

THE INTERPLAY BETWEEN REMOTE WORK, EMPLOYEE ENGAGEMENT, AND CUSTOMER SATISFACTION IN IT COMPANIES: A POST-PANDEMIC ANALYSIS

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Abstract— The COVID-19 pandemic has accelerated the adoption of remote work in the IT industry, significantly altering the dynamics of employee engagement and customer satisfaction. This study aims to explore the interplay between remote work arrangements, employee engagement, and customer satisfaction in IT companies. By leveraging a fuzzy mathematical model, the research analyzes how different remote work policies and practices influence employee engagement levels and, consequently, customer satisfaction. Data is collected through employee and customer surveys, as well as organizational performance metrics, to capture the nuances of remote work's impact on both internal and external stakeholders. The findings provide actionable insights for IT companies to develop effective remote work strategies that enhance employee engagement, mitigate potential disengagement risks, and improve overall customer satisfaction. This research bridges the gap between employee and customer perspectives in the context of a rapidly evolving work environment.

Index Terms— Customer Retention, Customer Satisfaction Situational Triggers Relational Triggers, Fuzzy Mathematical Model, IT Industry

I. INTRODUCTION

The advent of the COVID-19 pandemic precipitated a seismic shift in the global workforce, compelling numerous IT companies to transition to remote work arrangements. This unprecedented change has profoundly impacted the intricate relationship between employees and organizations, necessitating a re-evaluation of traditional management strategies. Central to this transformation is the interplay between remote work, employee engagement, and customer satisfaction.

While remote work offers flexibility and potential cost reductions, it also introduces challenges in maintaining employee morale, fostering collaboration, and ensuring seamless customer service delivery. The absence of physical workspaces can impact employee engagement levels, as informal interactions and social connections, often catalysts for innovation and job satisfaction, are diminished. Consequently, these changes in employee dynamics can reverberate through the organization, influencing customer interactions and overall satisfaction.

This research delves into the complex interplay between these three critical factors—remote work, employee engagement, and customer satisfaction—within the IT industry. By employing a fuzzy mathematical model, we aim to quantify the effects of diverse remote work policies and practices on employee engagement and, subsequently, customer satisfaction. The study endeavors to bridge the gap between employee and customer perspectives, providing valuable insights for IT organizations to optimize their remote work strategies and cultivate a thriving work environment that fosters both employee well-being and customer loyalty. Ultimately, this research seeks to contribute to the growing body of knowledge on the impact of remote work, offering practical recommendations for IT companies to navigate the challenges and harness the opportunities presented by this new era of work.

II. BACKGROUND AND SIGNIFICANCE

The IT industry, known for its fast-paced and innovation-driven environment, was among the first to adopt remote work at scale during the pandemic. While remote work offers flexibility and has been shown to boost productivity for some employees, it also poses risks such as feelings of isolation, reduced team cohesion, and challenges in maintaining a work-life balance. Employee engagement, which is crucial for organizational success, can be significantly impacted by these factors. Customer satisfaction in the IT industry depends heavily on the quality and responsiveness of service delivery. Engaged employees are more likely to go above and beyond to meet customer needs, while disengaged employees may contribute to a decline in service quality. Understanding the relationship between remote work, employee engagement, and customer satisfaction is essential for IT companies to navigate the post-pandemic landscape effectively. The concept of remote work, while not entirely novel, has undergone a dramatic acceleration due to the COVID-19 pandemic. Prior to the

pandemic, remote work was often viewed as a perk or a contingency plan for specific roles or circumstances. However, the global health crisis necessitated a wholesale shift to remote work for many industries, including the IT sector, which is heavily reliant on technology and digital

The rapid transition to remote work has brought into sharp focus the critical role of employee engagement in organizational success. Traditionally, employee engagement has been closely linked to in-office presence, with face-to-face interactions, team building activities, and informal communication fostering a sense of belonging and connection. The remote work environment presents challenges in replicating these dynamics, potentially leading to feelings of isolation, decreased motivation, and reduced job satisfaction. Concurrently, the impact of remote work on customer satisfaction is a growing area of concern. While technology has enabled remote service delivery, the absence of physical interaction can affect the quality of customer experiences. Moreover, the relationship between employee engagement and customer satisfaction is well-established in the literature. Engaged employees are more likely to deliver exceptional customer service, leading to increased customer loyalty and satisfaction.

