorithms into portfolio optimization frameworks.

- **Sustainable and Impact Investing:** With increasing awareness of environmental, social, and governance (ESG) factors, there is a growing interest in sustainable and impact investing. Future efforts may involve incorporating ESG considerations into portfolio optimization models and developing strategies that align with investors' values and sustainability goals.

- **Robo-Advisory and Digital Platforms:** The rise of robo-advisory platforms and digital investment platforms presents new opportunities for portfolio optimization. These platforms can provide personalized and automated portfolio management services to a wide range of investors. Future work may involve enhancing the capabilities of robo-advisors and leveraging technological advancements to improve portfolio optimization and decision-making processes.

Overall, portfolio optimization faces challenges related to data, risk management, behavioural factors, and incorporating new asset classes. The future scope lies in addressing these challenges and advancing the field through technological advancements, innovative modelling techniques, and a broader consideration of investor preferences and sustainability objectives.

Limitations

While the study provides valuable insights, it is important to acknowledge certain limitations that may impact the generalizability and reliability of the findings.

- **Sample Size and Representativeness:** The study's findings are based on a specific sample size of 500 individuals. The sample may not be representative of the entire population of investors, which limits the generalizability of the results.

- **Self-Reported Data:** The data collected for the study may rely on self-reported measures, such as participants' confidence in decision-making and risk-taking behaviour. This introduces the possibility of response bias, where participants may not accurately represent their true attitudes and behaviours.

- **Subjectivity and Perceptions:** The study relies on subjective measures, such as participants' perception of decision-making confidence and risk-taking behaviour. Different individuals may have varying interpretations and subjective assessments of these concepts, which may introduce measurement bias.

- **External Validity:** The study's focus on a specific context or time period may limit the external validity of the findings. Factors such as market conditions, economic trends, and investor sentiment can vary over time and across different market environments, which may influence decision-making and portfolio optimization outcomes.

- **Lack of Control Variables:** The study may not have accounted for all potential confounding variables that could impact decision-making confidence, risk-taking behaviour, and portfolio optimization. Factors such as financial literacy, investment experience, and personal financial circumstances could influence these relationships but may not have been considered in the analysis.

- **Long-Term Analysis:** The study may have focused on short-term outcomes and may not have captured the long-term effects of decision-making confidence and risk-taking behaviour on portfolio optimization. Long-term investment performance and sustainability may be influenced by additional factors that were not explored in the study.

It is important to consider these limitations when interpreting the findings of the study and to exercise caution when applying the results to real-world investment decision-making. Further research with larger and more diverse samples, controlling for additional variables, and exploring long-term outcomes would contribute to a more comprehensive understanding of the topic.

Conclusion

Based on the analysis of the data and the significant relationships found, we can draw several conclusions regarding decision-making confidence, risk-taking behaviour, and their impact on portfolio optimization. Firstly, there is a positive correlation between decision-making confidence and various factors such as thorough consideration of potential risks, careful evaluation of potential returns, seeking advice from experts, and considering external factors. This suggests that individuals who feel more confident in their decision-making abilities are more likely to make informed and calculated investment decisions. Secondly, risk-taking behaviour is positively associated with factors such as considering risks, evaluating potential returns, and considering external factors. This implies that individuals who are willing to take calculated risks are more likely to make investment decisions that lead to higher potential returns.

Based on these findings, it is recommended that investors focus on improving their decision-making confidence by thoroughly considering potential risks and evaluating potential returns. Seeking advice from experts or financial advisors can also provide valuable insights in making informed investment decisions. Additionally, it is important to consider the impact of external factors, such as market conditions and economic trends, on investment decisions. Regularly reviewing and reflecting on past decisions can also contribute to learning and improving decision-making skills. By incorporating these suggestions into their investment approach, individuals may enhance their portfolio optimization strategies and potentially achieve better investment outcomes

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Factors Affecting Employee Satisfaction in Indian IT Sector

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Abstract

The Indian IT industry is one of the fastest-growing industries in the world. The IT industry has a high level of employee satisfaction, which is critical for the success of the IT industry. The research paper explores the factors affecting employee satisfaction in the Indian IT sector, focusing on the relationship between HR policies and employee happiness, revealing key factors contributing to job satisfaction, such as training and development activities, financial rewards, and opportunities for promotion. The Indian IT sector faces challenges in maintaining high levels of job satisfaction due to rapid technological advancements, market fluctuations, and global competition. This study delves into the impact on employees' views regarding their workplace atmosphere, corporate culture, chances for career growth, and general job contentment. The research's significance lies in its potential to inform strategic HRM practices, organizational policies, and managerial interventions to foster a positive work culture, nurture talent, and maximize employee satisfaction. The study contributes to the knowledge of job satisfaction in the Indian IT Sector. Job satisfaction is influenced by training, working conditions, performance appraisals, remuneration, and working conditions with training having a greater impact. Job satisfaction levels vary among employees, with cognitive factors impacting it.

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Introduction

Job satisfaction plays a vital role in an employee's job and the organization they are a part of, impacting their drive, efficiency, and overall achievements. Within India's fiercely competitive IT sector, employee contentment stands as a critical element in a company's prosperity. Human resources policies, encompassing organizational ethos, regulations, and protocols, hold substantial sway over employee satisfaction. Research carried out within India's IT domain revealed that employees' viewpoints on HR policies hold considerable weight in their contentment levels. Essential elements that shape employee satisfaction consist of equity, openness, and involvement in the decision-making process.

The Indian IT industry, which has evolved over the last 20 years, is now a major player in the Indian market, with 4.36 million people working in it. Job satisfaction is defined as a joyful or optimistic emotional state arising from the assessment of one's employment or work-related experiences. The Indian IT sector faces challenges in maintaining high levels of job satisfaction due to rapid technological advancements, market fluctuations, and global competition. This research aims to explore the factors influencing employees' perceptions of their work environment, organizational culture, career development opportunities, and overall job satisfaction levels.. The research's significance lies in its potential to inform strategic HRM practices, organizational policies, and managerial interventions to foster a positive work culture, nurture talent, and maximize employee satisfaction. The study contributes to the body of knowledge on job satisfaction in the Indian IT sector.

Job satisfaction in the IT sector leads to enhanced efficiency, lower absenteeism, increased loyalty, retention of skilled employees, and improved work quality and productivity. It also improves customer satisfaction, fosters innovation, and contributes to the overall success of organizations, making it a crucial factor for employee satisfaction.

Objectives

To identify the factors affecting Employee Job Satisfaction in the Indian IT Sector

Literature Review

S.No.	Topic and Author	Objectives	Factors
1	Job Satisfaction in Information Technology Organizations in Chennai City-An Empirical Study Dr. N. Akbar Jan, Dr. A. Nirmal Raj, A.K.Subraman (2016)[1]	1. To develop a model to determine factors of enhancement of job satisfaction of employees	Development activities, financial rewards, suitable incentives, welfare measures, working environment challenges, and appropriate timing and growth are crucial for successful development.
2	A study on Job satisfaction for IT Industry Kumar,S Bhavani,Devi,G (2017)[2]	1. To assess the job satisfaction level of employees. 2. To know the factors that influence the job satisfaction of employees. 3. To offer suggestions to improve the satisfaction level of employees	Opportunities for advancement, respect from co-workers, relationship with supervisor, and financial rewards are key factors in the workplace.
3	Exploring job satisfaction & organizational commitment of employees in the information technology environment. E.J. Lumley, M. Coetzee, R. Tladinyane & N. Ferreira[3]	1. To explore the relationship between job satisfaction and organizational commitment of IT employees.	Job satisfaction positively impacts employee affective and normative commitment, with satisfaction in pay, promotion, supervision, fringe benefits, work nature, and communication leading to organizational commitment

5	Relationship between Organizational Leadership Capability and Job Satisfaction: Exploratory Study in the Small-Sized IT Service Organization in Estonia Kurmet Kivipold, Maret Ahonen.[5]	1. To know facets of job satisfaction. 2. To explore the linkage between organizational leadership capability & job satisfaction	Job satisfaction is influenced by intrinsic factors like achievement and recognition, extrinsic factors like working conditions, supervision, and social climate, and organizational leadership capability.
6	Women executives in IT/ITeS sector: Job satisfaction & quality of work life.Priya B,S,&Mahadevan,U (2013)[6]	1. To explore dimensions of job satisfaction & quality of work life. 2. To study the level of job satisfaction in IT/ITeS sector of Chennai	The satisfaction levels of senior, middle, and junior level women employees are similar, and there is a correlation between job satisfaction and the quality of work life for women executives.
7	Factors influencing Job satisfaction in Information Technology Professionals in India. Meetali Saxena, Deepika Pandita[7]	1.To know major intrinsic & extrinsic factors affecting job satisfaction of IT employees in India. 2.To know the influence of Intrinsic & extrinsic factors on job satisfaction.	The study reveals that intrinsic factors like creativity and extrinsic factors like recognition significantly contribute to job satisfaction in the IT industry.
8	Human resource management, Job satisfaction & employee commitment affecting Information Technology staff Turnover Intention: A Structural Equation Model Marrut Manistitya and Wanno Fongsuwan, (2015)[8]	1. To determine the impact of human information systems, work satisfaction & workplace motivation on employee retention	Organizational commitment and job satisfaction are crucial for reducing turnover, as they directly impact the overall organizational performance.

9	Employee Job Satisfaction in Software and ITeS units in Bangalore - An Empirical study Jyothi B.S & Dr. P.T. Ravindran[9]	1. The main objective of this study is, to analyze the job satisfaction of employees working in Software and ITeS units at Bangalore concerning core HR practices	Job satisfaction is influenced by training, working conditions, performance appraisals, remuneration, and working conditions, with training and working conditions having a greater impact.
10	Cognitive Factors and its Impact on Job Satisfaction: A Study on Selected Information Technology Enabled Service Companies in Bengaluru. Anthony Samson1 & K. Nagendra Babu[10]	1. To find out the level of job satisfaction among ITeS employees. 2.To find the impact of cognitive factors on job satisfaction among ITeS employees	Job satisfaction levels vary among employees, with cognitive factors impacting it. Most employees are dissatisfied with pay.

(Source: Author -Self compilation)

From the above Table 1, we are summarizing some major factors of job satisfaction and they are:

- **Work Environment:** A positive and supportive work environment can significantly impact employee satisfaction. Factors such as workplace culture, relationships with colleagues, and the physical work environment play a role. The work environment significantly influences employee satisfaction, especially in the Indian IT sector where long hours and high stress levels are common. A positive workplace culture, promoting teamwork, collaboration, and mutual respect, can enhance job satisfaction. Positive relationships with colleagues and supervisors can create a supportive atmosphere, while a comfortable, well-equipped workspace can contribute to employee well-being and productivity. A holistic approach addressing cultural, interpersonal, and physical factors can enhance employee satisfaction in the Indian IT sector.