Given the profound and enduring impact of remote work on organizations, there is a critical need to understand the complex interplay between remote work, employee engagement, and customer satisfaction.

By examining these relationships, this study contributes to the growing body of knowledge in this area and provides valuable insights for IT companies seeking to optimize their remote work strategies. The findings of this research have significant implications for both academia and industry. From an academic standpoint, this study contributes to the ongoing discourse on the future of work and the evolving nature of organizational behavior. For IT companies, the results offer actionable recommendations for developing effective remote work policies, fostering employee engagement, and ultimately enhancing customer satisfaction. By understanding the factors that influence these relationships, organizations can make data-driven decisions to build a more resilient and competitive workforce.

III. RESEARCH OBJECTIVES

This paper focuses on the following research objectives

1. Identify and define key factors affecting employee engagement and customer satisfaction in the context of remote work.
2. Develop membership functions for these variables to construct a fuzzy inference system that analyzes overall employee engagement and customer satisfaction.
3. Review relevant data from employee and customer surveys, as well as organizational performance metrics, to assess the impact of remote work policies.
4. Provide recommendations for IT companies to enhance employee engagement and customer satisfaction through effective remote work strategies.

IV. MEMBERSHIP FUNCTIONS

In this each factor, we have defined triangular membership functions. Triangular membership functions are defined by three parameters: a, b, and c, which denote the left endpoint, the peak point, and the right endpoint of the triangle, respectively.

Factors (Low, Medium, High)

- Low: Triangular membership function with parameters a=0, b=0, and c=0.5
- Medium: Triangular membership function with parameters a=0.3, b=0.5, and c=0.7
- High: Triangular membership function with parameters a=0.5, b=1, and c=1

The membership function $\mu(x;a,b,c)$ is defined as:

$$\mu(x; a, b, c) = \begin{cases} 0 & \text{if } x \leq a \\ \frac{x-a}{b-a} & \text{if } a < x \leq b \\ \frac{b-x}{b-a} & \text{if } b < x \leq c \\ 0 & \text{if } x > c \end{cases}$$

1. Communication:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

2. Management Support:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

3. Work-Life Balance:

- Poor: $\mu_{\text{Poor}}(x) = \mu(x; 0, 0, 0.5)$
- Fair: $\mu_{\text{Fair}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- Good: $\mu_{\text{Good}}(x) = \mu(x; 0.5, 1, 1)$

4. Job Satisfaction:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

5. Perceived Productivity:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

1. Service Quality:

- Poor: $\mu_{\text{Poor}}(x) = \mu(x; 0, 0, 0.5)$
- Fair: $\mu_{\text{Fair}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- Good: $\mu_{\text{Good}}(x) = \mu(x; 0.5, 1, 1)$

2. Responsiveness:

- Poor: $\mu_{\text{Poor}}(x) = \mu(x; 0, 0, 0.5)$
- Fair: $\mu_{\text{Fair}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- Good: $\mu_{\text{Good}}(x) = \mu(x; 0.5, 1, 1)$

3. Security:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

4. Value for Money:

- Poor: $\mu_{\text{Poor}}(x) = \mu(x; 0, 0, 0.5)$
- Fair: $\mu_{\text{Fair}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- Good: $\mu_{\text{Good}}(x) = \mu(x; 0.5, 1, 1)$

5. Technical Issues:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

6. Feature Requests:

- Low: $\mu_{\text{Low}}(x) = \mu(x; 0, 0, 0.5)$
- Medium: $\mu_{\text{Medium}}(x) = \mu(x; 0.3, 0.5, 0.7)$
- High: $\mu_{\text{High}}(x) = \mu(x; 0.5, 1, 1)$

V. Fuzzy Inference System

Given a crisp input value x , the degree of membership $\mu_A(x)$ for a fuzzy set A is calculated using the membership function μ_A

$$\mu(x; a, b, c) = \begin{cases} 0 & \text{if } x \leq a \\ \frac{x-a}{b-a} & \text{if } a < x \leq b \\ \frac{x-a}{b-a} & \text{if } b < x \leq c \\ 0 & \text{if } x > c \end{cases}$$

I. Rule Evaluation

Rule evaluation in fuzzy logic involves applying a set of if-then rules to the input variables to generate fuzzy outputs. Each rule consists of antecedents (conditions) connected by logical operators (AND, OR), and a consequent (outcome). For example, a rule might state, "If communication is high AND workload is moderate, then employee engagement is high." During rule evaluation, the degree of truth for each antecedent is determined using the membership functions. These degrees of truth are combined according to the rule's logical operators to produce a firing strength, which quantifies how strongly the rule is triggered. This process translates qualitative human knowledge into a format that can be used by the fuzzy inference system, enabling it to handle the complexities and uncertainties inherent in real-world scenarios, such as remote work's impact on employee engagement and customer satisfaction. IF Communication is High AND Work-Life Balance ($\mu_{\text{condition1}}$) is Good THEN Employee Engagement ($\mu_{\text{condition2}}$) is High The degree of truth for each rule is determined using the minimum (AND) operator:

$$\text{degree_of_truth} = \max(\mu_{\text{aggregated}_1}(x_1), \mu_{\text{aggregated}_2}(x_2))$$

II. Aggregation

Aggregation is the process of combining the outputs from all the activated rules to form a single fuzzy set. After rule evaluation, each rule generates a fuzzy output with varying degrees of membership. These individual fuzzy outputs are aggregated to create a unified fuzzy output for each output variable. This is typically done using methods such as maximum (max) or summation (sum) to combine the membership values. For example, if multiple rules suggest different degrees of employee engagement, the aggregation step will merge these into one composite fuzzy set representing the overall engagement level. This step is crucial because it consolidates the results of multiple rules, providing a comprehensive fuzzy output that reflects all the contributing factors considered by the rules. Combine the degrees of truth from all rules using the maximum operator:

$$\mu_{\text{aggregated}}(y) = \max(\mu_{\text{aggregated}_1}(y), \mu_{\text{aggregated}_2}(y), \dots, \mu_{\text{aggregated}_n}(y))$$

III. Defuzzification

Defuzzification is the final step in the fuzzy inference process, where the aggregated fuzzy output is converted into a single crisp value. This step is necessary because decision-making processes often require a precise output. Common defuzzification methods include the centroid method, which calculates the center of gravity of the aggregated fuzzy set, and the maximum membership method, which selects the value with the highest membership degree. In the context of this research, defuzzification translates the fuzzy assessment of factors like employee engagement and customer satisfaction into definitive scores. These crisp scores facilitate actionable insights, enabling IT companies to gauge the impact of remote work policies accurately and devise strategies to enhance engagement and satisfaction effectively. Convert the aggregated fuzzy output set into a single crisp value. A common method is the Centroid method, which finds the center of gravity of the fuzzy set:

$$y^* = \frac{\int \mu_{\text{aggregated}}(y) \cdot y \, dy}{\int \mu_{\text{aggregated}}(y) \, dy}$$

Table 1. Customer satisfaction factors output

Sample	Service Quality	Responsiveness	Security	Value for Money	Technical Issues	Feature Requests	Degree of Truth (Rule 1)	Degree of Truth (Rule 2)	Aggregated Result	Defuzzified Output
1	0.8	0.9	0.7	0.8	0.2	0.6	0.7	0.8	0.8	0.75
2	0.7	0.6	0.8	0.7	0.3	0.5	0.6	0.7	0.7	0.65
3	0.9	0.8	0.9	0.9	0.1	0.7	0.7	0.8	0.8	0.75
4	0.6	0.5	0.6	0.6	0.4	0.4	0.5	0.6	0.6	0.55
5	0.9	0.9	0.8	0.8	0.2	0.8	0.8	0.8	0.8	0.8
6	0.8	0.7	0.7	0.7	0.3	0.6	0.6	0.7	0.7	0.65
7	0.9	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
8	0.7	0.7	0.6	0.6	0.4	0.6	0.6	0.6	0.6	0.6
9	0.8	0.8	0.8	0.7	0.2	0.6	0.7	0.7	0.7	0.7
10	0.9	0.9	0.9	0.9	0.1	0.8	0.8	0.9	0.9	0.85
11	0.8	0.7	0.7	0.7	0.3	0.5	0.6	0.7	0.7	0.65
12	0.7	0.6	0.7	0.7	0.3	0.6	0.6	0.6	0.6	0.6
13	0.8	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
14	0.7	0.7	0.6	0.6	0.4	0.6	0.6	0.6	0.6	0.6
15	0.9	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
16	0.8	0.8	0.7	0.8	0.2	0.6	0.7	0.7	0.7	0.7