- **Salary:** The IT sector's salary, influenced by factors like role, experience, skill set, location, and market demand, ranges from entry-level to highly experienced professionals. Senior roles like managers, engineers, and architects with in-demand skills in cloud computing, cybersecurity, and big data can earn higher salaries. The sector's competitive salary packages reflect its high demand for skilled professionals.
- **Job Security:** Employees who feel secure in their jobs are more likely to be satisfied. Uncertainty about job stability can lead to stress and dissatisfaction. Job security is crucial for employee satisfaction in the Indian IT sector. Uncertainty can lead to increased stress, anxiety, and dissatisfaction, negatively impacting performance, productivity, and overall well-being. Employers can enhance job security by providing clear communication, offering opportunities for skill development, and creating a supportive work environment where employees feel valued and recognized.
- **Compensation and Benefits:** Fair and competitive compensation, along with benefits such as health insurance, retirement plans, and bonuses, are crucial for employee satisfaction. Compensation and benefits are crucial for employee satisfaction in the Indian IT sector. Fair, competitive compensation attracts top talent, while benefits like health insurance, retirement plans, and bonuses provide financial security and demonstrate organizational care. Flexible work arrangements, wellness programs, and employee assistance programs help manage work-life balance, reducing stress and boosting job satisfaction. A comprehensive compensation package is essential for employee retention.
- **Career Development:** Opportunities for career growth and advancement are important for keeping employees satisfied. This includes access to training, mentorship programs, and promotions. Career development is crucial for employee satisfaction in the Indian IT sector. Offering training programs, mentorship, and clear paths for advancement can keep employees engaged and motivated. Regular feedback and performance evaluations help employees understand their career progression. In the high demand for skilled professionals, offering meaningful career development opportunities can attract and retain top talent, leading to improved performance and retention rates.

- **Work-Life Balance:** Balancing work responsibilities with personal and family life is essential for overall job satisfaction. Flexible work arrangements and policies can help employees achieve this balance. Work-life balance is crucial for employee satisfaction in the Indian IT sector, where long hours and high job demands are common. Flexible work arrangements, such as telecommuting, flexible hours, and compressed workweeks, can help employees adjust schedules, reduce stress, and improve well-being. Organizations can also promote work-life balance by encouraging regular breaks, vacation time, and disconnecting from work outside of office hours.
- **Recognition and Rewards:** Feeling valued and appreciated for their contributions can enhance job satisfaction. Recognition can come in various forms, such as awards, bonuses, or promotions. Recognition and rewards are vital for employee satisfaction, especially in the Indian IT sector. Offering meaningful recognition and rewards, such as awards, bonuses, promotions, or simple gestures, boosts morale and motivation. Organizations can create a culture of appreciation by providing regular feedback and praise. This helps retain top talent and maintain high levels of employee satisfaction, thereby enhancing the overall performance of the workforce.
- **Workload and Job Complexity:** The study of workload and job complexity in organizational psychology reveals that they can significantly impact employee performance and well-being. Increased stress can negatively impact job performance, but social support can mitigate this. The relationship between workload, workaholism, and job performance is complex and influenced by perfectionistic concerns and work engagement, suggesting the importance of managing work engagement.
- **Relationships at Work:** Positive relationships with colleagues and supervisors can contribute to a positive work environment and higher levels of satisfaction. Positive work relationships are crucial for employee satisfaction, especially in the Indian IT sector. Fostering a culture of respect, collaboration, and open communication, encouraging social interactions, and providing opportunities for feedback can enhance teamwork and job performance. This, in turn, can lead to improved job satisfaction, engagement, and overall well-being within the organization.

- **Organizational Culture:** The culture of an organization, including its values, norms, and practices, can impact employee satisfaction. A culture that promotes transparency, trust, and open communication can lead to higher satisfaction levels. Organizational culture in the Indian IT sector significantly impacts employee satisfaction. A culture that fosters transparency, trust, and open communication can boost job satisfaction. This can be achieved by aligning values with employee needs, promoting work-life balance, offering professional development opportunities, and rewarding contributions. This approach can enhance employee satisfaction and overall organizational performance.
- **Employee Engagement:** Engaged employees are more likely to be satisfied with their jobs. Engaging employees through meaningful work, opportunities for input and involvement, and recognition can enhance satisfaction. Employee engagement is crucial for job satisfaction, as engaged employees are emotionally committed to their work. Organizations can boost engagement by offering meaningful work, allowing input, and rewarding contributions. In the Indian IT sector, fostering a culture of engagement can help retain top talent and maintain high satisfaction levels, creating a positive work environment

Factors of Employee Satisfaction

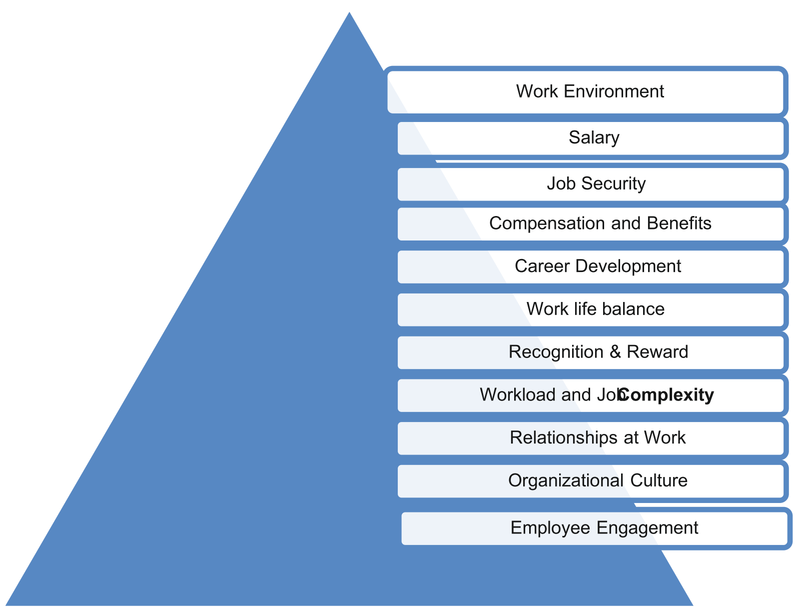

Figure 1 Factors of Job Satisfaction.

The IT sector is influenced by both intrinsic and extrinsic factors that significantly impact employee motivation and job satisfaction.

Job satisfaction is influenced by both intrinsic and extrinsic factors, including challenging work, recognition, and responsibility, as well as external factors like salary, job security, and working conditions.

Intrinsic Factor	Extrinsic Factor
• Skill variety	• Pay
• Empowerment	• Fringe Benefits
• Organizational Culture and Values	• Job Environment
• Creativity	• Management
• Work Independence	• Career Growth
	• Job security

Table 2: Factors impact employee motivation and job satisfaction

Conclusion

This paper examines the factors influencing employee satisfaction in the Indian IT sector, a rapidly growing industry. Job satisfaction is crucial for motivation, productivity, and overall success, leading to enhanced efficiency, lower absenteeism, increased loyalty, retention of skilled employees and improved work quality and productivity. Intrinsic factors like creativity and extrinsic factors like recognition significantly contribute to job satisfaction in the IT industry.

The study also examines the impact of human resource management, job satisfaction, and employee commitment on employee retention. Organizational commitment and job satisfaction are essential for reducing turnover, as they directly impact overall organizational satisfaction among IT employees. The work environment, particularly in the Indian IT sector, significantly influences employee satisfaction, especially in the face of long hours and high stress levels.

A holistic approach addressing cultural, interpersonal, and physical factors can enhance employee satisfaction in the Indian IT sector. Senior roles with in-demand skills in cloud computing, cybersecurity, and big data can earn higher salaries, reflecting the high demand for skilled professionals. Furthermore, job security, compensation, benefits, career development, flexible work arrangements, and recognition are essential for employee satisfaction. The relationship between workload, workaholism, and job performance is complex and influenced by perfectionistic concerns and work engagement. Positive work relationships, transparency, trust, and open communication can lead to higher satisfaction levels. Fostering a culture of engagement can help retain top talent and maintain high satisfaction levels, creating a positive work environment.

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Artificial Intelligence and Technology – Future of Accounting

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Abstract

Artificial intelligence and cloud computing are bringing about a technological revolution in the accounting industry that will boost accuracy and efficiency. To stay competitive, accounting professionals need to adjust to changing procedures and technologies. Technology and AI will certainly be incorporated into accounting, necessitating the development of new competencies and skills among professionals. Benefits from automation technologies like cloud computing and RPA include increased productivity, accuracy, and real-time insights. Financial reporting is more secure and transparent because of blockchain technology. Algorithms powered by AI and ML automate repetitive work, enhance judgement, and lower error rates in accounting procedures. Accounting professionals must pursue ongoing education and training to take advantage of innovative technologies and maintain their competitiveness in the ever-changing accounting industry.

Keywords: Artificial Intelligence, Enterprise Resource Planning, machine learning, Robotic Process Automation, Software as a Service, Platform as a Service, Infrastructure as a Service, case-based reasoning, optical character recognition, Amazon Web Services, customer relationship management, XBRL`

Introduction

Accounting is a critical function for all businesses, as it enables them to track and manage their financial transactions, budgets, and investments. The field of accounting has undergone significant changes in recent years, primarily due to advancements in technology. As businesses have embraced digital transformation, the accounting profession has evolved, becoming more efficient and accurate with the help of new technologies.

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In the post-industrial period, technological advancements such as the computer, transformed the accounting profession. The introduction of computers enabled accountants to automate many of the manual processes associated with accounting, making the process faster and more accurate. To elucidate further, interest calculation in banks, which is currently system driven was once computed manually by the bank staff. Given the huge volume of transactions, interest computation usually took over a month for each branch, and the chances of errors were very high since the same was manual.

Currently, there is an upsurge of technology in the accounting field on account of cloud computing and artificial intelligence, all of which are transforming the accounting profession, making it more efficient and accurate. However, these new technologies also present challenges for accounting professionals, who must adapt to new systems and processes to remain competitive.

The accounting industry is undergoing a profound transformation driven by rapid advancements in artificial intelligence (AI) and technology. As these innovations become increasingly integrated into financial practices, they promise to reshape the traditional roles of accountants and redefine the landscape of financial management. AI, with its capabilities in automation, data analysis, and predictive modeling, is poised to enhance the accuracy, efficiency, and strategic potential of accounting processes. Technologies such as robotic process automation (RPA), blockchain, and advanced analytics are not only streamlining routine tasks but also enabling deeper insights and more informed decision-making. This shift towards a more technologically advanced accounting framework offers significant benefits, including improved auditing accuracy, personalized financial services, and enhanced financial forecasting. However, it also brings forth challenges related to ethical considerations, data privacy, and the need for continuous skills development. As the future of accounting becomes increasingly intertwined with AI and technology, professionals in the field must adapt and evolve to leverage these tools effectively, ensuring they remain competitive and capable of delivering greater value in a rapidly changing environment.