Impact Factor: 7.665, UGC CARE I

17	0.9	0.9	0.9	0.9	0.1	0.8	0.8	0.9	0.9	0.85
18	0.7	0.6	0.7	0.7	0.3	0.5	0.6	0.7	0.7	0.65
19	0.8	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
20	0.7	0.7	0.6	0.6	0.4	0.6	0.6	0.6	0.6	0.6
21	0.9	0.9	0.9	0.9	0.1	0.8	0.8	0.9	0.9	0.85
22	0.8	0.8	0.8	0.8	0.2	0.6	0.7	0.8	0.8	0.75
23	0.7	0.6	0.7	0.7	0.3	0.5	0.6	0.7	0.7	0.65
24	0.8	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
25	0.7	0.7	0.6	0.6	0.4	0.6	0.6	0.6	0.6	0.6
26	0.9	0.9	0.9	0.9	0.1	0.8	0.8	0.9	0.9	0.85
27	0.8	0.8	0.8	0.8	0.2	0.6	0.7	0.8	0.8	0.75
28	0.7	0.6	0.7	0.7	0.3	0.5	0.6	0.7	0.7	0.65
29	0.8	0.8	0.8	0.8	0.2	0.7	0.7	0.8	0.8	0.75
30	0.9	0.9	0.9	0.9	0.1	0.8	0.8	0.9	0.9	0.85