Artificial Intelligence (AI) is poised to revolutionize the field of accounting, transforming traditional processes and enhancing the capabilities of accounting professionals. As AI technologies continue to evolve, their integration into accounting practices promises significant improvements in efficiency, accuracy, and decision-making. AI is set to transform the accounting profession by automating routine tasks, enhancing data analysis, improving compliance and fraud detection, personalizing client interactions, and continuously adapting to new information. While challenges exist, the overall impact of AI on accounting promises to be profoundly positive, paving the way for a more efficient, insightful, and strategic future in financial management.

Literature Review

The integration of artificial intelligence (AI) and technology in the field of accounting is a topic of growing interest and importance. Brown et al. (1994) discuss the emergence of case-based reasoning (CBR) systems in various fields, including accounting, highlighting the potential applications of AI in accounting research and practice. Qasim et al. (2019) emphasize the need to modernize the accounting curriculum to incorporate blockchain technology, business data analytics, and AI to meet the industry's technological demands. Zhang et al. (2020) provide a comprehensive review of the impact of AI and blockchain on the accounting profession, exploring the use of big data, machine learning, and AI in general business practices and specialized accounting tasks. Imene et al. (2020) further discuss the influence of information technology on the accounting profession, predicting future accountants to work with AI machines, invest in big data and cyber-security, and explore virtual reality and augmented reality technologies. Li (2020) analyzes the influence of AI development on financial accounting, highlighting the advantages of using AI to address the shortcomings of traditional accounting methods. Ping (2021) discusses the integration of data mining and XBRL technology in management accounting information using AI, emphasizing the importance of combining theory and practice in modern accounting. Gambhir et al. (2021) focus on the changing skill set expectations for accounting and finance professionals due to the increasing role of AI in the industry. Hasan (2022) conducts a literature review on the application of AI in accounting and auditing, predicting significant changes in the profession shortly. Alghafiqi et al. (2022) provide an overview of the latest developments in AI, big data, and machine learning in the accounting profession, assessing the impact of technological advancements on the future of accounting. Overall, the literature suggests that the integration of AI and technology in accounting is inevitable and will lead to significant changes in the profession, requiring professionals to adapt to new skill sets and technological advancements to remain competitive in the evolving landscape of accounting.

3. Current State of Technology in accounting

Automation Process	**Cloud Computing**	**Enterprise Resource Planning**

3.1 Automation Process

Automation is the use of software and other tools to automate manual processes, making them faster and more accurate. The entire process happens in a fraction of a second, saving valuable time and mitigating all errors. Automation uses technology to perform tasks with minimal human intervention, aiming to boost efficiency, accuracy, and consistency. It includes types like fixed, programmable, and flexible automation, each suited to different production needs. Key components include sensors, controllers, actuators, and human-machine interfaces. Automation helps businesses achieve efficiency, accuracy and decision-making in accounting while saving time and money and facilitating compliance with regulations and standards.

Benefits of Automation Process

1. **Streamlining Data Entry:** Automation tools, such as optical character recognition (OCR) or barcode recognition technology, can help to automate the entry of data from source documents such as receipts and invoices. This can reduce the amount of time and effort required for manual data entry, as well as minimizing the potential for human error.

2. **Accelerating Data Processing:** Automation can help to process large amounts of data / large volumes of transactions more quickly and accurately than manual methods. For example, software can automatically categorize transactions into the appropriate accounts, calculate tax amounts, and generate financial statements, among other tasks.

3. **Enhancing Accuracy:** Automation can help to reduce errors and discrepancies in accounting processes. By automating tasks such as data entry and calculations, businesses can minimize the risk of errors caused by human error, improving the accuracy and reliability of their financial data.

4. **Improving Decision-Making:** Automation can provide real-time insights into financial data, enabling businesses to make informed decisions more quickly. With automated

reporting, the time spent on routine tasks is greatly minimized, enabling businesses to gain deeper insights into their financial performance, identify trends and patterns, and adjust their strategies accordingly.

5. **Saving Time and Money:** Automation reduces the amount of time and resources required to perform manual tasks such as data entry and reconciliations. This results in businesses saving on staffing costs and increases productivity and enabling accountants to focus on higher-level tasks such as analysis and planning.

Challenges in Automation Process

Automation also comes with its own set of potential drawbacks and challenges, some of them are mentioned below:

- It arises the need for ongoing training and education to keep up with the latest technology.
- Automation also presents a risk of data breaches and cyber-attacks, which can compromise the security and confidentiality of financial data.
- Due to automation, there exists potential loss of jobs. However, this can be mitigated by ensuring appropriate training to the workforce to remain updated with the technology.

Robotic Process Automation

Robotic Process Automation (RPA) is an emerging technology that revolutionizes financial reporting processes. RPA utilizes software robots or "bots" to automate manual and repetitive tasks in financial data processing, analysis, and reporting. By mimicking human interactions with digital systems, RPA bots can extract and consolidate data, perform calculations, generate reports, and ensure compliance with accounting standards. The adoption of RPA in financial reporting improves accuracy, enhances efficiency, and frees up valuable time for finance professionals to focus on more strategic activities. Moreover, RPA enables organizations to achieve timely reporting, cost savings, and increased data integrity, ultimately leading to more reliable and insightful financial information.

Cloud Computing

Cloud computing refers to the delivery of computing services over the internet. It allows accountants to access their data and software from any device with an internet connection. The entire world was hit in 2020 with probably the biggest black swan event of the past couple of decades– the COVID-19 pandemic. The continuous lockdowns severely impacted businesses, and operations came to a standstill. This in turn led to viewing cloud computing as a serious alternative compared to traditional client-server architecture in physical locations controlled by the entities themselves.

With the advent of cloud computing, persons could access the systems from their respective locations, work remotely during the lockdown, and ensure that the accounting process and reporting requirements did not suffer adversely.

Common Applications / Cases of Cloud Computing

1. **Cloud Storage:** Services like Dropbox, Google Drive, and Microsoft OneDrive offer cloud storage solutions that allow users to store and access their files and data from anywhere with an internet connection. Users can save documents, photos, videos, and other files in the cloud and synchronize them across multiple devices.

2. **Software as a Service (SaaS):** SaaS platforms provide cloud-based software applications that users can access and utilize via the internet. Examples include Salesforce for customer relationship management (CRM), Slack for team collaboration, and QuickBooks Online for accounting and financial management.

3. **Infrastructure as a Service (IaaS):** IaaS providers offer virtualized computing resources, including servers, storage, and networking infrastructure, on a pay-as-you-go basis. Examples include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform. These platforms allow businesses to scale their IT infrastructure based on demand without the need for physical hardware.

4. **Platform as a Service (PaaS):** PaaS providers offer cloud-based platforms that enable developers to build, deploy, and manage applications without the complexity of infrastructure management. Examples include Microsoft Azure App Service and Google App Engine.

5. **Cloud-based Communication and Collaboration:** Applications like Microsoft Teams, Google Workspace (formerly G Suite), and Zoom provide cloud-based communication and collaboration tools that facilitate real-time messaging, video conferencing, file sharing, and project management.

6. **Cloud-based E-commerce:** Few platforms enable businesses to set up and manage online stores using cloud infrastructure. These platforms provide features like product catalogs, payment processing, inventory management, and customer analytics.

7. **Big Data Analytics:** Cloud computing enables organizations to process and analyze large volumes of data efficiently. Services like Amazon Redshift, Google BigQuery, and Microsoft Azure Data Lake Analytics provide scalable infrastructure for big data processing and analytics, empowering businesses to derive valuable insights from their data.

Benefits of Cloud Computing

Following are some of how Cloud Computing has positively impacted accounting:

1. **Improved accessibility:** Cloud-based accounting software allows users to access their financial data from any location with an internet connection. This has increased accessibility and flexibility for accountants and business owners, allowing them to work remotely and collaborate in real-time.

2. **Enhanced security:** Cloud-based accounting software providers typically offer advanced security features such as encryption, firewalls, and multi-factor authentication helping in the protection of sensitive financial data from cyber threats and data breaches.

3. **Increased scalability:** Cloud-based accounting software allows businesses to easily scale up or down based on their changing needs. As a business grows, it can easily add new users and features without having to invest in additional hardware or software.

4. **Reduced costs:** Cloud-based accounting software typically requires less upfront investment in hardware and software, as well as ongoing maintenance costs. This can help businesses save money on IT expenses and redirect those funds to other areas of the business. For example, the cost of installing Microsoft Office Suite on a laptop or desktop is far more expensive than subscribing to the Office 365 Suite, which is a web-based download. Further, the web-based download also provides the option of continuous free updates, unlike its Office Suite offline counterpart.

5. **Streamlined collaboration:** Cloud-based accounting software allows multiple users to collaborate in real-time, reducing the need for manual data entry and communication. This can help to streamline workflows and reduce errors caused by miscommunication.

6. **Improved reporting and analytics:** Cloud-based accounting software often includes powerful reporting and analytics tools that allow businesses to gain deeper insights into their financial performance. This can help businesses make more informed decisions and identify areas for improvement.

Challenges in Cloud Computing

The following are the potential challenges that may emerge in cloud computing:

1. **Prone to hackers:** Since cloud-based software is completely online, they could be prone to hackers who could 'steal' data or passwords or compromise the integrity of the processed data, thereby causing disruptions to the businesses.

2. **Strong net connectivity:** It is a must for cloud-computing to be a success. Though there has been a huge surge in network and mobile connectivity in the past decade, connectivity in non-metros, tier-2 or tier-3 cities is not well-developed, which could create accessibility issues for the users of the cloud-based accounting software.

Enterprise Resource Planning (ERP)

Enterprise resource planning (ERP) is a type of software that organizations use for managing day- to-day business activities like procurement, project management, accounting, risk management, compliance, and supply chain operations.

ERP systems connect and correlate a multitude of business processes and enable the flow of data between them. It collects an organization's shared transactional data from multiple sources and thus eliminates data duplication and provides data integrity with a single source of authentication.

Nowadays, ERP systems are used by many organisations as it is critical for managing thousands of businesses of varied sizes covering all industries. Cloud-based ERP applications are embedded with next-generation technologies, such as AI, machine learning (ML), and digital assistants.

ERP systems are designed around a single, defined data structure (schema) that typically has a common database. This helps to ensure that the information used across the enterprise is normalized and based on common definitions and user experiences. These core constructs are then interconnected with business processes driven by workflows across business departments (e.g. finance, human resources, engineering, marketing, and operations), connecting systems and the people who use them.

Since data is the lifeblood of every modern company, ERP makes it easier to collect, organize, analyse, and distribute this information to every individual and system that needs it to best fulfil their role and responsibility. ERP also ensures that these data fields and attributes roll up to the correct account in the company's general ledger so that all costs are properly tracked and represented. A key ERP principle is the central collection of data for wide distribution. With a secure and centralized data repository, everyone in the organization can be confident that data is correct, up- to-date, and complete. Data integrity is assured for every task performed throughout the organization, from a quarterly financial statement to a single outstanding receivables report.

Benefits of ERP

It's impossible to ignore the impact of ERP in today's business world. As enterprise data and processes are caged into ERP systems, businesses can align separate departments and improve workflows, resulting in significant bottom-line savings. Examples of specific business benefits include:

1. Improved business insight from real-time information generated by reports
2. Less operational costs through streamlined business processes and best practices
3. Enhanced collaboration of users sharing data in contracts, requisitions, and purchase orders
4. Better efficiency through a common user experience across many business functions and well-defined business processes
5. Consistent infrastructure from the back office to the front office
6. Increased user-adoption rates from a common user experience and design
7. Reduction in risk through improved data integrity and financial controls
8. Less management and operational costs through uniform and integrated systems

Disadvantages of ERP

Implementation Costs: The initial cost of ERP software, along with installation, customization, and training, can be prohibitively high, especially for small to medium-sized businesses.

On-going Costs: Maintenance, updates, and support require continuous investment. These costs can add up over time, making ERP systems expensive to sustain.

Complex Implementation: Time-Consuming: ERP implementations can take several months or even years to complete, disrupting business operations.

Customization Challenges: Customizing ERP software to fit specific business needs can be complex and may require significant time and technical expertise.

Resistance to Change

Employee Resistance: Employees may resist adopting new systems due to unfamiliarity or fear of change, leading to lower productivity and morale.

Training Requirements: Extensive training is often needed for employees to effectively use the new system, which can be time-consuming and costly.

Integration Issues:

Compatibility Problems: Integrating ERP systems with existing legacy systems and other software can be challenging, leading to potential compatibility issues.

Data Migration: Transferring data from old systems to the new ERP system can be complex, time-consuming, and prone to errors.

Rigidity:

Inflexibility: Once implemented, ERP systems can be rigid, making it difficult to adapt to new business processes or changes without significant additional investment and effort.

Standardization: ERP systems often enforce standardized processes that may not align perfectly with the unique needs of every business unit.

Dependence on Vendors

Vendor Lock-in: Businesses can become dependent on their ERP vendors for updates, support, and maintenance, which can be risky if the vendor increases prices or fails to deliver adequate service.

Limited Customization Options: Some ERP vendors offer limited customization options, restricting the ability of businesses to tailor the system to their specific needs.

Security Risks

Data Security: Centralizing data in one system can make it a target for cyberattacks. Ensuring robust security measures is crucial but can be costly and complex.

System Downtime: Any failure or downtime in the ERP system can have widespread effects, disrupting multiple business processes simultaneously.

4. Future of Technology in Accounting

Blockchain | **Artificial Intelligence**

4.1 Blockchain

Blockchain technology is revolutionizing the financial landscape, and its impact on financial statement preparation is undeniable. As a Chartered Accountant involved in financial reporting, understanding blockchain is crucial for staying ahead in this rapidly evolving digital era. At its core, blockchain is a decentralized and transparent ledger that enables secure and immutable transactions. Unlike traditional centralized systems, blockchain offers a distributed network where information is shared and verified by multiple participants, eliminating the need for intermediaries and enhancing data integrity. From a financial statement preparation perspective, blockchain holds immense potential to streamline processes, enhance transparency, and improve the accuracy and reliability of financial reporting. By leveraging blockchain, financial professionals can ensure trustworthy and real-time financial information, revolutionizing how financial statements are prepared, audited, and shared with stakeholders. In this dynamic landscape, embracing blockchain technology is essential for Chartered Accountants to navigate the future of financial reporting effectively.

Key Impacts of Blockchain on Financial Reporting

1. **Enhanced Transparency:** Blockchain technology provides a decentralized and immutable ledger, where transactions are recorded and stored in a transparent and tamper-proof manner. This increased transparency ensures that financial data is accurately captured and can be easily audited, promoting trust and reliability in financial reporting.

2. **Improved Data Integrity:** Blockchain's distributed ledger ensures that each transaction is verified and encrypted, preventing unauthorized modifications or tampering. This feature enhances data integrity, reducing the risk of fraudulent activities and errors in financial reporting.

3. **Streamlined Audit Processes:** Blockchain technology enables real-time access to financial data, eliminating the need for time-consuming and manual data reconciliation processes. Auditors can directly access the blockchain ledger to verify transactions, reducing audit time and enhancing efficiency in financial reporting.

4. **Enhanced Security:** Blockchain incorporates advanced cryptographic algorithms, making it highly secure against unauthorized access or data breaches. Financial data stored on the blockchain is encrypted and protected, minimizing the risk of data manipulation or unauthorized disclosure, thus strengthening the security of financial reporting.

5. **Simplified Reconciliation:** Blockchain's decentralized ledger eliminates the need for reconciling multiple versions of data across different systems. With a single shared source of truth, financial reporting processes become more streamlined, reducing reconciliation efforts and potential errors.

6. **Cost Reduction:** By eliminating intermediaries and central authorities, blockchain reduces the costs associated with traditional financial reporting processes. It eliminates the need for third-party verification and reconciliation, leading to cost savings for organizations.

7. **Enhanced Audit Trail:** Blockchain maintains a comprehensive and immutable audit trail of all transactions, providing a transparent and traceable record of financial activities. This audit trail simplifies the identification and investigation of any irregularities or discrepancies, improving the accuracy and reliability of financial reporting.

8. **Real-time Financial Reporting:** With blockchain's real-time data availability and consensus mechanism, financial reporting can be performed more frequently and with greater accuracy. Organizations can generate up-to-date financial statements, enabling stakeholders to make informed decisions based on the most current financial information.

4.2 Artificial Intelligence (AI)

AI refers to the simulation of human intelligence in machines, enabling them to perform tasks that would typically require human intervention. Apart from the aspects of automation, accuracy, fraud detection, and cost savings, the most important feature is enabling predictive analytics. AI can be used to analyze large amounts of data and make predictions about future trends, which can be useful for forecasting financial performance and identifying potential risks. Thus, AI has the potential to transform the accounting profession by enabling accountants to provide more accurate and timely financial information to their clients.

While technology has transformed the accounting profession, it has also presented challenges such as the need for ongoing training and education, the risk of data breaches, and the potential loss of jobs due to automation. However, technology also presents opportunities for accountants to expand their skill sets, offer new services to clients, and automate routine activities thereby freeing up human resources for tasks requiring greater application of knowledge and skill sets.

This section seeks to provide an understanding of how AI and machine learning are transforming/disrupting the accounting profession. The chapter provides an introduction to AI and machine learning, explores their applications in accounting, and discusses the benefits and challenges associated with their adoption.

Artificial Intelligence (AI) and Machine Learning (ML) are technologies that enable computers to learn and perform tasks without being explicitly programmed to do so. AI and ML are having a significant impact on the accounting profession, enabling accounting professionals to automate routine tasks, improve decision-making processes, and reduce errors.

Benefits of AI and ML when used in accounting

1. **Automated Data Entry:** AI and ML algorithms can process and extract data from invoices, receipts, and other documents, reducing the need for manual data entry. If programmed, AI and ML algorithms can also review bank statements and pass entries in the system, followed by a bank reconciliation, thereby automating the entire process, saving time and improving efficiency.

2. **Fraud Detection:** AI can help detect fraud by analysing large amounts of data and identifying patterns that may indicate fraudulent activity.

3. **Financial Forecasting:** ML can be used to develop predictive models that can forecast financial performance based on historical data, market trends, and other factors. The predictive models can be of particular advantage where estimates are required to be made in financial reporting. For instance, where a store sells goods and offers a voucher giving the customer a discount on subsequent purchases, Ind AS 115 requires a degree of estimation of the likelihood of availing such discount to record Revenue. Predictive models can track customers' preferences and likelihood of availing the voucher, in which case the estimation of revenue as required under Ind AS 115 becomes more realistic.

4. **Accounting Automation:** AI can analyse financial statements and other data to identify errors or inconsistencies, making accounting more efficient and accurate.

5. **Tax Compliance:** AI can help automate tax compliance by analysing financial data and identifying tax obligations, ensuring that businesses remain compliant with tax regulations.

Challenges with Artificial Intelligence

Along with the advantages of AI and ML, there are following potential challenges and risks associated with the adoption of AI and machine learning like:

1. Data privacy
2. Security concerns
3. Technical complexity
4. Need to train employees in an organization to extract capabilities of AI from the system

AI and ML technology are expected to continue transforming the accounting landscape, with the development of more advanced applications such as natural language processing and cognitive computing. However, the adoption of AI and ML in accounting will require careful consideration of its benefits and risks, as well as ongoing education and training for accounting professionals.

Emerging technologies are changing the accounting landscape and hold a future for accounting professionals.

Conclusion

Emerging technologies, such as artificial intelligence (AI), machine learning (ML), and Robotic Process Automation (RPA), have had a revolutionary impact on the accounting profession.

These technologies have the potential to revolutionize the way accounting is done, by automating routine tasks, reducing errors, and providing real-time insights into business performance. AI and machine learning can be used to automate tasks such as data entry, account reconciliation, and financial analysis. The potential benefits of these technologies for accounting professionals could include increased efficiency, accuracy, and cost savings. However, technology also comes with its potential challenges and risks, such as the need for specialized skills and expertise, the risk of job displacement, and the need to maintain security and privacy. Accounting professionals must be willing to adapt to these changes and develop new skills and competencies to stay relevant in the industry. The preceding sections emphasize the need for ongoing education and training to ensure that accounting professionals have the skills and knowledge required to leverage these emerging technologies. The emergence of these technologies is likely to lead to significant changes in the industry, such as the need for new business models and the rise of new types of accounting services. As accounting professionals, it becomes imperative to understand new business models based on which accounting can be done to give a true and fair view of the affairs of the business. Accounting professionals who are willing to adapt to these changes and develop new skills and competencies will be better positioned to provide value-added services to their clients or organizations and maintain a competitive edge in the industry.

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Role of Digital Marketing on MSMEs in the Post-COVID-19 Era: Opportunities, Challenges, and Future Prospects

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Abstract

This study is to understand the role of digital marketing in improving the performance of Micro, Small, and Medium Enterprises (MSMEs) in the post-COVID-19 situation, with an emphasis on resilience, adaptability, and recovery tactics. The study is qualitative, including secondary data sourced from academic journals, industry reports, and reliable online sources. Using a qualitative approach through primary & secondary data, the study investigates the adoption patterns, effectiveness, and challenges of various digital marketing techniques that are Search Engine Optimization (SEO), social media, email marketing, content marketing, display advertising, and analytics. This research looks at the digital marketing methods used by Micro, Small, and Medium Enterprises (MSMEs) in the post-COVID-19 situation. It illustrates the potential and challenges that these businesses confront, providing a thorough grasp of how digital marketing can create resilience and success in a quickly changing market context. The insights presented are useful for firms and policymakers looking to use digital marketing to recover from the epidemic and achieve long-term success.