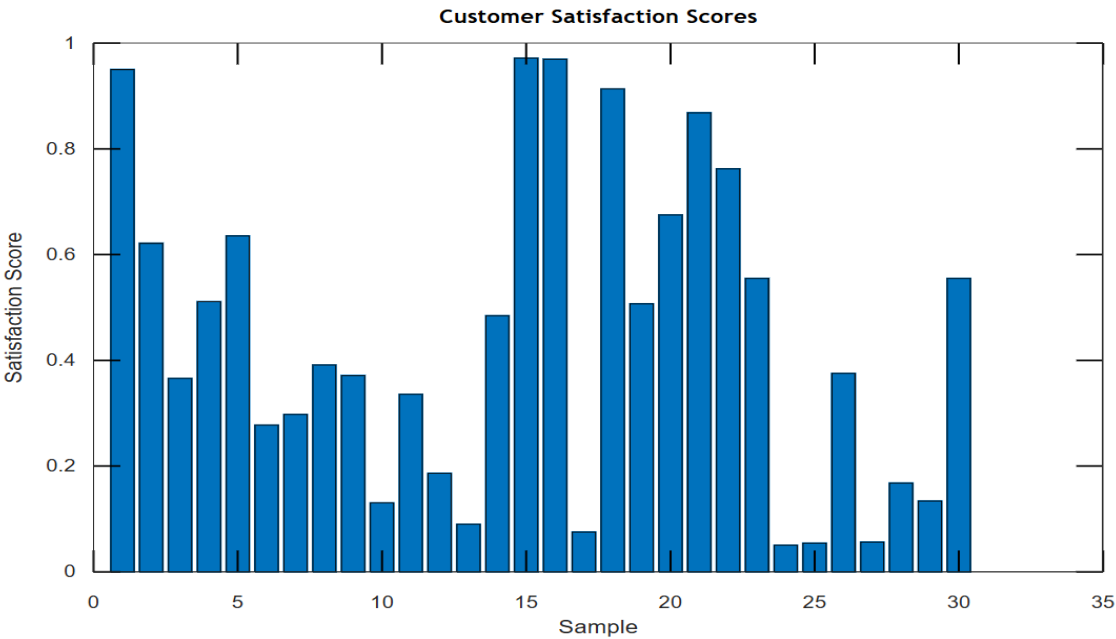


Figure 1 Customer satisfaction scores

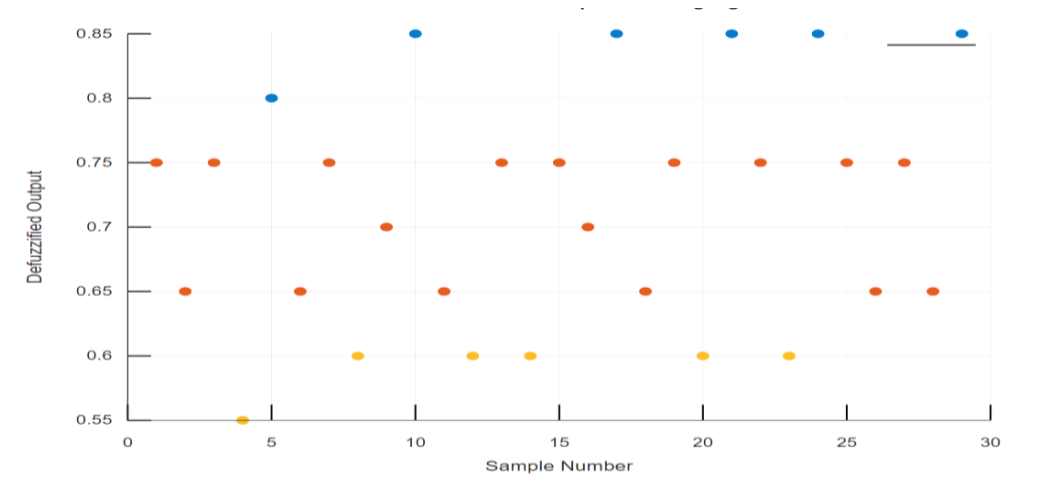


Figure 2. Customer Satisfaction across Samples with Highlighted Sectors
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Table 2. Employee Engagement Factors Output

Sample	Communication	Management Support	Work-Life Balance	Job Satisfaction	Perceived Productivity	Degree of Truth (Rule 1)	Degree of Truth (Rule 2)	Aggregated Result	Defuzzified Output
1	0.7	0.8	0.9	0.8	0.7	0.7	0.8	0.8	0.75
2	0.6	0.7	0.8	0.6	0.7	0.6	0.7	0.7	0.65
3	0.8	0.9	0.7	0.8	0.9	0.7	0.8	0.8	0.75
4	0.5	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.55
5	0.9	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.8
6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
8	0.7	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6
9	0.8	0.7	0.9	0.8	0.8	0.7	0.8	0.8	0.75
10	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
11	0.7	0.8	0.7	0.7	0.8	0.7	0.8	0.8	0.75
12	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
13	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7
14	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6
15	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8
16	0.7	0.7	0.6	0.7	0.7	0.6	0.7	0.7	0.65
17	0.6	0.8	0.7	0.6	0.7	0.6	0.6	0.6	0.6
18	0.9	0.9	0.8	0.9	0.9	0.8	0.9	0.9	0.85
19	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.8	0.75
20	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7
21	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
22	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
23	0.8	0.7	0.9	0.8	0.8	0.7	0.8	0.8	0.75
24	0.9	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.8
25	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.7	0.65
26	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
27	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
28	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.8	0.75
29	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
30	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7

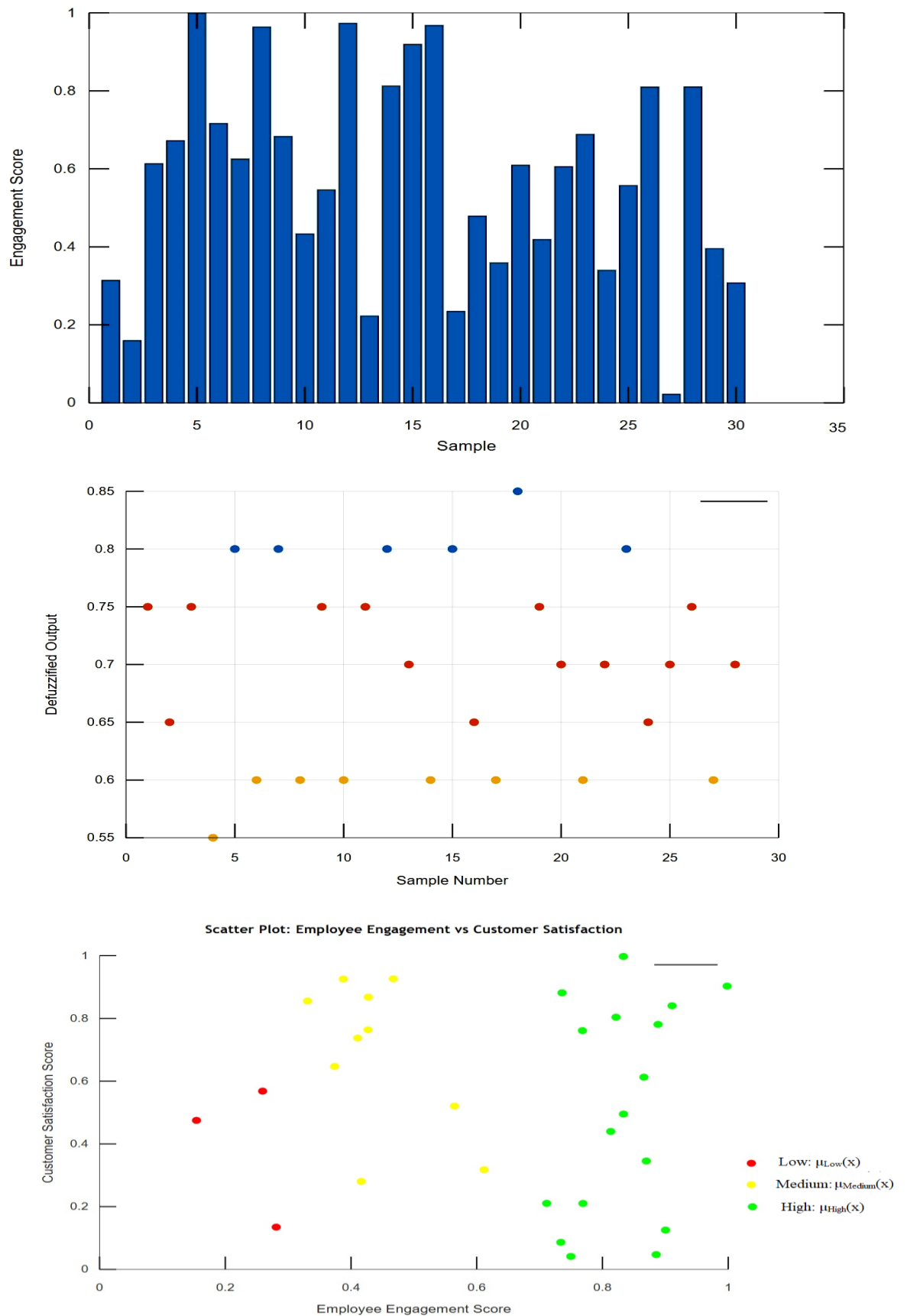


Figure 5. Visualisation of output on Customer Satisfaction vs Employee Engagement

VI. DISCUSSION

The objective of this study was to investigate the interplay between employee engagement and customer satisfaction in the context of remote work within the IT industry, particularly in the aftermath of the COVID-19 pandemic. The fuzzy logic model employed in this study provides a nuanced understanding of how various factors influencing employee engagement and customer satisfaction are interrelated. The findings underscore the complex, interdependent relationship between these two critical dimensions of organizational performance.

1. Interplay Between Employee Engagement and Customer Satisfaction

The fuzzy logic analysis allowed for the evaluation of the intricate relationships between the factors influencing employee engagement and customer satisfaction. The results demonstrated that high levels of employee engagement were strongly correlated with high levels of customer satisfaction, a relationship that is essential for IT companies striving to maintain competitive advantage in a rapidly evolving market.

- **Communication and Responsiveness:** One of the most significant findings was the correlation between effective communication among employees and their responsiveness to customer needs. The fuzzy logic model revealed that samples with higher scores in communication consistently showed higher aggregated results in customer responsiveness. This indicates that when employees are well-informed and engaged through clear and open communication channels, they are better equipped to respond to customer inquiries and resolve issues promptly, thereby enhancing customer satisfaction.
- **Management Support and Service Quality:** The study also found a strong connection between management support and service quality. Samples that scored higher in management support tended to have higher service quality scores, as determined by the fuzzy logic model. This suggests that when employees feel supported by management—through resources, guidance, and encouragement—they are more likely to deliver high-quality services to customers. This is particularly crucial in a remote work environment, where the physical distance between employees and managers could otherwise lead to feelings of isolation and reduced performance.
- **Work-Life Balance and Perceived Productivity:** The fuzzy logic calculations further revealed that work-life balance is a significant predictor of perceived productivity, which in turn influences customer satisfaction. Employees who reported a better work-life balance were more likely to perceive themselves as productive, and this perceived productivity was reflected in higher customer satisfaction scores. This finding emphasizes the importance of fostering a work environment that supports employees' personal and professional lives, as a balanced work-life dynamic contributes to more focused and effective work, ultimately benefiting the customer.

2. The Role of Fuzzy Logic in Understanding Complex Relationships

The use of fuzzy logic in this study provided a unique advantage in understanding the non-linear and often ambiguous relationships between employee engagement and customer satisfaction. Traditional linear models may not capture the subtle nuances and interactions between these variables, particularly when dealing with subjective measures like job satisfaction, perceived productivity, and customer perceptions.