Keywords: Digital Marketing, MSME, Social Media, Covid-19

Introduction

According to the National Institute for Transforming India (NITI) aayog report, around 63 million of micro, small, and medium level firms have been developed in India. MSMEs make a substantial

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contribution to the economy. It also has a crucial impact on employment generation. The micro sector is distributed across the country, giving self-employment opportunities in both urban and rural locations. The COVID-19 epidemic has fundamentally altered the global business landscape, forcing enterprises of all sizes to react to new challenges. For MSMEs, transitioning to digital operations has become critical for survival and growth. The pandemic has expedited the adoption of digital technology, with digital marketing emerging as an important approach for MSMEs to retain and expand their consumer base. This research study examines the digital marketing methods used by MSMEs in the post-COVID-19 era, focusing on the potential and problems these businesses confront.

The COVID-19 crisis caused a severe impact on India's MSME sector. Roy, Patnaik, and Satpathy (2020) investigated the pandemic's disruptions, highlighting severe pauses in essential business activities such as commerce and raw material procurement as a result of poor relief measures. According to their findings, approximately half of India's MSME firms lost 20-25% of their value during the epidemic. Furthermore, manufacturers of both general and essentialproducts and services witnessed losses of up to 50%, owing mostly to the failure to provide adequate relief measures.

1.2. Digital Marketing in India

Digital marketing in India addressed significant growth over past years and future prospects are also very bright for it. According to statista.com, the value of the digital media market in India from 2016 to 2023, with estimates till 2026 (in billion INR), is shown in table 1.

The data in table 1 shows a steady increase in the digital media market value in India from 2016 to 2026.

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Value (in billion Indian rupees)	92	119	169	221	235	439	571	654	751	862	955

Table-1

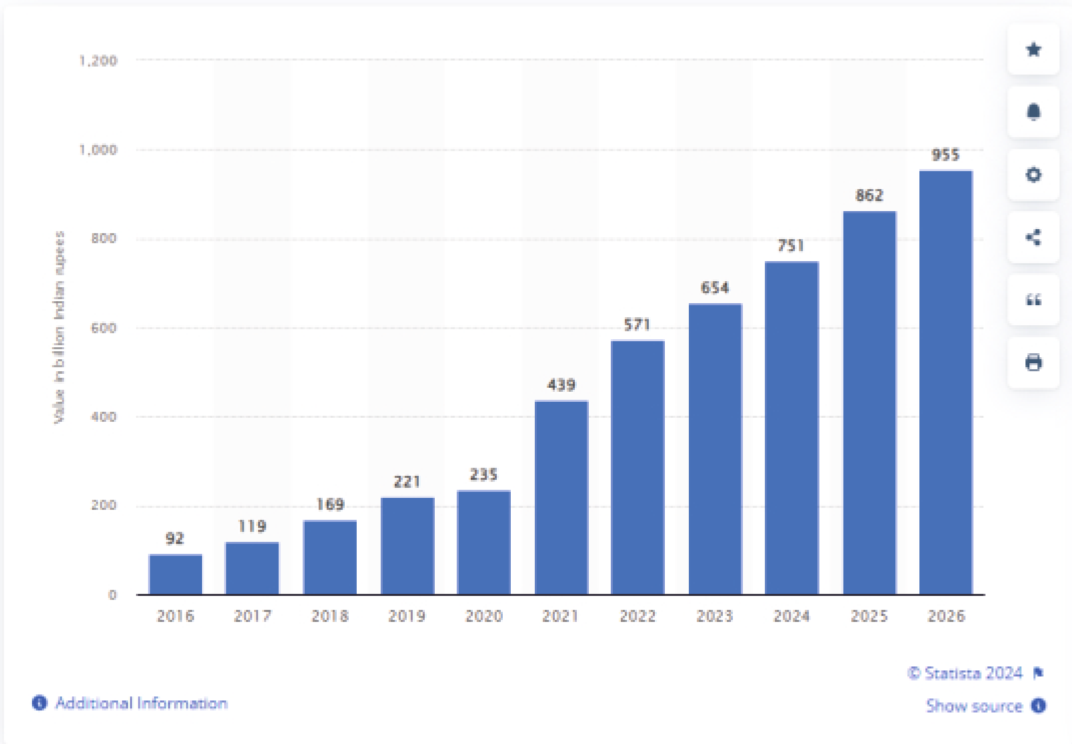

Fig. 1 Source: www.statista.com

1.3 Scope of the study

This study will try to understand the impact of digital marketing on company performance in the post-COVID-19 era, with an emphasis on enterprises' resilience, adaptability, and recovery methods. The study is critical because of the pandemic's considerable shift toward digital platforms, which required businesses to quickly modify their marketing methods in order to survive and achieve growth in a changing business environment. This study covers a review of digital marketing tools, the effectiveness of various techniques, and the problems that businesses confront when implementing these technologies. The study's goal in investigating these characteristics is to provide a thorough knowledge of how digital marketing might assist business resilience and growth in a post-pandemic environment.

2. Literature Review

A deep study of literature review was very much helpful in the research. Different researcher suggested and find out the role of digital marketing in the past.

2.1 Evolution of Digital Marketing

Digital marketing has changed quickly, keeping up with technological advancements and shifting consumer demands. The global trend shows a greater emphasis on marketing rather than advertising, with digital media anticipated to become the primary marketing channel in the future. Abbruzzese, Ingram, and Click (2020) emphasized the pandemic's role in bringing life online, creating an environment in which enterprises must adjust to new digital standards.

Anwar and El-Bassiouny (2020) investigated the role of marketing in meeting the Sustainable Development Goals (SDGs) of United Nations, emphasizing the potential for digital marketing to encourage sustainable consumption and production patterns. Businesses that incorporate sustainability into their digital marketing strategy can help to achieve global development goals while also improving brand reputation and consumer loyalty.

Coreynen, Matthyssens, and Van Bockhaven (2017) looked at the relationship between digitization and servitization in the industrial industry. Their research identifies how manufacturers can use digital technologies to innovate service offerings, resulting in new value propositions and competitive benefits.

Dodson (2016) offers a fundamental guide to developing planned, targeted, and measurable online campaigns, highlighting the significance of data-driven decision-making in maximizing digital marketing efforts.

Hanlon (2021) and Chaffey and Smith (2022) expand on strategic planning and integration, providing frameworks for aligning digital marketing strategies with overall corporate goals and achieving digital excellence.

Kane et al. (2015) explored firms' readiness for the digital future, emphasizing the importance of establishing digital capabilities and cultivating a digital culture. Their findings highlight the need of investing in digital technologies and training to be competitive in an increasingly digital world. Jagwan et al. (2023) investigated that digital marketing has a significant influence on consumer behavior, with online reviews, social media interactions, and targeted advertisements all playing important roles in shaping purchasing decisions.

Yen and Tang (2015) investigate the effectiveness of hotel qualities and the motivations behind electronic word-of-mouth (eWOM) in the hospitality business, discovering that positive eWOM boosts brand reputation and attracts new customers via digital channels.

2.2. Opportunities in Digital Marketing for MSMEs

2.2.1 Increased Online Presence

One of the most notable trends is MSMEs' greater internet presence. The need to engage with clients remotely resulted in an increase in the usage of social media platforms, websites, and online marketplaces. This transition not only allowed MSMEs to maintain operating, but it also extended their reach to a larger, often worldwide, audience (Abbruzzese, Ingram, and Click, 2020).

2.2.2 E-commerce Integration

The incorporation of e-commerce capabilities has been another essential component of digital marketing acceptance. MSMEs have created or improved their online stores, enabling them to sell their products and services directly to consumers via digital platforms. This shift toward e-commerce has helped to maintain sales amid lockdowns and social distancing measures (Coreynen, Matthyssens, & Van Bockhaven, 2017).

2.2.3 Utilization of Social Media

Social media platforms are being used majorly by MSMEs, offering low-cost channels for marketing and client involvement. Platforms such as Facebook, Instagram, and LinkedIn have been utilized to launch targeted advertising campaigns and establish brand communities. These platforms include advanced targeting capabilities, allowing MSMEs to reach certain demographics and interact with their audiences more efficiently (Dodson, 2016).

2.2.4 Focus on Content Marketing and SEO

Content marketing and SEO have emerged as key components of MSMEs' digital marketing strategy. Businesses that create high-quality, relevant content can attract and retain customers while improving their search engine results. This emphasis on content promotes brand authority and trust, both of which are essential for long-term client interactions (Chaffey & Smith, 2022).

2.3 Challenges Faced by MSMEs in Adopting Digital Marketing

2.3.1 Maintaining Online Reputation: MSMEs must actively manage their internet reputation by reacting quickly to customer inquiries and successfully dealing with bad feedback. The internet environment magnifies both positive and negative feedback, making reputation management an essential component of digital marketing (Yen and Tang, 2015).

2.3.2. Technological Barriers

The rapid evolution of digital marketing technologies creates substantial hurdles for MSMEs. Kane et al. (2015) address the importance of building digital skills and cultivating a digital culture. Their findings highlight the need of investing in digital technologies and training to be competitive in an increasingly digital world.

2.3.3 Financial Constraints

Financial constraints sometimes prevent MSMEs from implementing advanced digital marketing tools and tactics. According to Coreynen, Matthyssens, and Van Bockhaven (2017), integrating digital technology can be resource-intensive, making it difficult for small enterprises with limited expenditures.

2.3.4 Skill Gaps

MSMEs frequently lack digital marketing skills and competence, posing a barrier to effective strategy implementation. Dodson (2016) emphasizes the necessity of data-driven decision-making in maximizing digital marketing efforts, as well as the requirement for experienced staff to assess data and execute campaigns.

2.3.5 Competition and Market Saturation: The digital arena has gotten crowded, with larger companies competing fiercely. MSMEs frequently struggle to differentiate themselves and compete with larger enterprises with established digital presences (Kane et al., 2015).

2.3.6 Privacy of data and Security: Data privacy and security is very crucial, which force regulatory compliance and strong security measures. MSMEs must emphasize data security in order to create customer trust and prevent legal and reputational issues (Hanlon, 2021).

2.4 Futuristic Trends in Digital Marketing

Waldfogel (2018) investigates the future of popular culture in the digital era, utilizing statistics and economic research to forecast trends. His research argues that digital platforms have democratized content creation and delivery, resulting in a renaissance of popular culture marked by more diversity and accessibility. The integration of artificial intelligence (AI) technology into digital marketing has transformed the industry. Nair and Gupta (2021) address the use of AI in online marketing emphasizing its importance in improving customer experience and optimizing marketing strategies. Van Esch and Black (2021) delve deeper at how AI is transforming digital marketing, focusing on personalized marketing and client engagement.

Huseynov (2023) investigates the use of chatbots in digital marketing, highlighting their impact on improved customer experience and lower customer service expenses. AI has also been employed for data analytics, assisting MSMEs in better understanding consumer behavior and optimizing marketing strategies appropriately.

According to this extensive literature study, digital marketing has created substantial potential for MSMEs in the post-COVID-19 era, including expanded online presence, e-commerce integration, and improved consumer involvement via social media. However, technological limitations, financial limits, and talent gaps must be solved in order to utilize the full potential of digital marketing. Future advancements, notably the incorporation of AI, present exciting opportunities for MSMEs to improve their marketing strategies and achieve long-term success.

3. Methodology

3.1 Research Design

This study is an exploratory research, and the researcher employed a qualitative technique to investigate the digital marketing strategies used by MSMEs in the post-COVID-19 era. The study's main aim is to acquire a thorough knowledge of the opportunities and challenges that these organizations face by evaluating secondary data.

3.2 Data Collection Tool

This study included both primary and secondary data collection methods. The questions were asked using a five-pointer likert scale-based questionnaire. Data gathering consists of a questionnaire survey and a thorough assessment of the existing literature on digital marketing techniques and MSMEs.

3.3 Sample design

The sample of 234 MSME's has been studied to understand the adoption and challenges being faced by the enterprises.

3.4 Objectivity of the research

- To understand the digital marketing practices in MSMEs.
- To analyse the adoption pattern of digital marketing among MSMEs.
- To determine the most effective digital marketing tools for business professionals in the post-COVID age.
- To analyze the opportunities and challenges associated with the adoption of digital marketing.

4. Data Collection

4.1 Demographic profile of the respondents- All Respondents were categorized into three age groups: below 30 (33.33%), 30-45 (36.75%), and above 45 (29.91%).

Age	No. of Respondent	Percentage
Below 30	78	33.33%
30-45	86	36.75%
Above 45	70	29.91%

Table-2

4.2 Enterprise profile: The respondents' enterprises were categorized into production and service sectors. The service sector had a larger representation (66.67%) compared to the production sector (33.33%).

Sector	Micro	Small	Medium	Total
Production	54	23	1	78
Service	107	46	3	156
Total	161	69	4	**234**

Table-3

4.3 Education Profile: Most of the respondents had qualifications above high school, with postgraduate qualifications being the most common (234 respondents).

Highest Qualification	No. Of Respondent
Below High School	54
High School / 10^{th}	96
Intermediate / 12^{th}	55
Graduate	29
Post Graduate	234
Total	54

Table - 4

4.4 State wise data: All respondents were from various states, with Uttarakhand (46 respondents), Himachal Pradesh (23 respondents), and Gujarat (23 respondents) having the highest representation.

State	Number of Respondents
Andhra Pradesh	4
Delhi	6
Gujarat	23
Haryana	4
Himanchal Pradesh	23
Karnataka	8
Kerala	7
Madhya Pradesh	14
Maharashtra	11
Punjab	4
Tamil Nadu	14
Uttar Pradesh	16
Uttarakhand	46
West Bengal	17
Other States (Either 3 or Less respondents)	37
Total	**234**

Table-5

5. Data Analysis

5.1 Usage of digital marketing: The data shows that MSMEs use a variety of digital marketing strategies to varying degrees.

- High SEO utilization (40.60%) was recorded, followed by moderate (29.91%) and extremely high (7.69%) levels.
- Social media had the highest adoption rate, with 55.10% reporting high usage and 29.50% extremely high usage.

- The most common email marketing usage was moderate (31.60%), followed by high (33.30%) and low (19.20%).
- Content Marketing: High (40.60%) and moderate (26.50%) usage were observed. Display advertising usage was often low (29.10%) or moderate (23.50%). Low usage of analytics tools, with high (23.50%) and moderate (23.50%) levels noted.
- The data highlights that social media is the most widely adopted tool, while analytics tools have the lowest adoption rates.

Metric	**SEO**	**Social Media**	**Email Marketing**	**Content Marketing**	**Display Advertising**	**Analytics Tools**
Very Low	10	5	15	12	39	45
Low	25	10	45	25	68	82
Moderate	70	21	74	62	55	62
High	95	129	78	95	55	37
Very High	34	69	22	40	17	8
Total	234	234	234	234	234	234

Table-6

Metric	**SEO (%)**	**Social Media (%)**	**Email Marketing (%)**	**Content Marketing (%)**	**Analytics Tools (%)**	**Display Advertising (%)**
Very Low	4.30%	2.10%	6.40%	5.10%	16.70%	19.20%
Low	17.52%	4.30%	19.20%	10.70%	29.10%	35.00%
Moderate	29.91%	9.00%	31.60%	26.50%	23.50%	26.50%
High	40.60%	55.10%	33.30%	40.60%	23.50%	15.80%
Very High	7.69%	29.50%	9.40%	17.10%	7.30%	3.40%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table-7

5.2 Descriptive Analysis: The respondents' impressions of digital marketing adoption levels were measured using a Likert scale (1–5), with the following results:

- The majority of respondents gave neutral (27.80%) or agreeing (31.60%) answers to various digital marketing strategies.
- The average adoption rate was 3.44 with a standard deviation of 1.17, demonstrating moderate agreement on the efficiency of digital marketing tools.

Level of Adoption of Digital Marketing										
Response	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Strongly Disagree	20	18	19	20	21	19	20	19	20	21
Disagree	40	42	41	40	39	41	40	41	40	39
Neutral	65	64	65	65	66	65	65	65	65	66
Agree	74	75	73	74	73	74	74	74	74	73
Strongly Agree	35	35	36	35	35	35	35	35	35	35
Total	234	234	234	234	234	234	234	234	234	234
Mean	3.44	3.45	3.44	3.45	3.44	3.45	3.44	3.45	3.45	3.44
Standard Deviation	1.17	1.15	1.16	1.17	1.17	1.16	1.17	1.16	1.17	1.17
Strongly Disagree (%)	8.5	7.70	8.10	8.50	9.00	8.10	8.50	8.10	8.50	9.00
Disagree (%)	17.10	17.90	17.50	17.10	16.70	17.50	17.10	17.50	17.10	16.70
Neutral (%)	27.80	27.40	27.80	27.80	28.20	27.80	27.80	27.80	27.80	28.20
Agree (%)	31.60	32.10	31.20	31.60	31.20	31.60	31.60	31.60	31.60	31.20
Strongly Agree (%)	15.00	15.00	15.40	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Table- 8

Challenges in the adoption of digital marketing					
Response	**Q11**	**Q12**	**Q13**	**Q14**	**Q15**
Strongly Disagree	19	20	21	19	20
Disagree	41	40	39	41	40
Neutral	65	65	66	65	65
Agree	74	74	73	74	74
Strongly Agree	35	35	35	35	35
Total	**234**	**234**	**234**	**234**	**234**
Mean	3.45	3.45	3.44	3.45	3.44
Standard Deviation	1.16	1.17	1.17	1.16	1.17
Strongly Disagree (%)	8.10%	8.50%	9.00%	8.10%	8.50%
Disagree (%)	17.50%	17.10%	16.70%	17.50%	17.10%
Neutral (%)	27.80%	27.80%	28.20%	27.80%	27.80%
Agree (%)	31.60%	31.60%	31.20%	31.60%	31.60%
Strongly Agree (%)	15.00%	15.00%	15.00%	15.00%	15.00%

Table-9

6. Findings

- **Current Usage of Digital Marketing:** For our first objective, the data shows that MSMEs use a variety of digital marketing tools, with social media having the highest adoption rates, followed by SEO and content marketing, indicating that MSMEs are actively integrating digital marketing into their operations to improve their online presence.

- **Adoption Pattern Analysis:** For our second aim, the adoption patterns demonstrate that a considerable part of MSMEs moderately or strongly use digital marketing tools, with social media leading in the high and very high adoption categories, highlighting its relevance in reaching and engaging customers.

- **Most Valuable Digital Marketing Tools:** For the third objective, the results suggest that social media is the most valuable instrument for MSMEs, with the biggest percentages falling into the high and very high categories. This highlights its usefulness in marketing activities, especially in the post-COVID-19 period, when internet interactions have increased dramatically.

- **Opportunities & Challenges:** Following an exhaustive literature analysis and survey, it is revealed that small businesses confront substantial hurdles in implementing digital marketing. Key concerns include resource restrictions (time, budget, and manpower), with 47% agreeing or strongly agreeing. A similar percentage struggles with a lack of technical knowledge. Rapidly shifting digital marketing trends, content production, and campaign effectiveness measurement all present substantial problems, as evidenced by average scores of 3.45 for all challenges. These findings underline the need of providing tailored assistance to small businesses in overcoming these challenges.

Major opportunities for MSMEs are

- **Increase Online Presence:** One of the most notable opportunity for MSMEs' is to have a greater internet presence. This willhelp them to engage with clients remotely resulted in an increase in the usage of social media platforms, websites, and online marketplaces.

- **E-commerce Integration:** MSMEs also have opportunities to expand their businesses online. B2B channels like Indiamart providing opportunities to the businesses to build a strong online presence. Other than these own e-commerce opportunities are also available.

- **New Social Media Applications:** Current age is known as a social media age and people who are using internet, are the users of it. Existing and new social media applications are providing opportunities to find and retain customers.

- **Focus on Content Marketing and SEO:** As the internet users are increasing with the time, content users are also consuming lots of content. Good content attract and create new customers

Key challenges faced by MSMEs in adopting digital marketing were identified:

- **Online Reputation Management:** Managing online reputation by promptly responding to customer inquiries and addressing negative comments.
- **Technological Barriers:** Rapid evolution of digital marketing technologies requiring continuous investment in digital capabilities.

- **Financial Constraints:** Limited budgets hindering the adoption of advanced digital marketing tools.
- **Skill Gaps:** Lack of digital marketing skills and expertise within MSMEs.
- **Competition:** Intense competition from larger firms in the digital space.
- **Privacy of data and Security:** Ensuring data privacy and security to build customer trust.

Limitation and Future scope

- In the limitation of this study, first, the data is initially taken from secondary sources, which may not reflect current market dynamics and firm-specific strategy. Online survey has been done for primary data collection. Other data collection methods like personal interviews, case studies, etc. should be used for further generalization of the results. Future research should seek to acquire primary data to gain deeper insights and broaden the analysis to additional sectors and areas. Furthermore, investigating the long-term effects of digital marketing tactics on firm performance and sustainability would provide useful information to firms and policymakers.

Conclusion

To summarize, digital marketing has emerged as an essential tool for businesses navigating the problems of the post-COVID-19 era. The report emphasizes that, while digital marketing provides substantial prospects for increasing customer engagement and economic success, organizations confront a number of hurdles, including technology barriers, financial limits, and talent gaps. Addressing these obstacles through targeted support and ongoing marketing strategy adaption is critical to realizing digital marketing's full potential. The outcomes of this study highlight the importance of digital transformation in building corporate resilience and sustainability in an increasingly digital environment.

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Industry 6.0: The Rise of Intelligent Manufacturing and Marketing in the Future of Industry

Saurav Kumar

Abstract

Industry 6.0 is not just about automating factories, but rather transforming entire industries through the integration of advanced technologies, enabling smarter decision-making, higher productivity, and unprecedented levels of customization. Industry 6.0 represents the next phase of industrialization, and it's poised to transform entire industries through the integration of advanced technologies. It combines human intelligence, artificial intelligence, cloud computing, energy, human-robot collaboration, big data, and quantum computing. The present paper provides an overview of the sustainability of Industry 6.0 in a global perspective with vision, objective, and transformation of Industrial Revolutions.

Keywords: Industry 6.0, Technological revolution, Quantum technology, Cutting-edge method, Internet of Things.

Introduction

Industry 6.0 is not merely about automating factories; it aims to create fully integrated, intelligent manufacturing systems that can operate with minimal human intervention. It combines human intelligence, artificial intelligence, cloud computing, energy, human-robot collaboration, big data, and quantum computing. While predicting the exact timing of Industry 6.0 is uncertain, it's estimated that technology will achieve pure autonomy by 2050. This interdisciplinary revolution will involve all global players, from government and business to academia and civil society. Industry 6.0 envisions a future where: Work culture is transformed by utilizing people's noble creativity combined with machines. Advanced digital technologies enable direct machine operation using intelligence. Sustainability, homogeneous assets, security, resilience, anti-fragility, and harmony with nature are prioritized. Collaborative use of technologies (such as digital twins) and eco-economy drive progress. It goes beyond previous industrial revolutions in

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terms of vision and impact. Industry 4.0 and Industry 5.0 laid the groundwork with cutting-edge technologies. Industry 6.0 is expected to build upon these foundations, incorporating advancements in medical and bionic enhancements, robotic automation, and neo-critical manufacturing trends1234. Potential directions for Industry 6.0 could involve advancements in areas such as:

1. Biotechnology Integration: Further integration of biotechnology into industrial processes, including bioengineering, bio-manufacturing, and bioinformatics.

2. Sustainable and Circular Economy Practices: Greater emphasis on sustainable manufacturing practices, resource efficiency, and circular economy models to minimize waste and environmental impact.

3. Quantum Computing and Quantum Technologies: Utilization of quantum computing and other quantum technologies to solve complex optimization problems, enhance data security, and revolutionize computation capabilities.

4. Advanced Robotics and Autonomous Systems: Development of more sophisticated robotics and autonomous systems capable of handling complex tasks in diverse industrial settings.

5. Augmented Reality (AR) and Virtual Reality (VR): Expanded use of AR and VR technologies for training, maintenance, design, and collaboration in industrial settings.

6. Advanced Materials and Nanotechnology: Continued development of advanced materials and nanotechnology for applications in manufacturing, energy, healthcare, and other industries.

7. Decentralized Manufacturing and 3D Printing: Increased adoption of decentralized manufacturing models enabled by advancements in additive manufacturing (3D printing) and distributed production networks.

8. Cyber-Physical Systems and Digital Twins: Integration of cyber-physical systems and the widespread adoption of digital twin technologies for real-time monitoring, optimization, and predictive maintenance.

Industry 6.0 is a futuristic industry that transcends previous revolutions, emphasizing sustainability, intelligence, and holistic integration. Its impact will be profound, shaping the way we work, interact, and live in the coming decades.

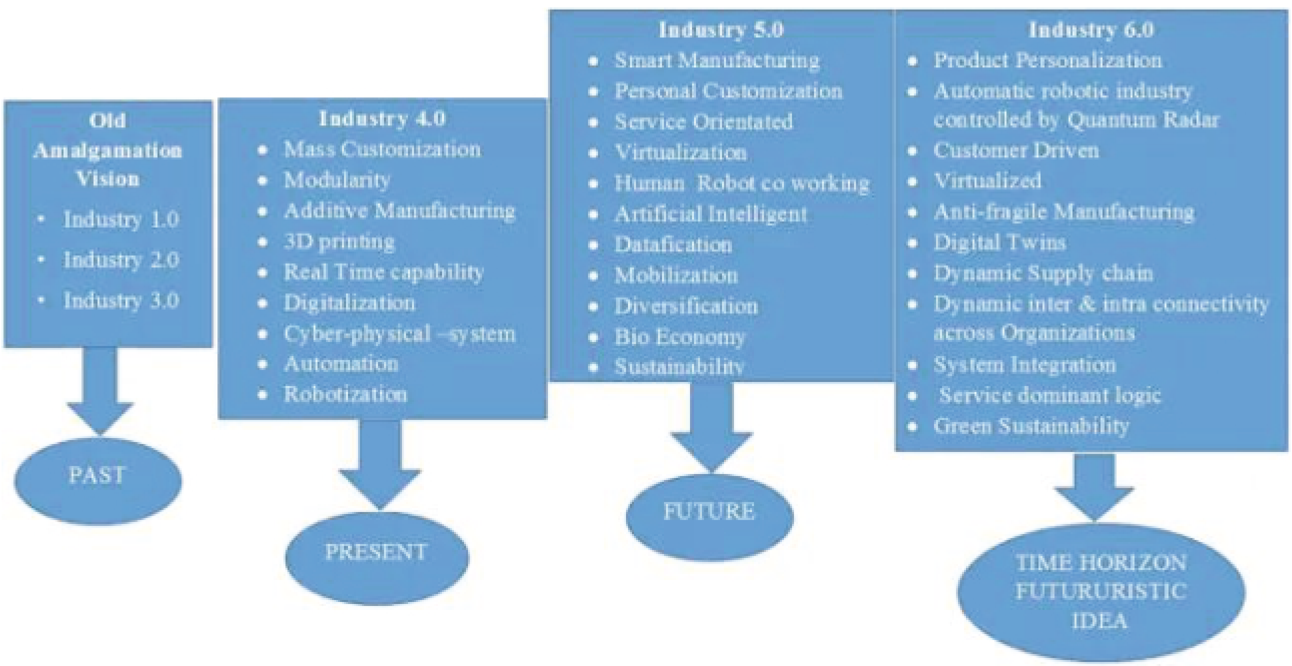
Industry 6.0 is looking like a futuristic industry, where its vision is far broader than the remaining industrial revolutions, which held up till now. This revolution will work to influence the industries 6.0 toward changing the work culture of humans, with the use of noble creativity of human beings associated with machines and advanced production systems in the highly cutting-edge digital technologies environment (K.A. Demir and H. Cicibas, 2018). In this environment, humans can directly operate the machines using brainpower, which would be enabled with digital technologies and perceived resource competent and user-oriented manufacturing solutions compared to other industrial revolutions. The future industry 6.0 focuses on sustainability, homogeneous assets, safety, resilience, Antifragility, harmony with nature, coworking use of technologies (digital twins), and eco economy (K.A. Demira, G. Do¨vena, B. Sezen, 2019). Throughout its history, industry has proven its ability to lead transformation. And it shall do the same in the times of transition towards climate neutrality and digital leadership in an ever-changing and ever-unpredictable world. We are already in the midst of a significant transformation regarding the way we produce products and deliver services thanks to the digitization of manufacturing and the new connected supply chains and co-creation systems.

Industry 6.0, the next stage in the evolution of manufacturing, has emerged as a possible solution to these challenges. It builds on the previous industrial revolutions and incorporates advanced technologies such as artificial intelligence (AI), and the industrial internet of things (IIoT) to create a more efficient and sustainable manufacturing environment. This paper aims to provide a comprehensive overview of Industry 6.0 and its potential. It examines the fundamental principles, objectives, and evolution of industrial revolutions, and outlines the role of Industry 6.0 in promoting sustainable manufacturing practices. Additionally, it explores the potential of Industry 6.0 to provide mass personalization of services and products, enhance production capacity, and improve the fault-free environment as illustrated by a real-world scenario.

A Vision of Industry 6.0 Toward Sustainability

Industry 6.0 looks like a futuristic industry with a much broader vision than the remaining industrial revolutions that are on-going to this day. This revolution will influence Industry 6.0 to transform people's work culture by utilizing people's noble creativity combined with machines and advanced production systems in the environment of advanced digital technologies. In this environment, people can operate machines directly using intelligence, which would be made possible by digital technologies and manufacturing solutions that are considered resource-efficient and user-centric compared to other industrial revolutions. Industry 6.0 of the future is based on sustainability, homogeneous assets, security, resilience, anti-fragility, harmony with nature, collaborative use of technologies (digital twins), and eco-economy. Industry 4.0 and Industry 5.0 consist of promising cutting-edge technologies and applications that are expected to support the futuristic Industry 6.0.

Figure 1. Shows the differentiated vision from Industry 1.0 to Industry 6.0.



Intelligent manufacturing

The new models are an autonomous manufacturing structure built on the internet, which is service-oriented, collaborative, adaptable, agile, and socialized. New means stand for integrated, human-machine, digitalization, Internet of Things, virtualization, services, teamwork, adaptation, versatility and intelligence, and smart Production Processes. New form means intelligent production ecology with all-embracing connectivity features, data-driven, cross-border convergence, self-service intelligence, and mass creativity. The combination of these models, resources, and types with the application will eventually shape an ecosystem (Li, B.-h.., et al., 2017).

In relation to the future of energy demand and sources, a detailed exploratory analysis providing a view into how the usage of nuclear fusion energy being employed late into the fifth and in the early onset of the sixth industrial revolution has been estimated. Theoretical work on the world's biggest nuclear fusion facility 'ITER' has been ongoing and shall officially proceed into the DEMO power stage of planning under the support of several countries aiming to be ahead of the curve in terms of becoming independent from fossil fuel imports. With multiple nations expending major shares of their investments in alternate energy sources, it is expected that the "burning plasma" fusion reaction will soon exist in equivalent status as the trinity test, as an independent self-sufficient closed feedback event in its entirety. The whole process of experimentation could be sped up with the declaration of this pursuit as a global priority (Carayannis, E.G., Draper, J., Bhaneja, B., 2020). The constantly reducing fossil fuel reserves in the current age are pushing forth research on alternative fuels and energy sources. Bio-fuel from algae processing is one of the frontline contenders. In light of these facts, an in-depth exploration of the cultivation and generation of bioenergy by identifying and tweaking various environmental and economic factors in algae growth has been performed in alignment with the sustainable development goals. In further pursuit of higher efficiency and fuel output, genetic engineering was also explored as an approach that would expectedly be followed in the fifth industrial phase (El Far et.al. 2020). It is estimated that future manufacturing units, in the pursuit of higher orders of creative design and consumer-personalized ergonomics, will opt for an automated configuration at every nodal level with collaborative bots mimicking artisanal moves precisely (Javaid, M., Haleem, 2020). Another study drew parallels between each past industrial revolution and the organic manual means with which the functions they replaced were performed previously. In that analogy, the first revolution could be equated to the basic fundamental cellular level, the second revolution to the power source, the third to the motor limbs, the fourth to the nervous system, and congruently, the fifth revolution could be analogous to an intelligent organism with its constituents working in perfect synergy. Drawing that analogy, work was done on building a distributed system working for a central unifying goal; a swarm robotic system (Jiuqiang Han, X.Z., Wu, S, 2020). Since the introduction of advanced organic elements in production is one of the distinguishing factors of the fifth revolution, the technical back ends involving motor units and control systems require a higher order of accuracy and precision to replicate the fluidity of organic effects artificially. This outcome is brought forth by implementing critical thinking skills (Yavari, F., Pilevari, N, 2020).

Bringing the industry closer to the layman consumer, the co-bot structure will witness an overall revamp in a way that they will become capable of human-like motor functions like manipulator motion based on environmental stimuli, pre-set programs, and circumventive explicit real-time commands. In spite of programming having reached depth-wise into far-fetched milestones, breadthwise, it still hides some esoteric underdeveloped hardware-specific potential. It is believed that the upcoming revolution will patch all such untapped resources (Nahavandi, S., 2019).

Benefits of Industry 6.0

Industry 6.0 would support hyper-connected industries and provide dynamic value networks, dynamic supply chains, and transparency in the flow of information between all administrations, whether internal or external around the world. It would be the way of life to keep the right balance or master the learning economy. It promotes the virtual human digital twin, where anyone can view physical goods and virtual product information at the same time, connecting manufacturing industries worldwide and providing superior technical support, better understanding, and better decision-making. Antifragile manufacturing will be the planned concept for this revolution where anti-brittleness can be achieved through flexible system design. It depends on the non-functional requirements in which software systems are judged on openness, usability, security, mobility, and other characteristics that are obstacles to the realization of system software. In the years to come, this revolution would generate unique and innovative creative thinking and ideas in manufacturing and other fields, enhancing the most important characteristics of humans and machines.

Problems Industry 6.0 Will Solve

Automation delivers other benefits far more impressive than AI's ability to produce documents or pictures. First, by requiring fewer employees, automation will reduce exposure to workplace hazards and may entail fewer management challenges of a complex workplace culture. Businesses will likely spend less on salary, benefits, and creature comforts like cafeterias, fitness centers, and foosball – again, for workers they can't find.

Secondly, there are likely to be fewer mistakes. Mistakes by people are some of the most common sources of technological risk. So-called “human element” factors are responsible for over one-third of large industrial property losses. With fewer people on the factory floor may come fewer miscues, provided the automated systems are well designed, manufactured, and maintained, and the people who manage them are skilled and well trained.

Third, the automated workplace will deliver environmental benefits. With lower building occupancy and a more efficient footprint, companies will spend less energy on heating and cooling the environment. That's a major sustainability benefit given that residential and commercial buildings today consume over half the worlds electricity. Since companies will use less parking, land use will improve. Energy-intensive commutes will largely be obsolete. Complex emergency evacuation plans can be simplified.

Businesses of all types are working diligently to secure the benefits of automation, and now is also the right time to consider future risks. It's always more cost-effective to anticipate and manage problems early in any transformation.

New Risks

Even highly automated facilities will be disrupted from time to time, just in different ways than they are now. Novel, complex technologies will necessitate a new kind of problem-solving worker, a prodigiously multiskilled (perhaps systems) engineer with a sound understanding of robots, manufacturing technology, hardware, firmware, electrical circuits, and computer code. When a robot stops working, an expert will need to quickly diagnose the issue, manage the repair, and restore operation, since business interruption costs per unit time will be far higher. AI may help here, providing more knowledge as it is needed, but the consequences of getting incorrect or incomplete information will be much greater.

Another risk: When more computers control more machines, cyberattacks will be more disruptive than ever. In fact, with fewer people around, any incident could get serious quickly since there are fewer people to see and respond to hazards such as fires and equipment breakdown before the problem is amplified. Although intelligent sensors detect problems and machines can respond to some extent, automated responses are only helpful if they haven't been knocked offline by fire, flood, wind, collapse, etc.

How To Mitigate Automation Risk

Here are six ways global businesses can prepare for the risk of their Industry 6.0 journey:

1. **Develop an Industry 6.0 Roadmap** to chart your long-term transformation. Set criteria for investments, e.g., in operations where skilled labor is scarce, or where legacy equipment is ready for decommissioning. It doesn't matter if your company is at Industry 3.2 or 5.6. What matters is that you have a plan.

2. **Adopt *condition-based* maintenance and response.** Too much maintenance today is based on the calendar – instead of actual need. Use internet-connected sensors and analytics to continuously monitor and predict machinery problems. Perform maintenance (or respond in advance to an incipient failure) when your machine is running too hot, vibrating too much, making strange noises, consuming too much power, or operating out of specification.

3. **Develop new troubleshooting talent** to fix heavily automated, complex, intelligent technology from the plant floor to the back office.

4. **Revise your emergency response plan.** Since the work environment is changing, your emergency response should change, too.

5. **Focus on change management.** Software will drive virtually everything in the business of the future. As always, that software will be constantly updated, and every new version will present potential new problems. Digital twins (software test beds that replicate real-life operations) are a good strategy here.

6. **Create or partner with innovation labs** An innovation lab is a digital twin on steroids. Major governments, NGOs, or businesses can use them to experiment on the most exciting innovative technologies with the biggest potential. The kinks get worked out before they disrupt real businesses and supply chains.

Advances in AI are exciting and thankfully the risks associated with its use are being thoughtfully considered. The next industrial revolution for companies, will have at least equally impressive benefits, and very different risks. The biggest risk of all though, is to do nothing. Now is the time to plan the transition and consider the plan to manage the risks in advance.

Marketing 6.0 Conceptualization

Indeed, when technologies are improved, people's demand level will also increase. They will not be satisfied as quickly as they would in the past. Marketing and its generation have hard work because of people's satisfaction level. Historically, marketing could be a key player in the field of industry. Data analysis means how customers behave. Data analysis gives insight to people. It helps companies use what they know and improve their marketing application in the marketplace

(Park et al., 2023). Consequently, this newfound wealth of information empowers them to craft marketing campaigns that are highly personalized and precisely targeted to individual customers. Personalized marketing can target the vulnerability of users (Duivenvoorde, 2023). However, this type of marketing is one of the most effective ones. Because modern humans need more attention than their ancestors. So, if marketing can be customized optimally, people will be more satisfied.

Immersive marketing or Marketing 6.0 is made possible by new technologies and the fact that the new Generation Z and Alpha are digital natives who have greater knowledge of technology and have grown up with it in their daily lives. By providing multisensory experiences and leveraging data collected in the digital world, personalized experiences can be offered on a large scale, helping companies create immersive customer journeys. Due to the pandemic, more people have delved into new technologies and increased their daily micro-moments, such as using their phones to listen to a podcast for a few minutes, learn something new, or shop online, among other activities.

Extended reality (XR) encompasses two concepts: augmented reality (AR) and virtual reality (VR). Both AR and VR allow users to blend the physical with the digital, but this does not mean they are the same. Augmented reality introduces digital elements into the physical world. An example is IKEA, which allows customers to virtually try out furniture they are interested in using a mobile app in a space like their home. Cosmetic company L'Oréal also allows customers to try on makeup through augmented reality.

Virtual reality allows the user to experience a digital world that simulates an environment in the real world. An example is Volvo, which offers customers a virtual test drive. The New York Times also uses virtual reality to provide engaging content.

The extended reality and the metaverse eliminate the boundaries between the digital and physical worlds, providing users with an immersive experience that we can call metamarketing, which is the central axis or heart of Marketing 6.0.

Before people had internet access, those who wanted to offer a product or service had to use traditional methods. Now, thanks to the digital world, anyone can offer a product or service to thousands of people in different parts of the world. This is good but it also presents new challenges such as:

- Clear market differentiation
- Conducting psychographic segmentation of consumers
- Staying updated to monitor the consumption habits of your target audience
- Creating strategies tailored to the needs and interests of your target audience

Immersive marketing is not science fiction; it is already a reality that companies have been incorporating into their processes to connect with younger generations such as Generation Z and Alpha. That's why metamarketing is considered the next stage of omnichannel marketing. Omnichannel marketing refers to an organization's presence on multiple channels, creating a seamless customer experience on each channel.

Some people may have considered that the online marketplace would replace the physical marketplace, but data has shown that customers interact with a business online and offline in a single marketing funnel. That is, the digital and physical world channels complement each other in most cases rather than replace each other.

Meta-marketing consists of a series of strategies and tactics that help companies offer immersive experiences through physical and digital media. Marketing 6.0 consists of 3 layers:

1. Enabling Layer
2. Environment Layer
3. Experience Layer

1. Enabling Layer:

The enabling layer includes technological enablers that allow mixing experiences from the digital world with the physical one, such as:

- IoT
- AI
- Spatial computing
- AR and VR
- Blockchain

2. Environment Layer:

It consists of two distinct environments, which are:

- Extended Realities
- Metaverse

3. Experience Layer:

- 3D digital spatial experiences
- Marketing in the metaverse

Meta-marketing is important to connect with Generation Z and Generation Alpha, so organizations need to start embracing it and find ways to make sure the experience they deliver is truly designed to meet the needs of their target audience and understand their interests.

Result & Findings

The dream of industrial revolution 6.0 can only be attained by doing systematic work and collaborative effort of government and manufacturers toward the welfare of society. This revolution wants long-term commitment from the manufacturers, policymakers, stakeholders, and government to implement sustainable Industry 6.0 in the organization. The implementation of this holistic approach can be geared with proper research and development to positioning in the revitalization of Industrial Production. During the execution of Industry 6.0 could face many challenges such as digital transformation, difficulty in adopting new and advanced technologies, allocation of resources, industry-relevant technology, internationalization, industry collaboration, freedom to research in development, capital cost (needed funding) involved in developing and implementation of new technologies, reskilling costs and adoption of 5G /6G technologies.

Conclusion

Industry 6.0 has been the theoretical concept; it will change the manufacturing world's entire scenario if it applies to industries. Numerous people have been scared of losing their jobs due to complete automation in industries, so it is required while introducing any new industrial revolution that the number of jobs should always be more than the job loss. Otherwise, social un-satisfaction and negative impressions could engender in society. This revolution focuses on providing virtualized anti-fragile manufacturing and anti-fragile services. It would concentrate on customercentric, customer-focused ethos, super-connected industries with vibrant supply chains, automated flexibility, and internal value networks where proper interactions within the organization or outside across the various nations and its administrative areas.

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