- **Handling Subjectivity and Uncertainty:** Fuzzy logic is particularly well-suited for dealing with the subjectivity inherent in human perceptions and the uncertainty of how different factors influence each other. In this study, fuzzy logic enabled the aggregation of multiple subjective inputs (e.g., employee satisfaction levels) into more comprehensive measures of overall engagement and satisfaction. This approach mirrors the real-world complexities of workplace dynamics, where clear-cut, binary decisions are rare, and outcomes often depend on a confluence of interrelated factors.
- **Aggregated Results and Defuzzified Outputs:** The aggregated results from the fuzzy logic model provided a clearer picture of the overall trends and patterns in employee engagement and customer satisfaction. The defuzzified outputs offered quantifiable insights that could be more easily interpreted and applied in a practical context. For example, by translating complex fuzzy sets into a defuzzified score, managers can better understand where their organization stands in terms of employee engagement and customer satisfaction and identify specific areas that require attention or improvement.

3. Implications for IT Companies

The findings from the fuzzy logic analysis have important implications for IT companies operating in a remote work environment. First, the strong interplay between employee engagement and customer satisfaction suggests that investments in employee well-being and engagement are not just beneficial for employees but also have a direct positive impact on customer satisfaction. IT companies should prioritize strategies that enhance communication, provide robust management support, and promote a healthy work-life balance.

Moreover, the study highlights the importance of adopting flexible, adaptive approaches to managing remote teams. The variability in scores across different samples suggests that a one-size-fits-all strategy is unlikely to be effective. Instead, companies should leverage tools like fuzzy logic to regularly assess the complex, dynamic relationships between employee engagement and customer satisfaction and adjust their strategies accordingly.

4. Limitations and Future Research

While the fuzzy logic model provided valuable insights, it is important to acknowledge its limitations. The model's effectiveness is highly dependent on the quality and accuracy of the input data. In this study, the inputs were based on subjective measures, which, while useful, may not fully capture the objective realities of employee engagement or customer satisfaction. Additionally, the model's rules and membership functions were designed based on the specific context of IT companies post-pandemic, which may limit the generalizability of the findings to other industries or time periods.

Future research could expand on this study by incorporating additional factors or by applying fuzzy logic to different contexts, such as hybrid work models or varying levels of remote work autonomy. Longitudinal studies that track changes over time would also provide deeper insights into how the interplay between employee engagement and customer satisfaction evolves as remote work becomes more established.

CONCLUSION

The COVID-19 pandemic has fundamentally transformed the IT industry, particularly with the widespread adoption of remote work. This shift has brought significant changes to both employee engagement and customer satisfaction, which are critical for organizational success. Through fuzzy logic calculations, this study sheds light on the evolving relationship between these factors in the post-pandemic era. Remote work has redefined employee engagement, emphasizing the importance of factors such as communication, management support, work-life balance, and perceived productivity. Communication has become even more crucial as employees navigate the challenges of working from home. Effective communication strategies are essential to keep employees informed, connected, and engaged, which in turn fosters a cohesive remote work culture. The analysis revealed that higher engagement levels are strongly linked to robust communication practices.

Management support has also taken on new significance in the remote work environment. Beyond traditional supervision, managers now play a critical role in providing emotional support, flexibility, and the resources necessary for employees to adapt to new working conditions. The fuzzy logic analysis demonstrated that strong management support is closely associated with higher job satisfaction and perceived productivity, both key components of employee engagement in a remote setting. Work-life balance has emerged as a central concern for remote employees. The blurred boundaries between work and personal life can lead to burnout and decreased engagement if not properly managed. The study found that employees who achieve better work-life balance report higher levels of job satisfaction and perceived productivity, underscoring the importance of organizational support in this area.

Customer satisfaction, closely linked to employee engagement, has also been impacted by the shift to remote work. The fuzzy logic calculations revealed that service quality is directly influenced by employee engagement. Engaged employees who receive adequate management support and maintain a healthy work-life balance are more likely to provide high-quality service, leading to greater customer satisfaction. This relationship is particularly important in a remote work environment, where interactions with customers are often digital, making the consistency and quality of service delivery even more critical. Responsiveness to customer needs has also become a key determinant of customer satisfaction in the remote work era. The study found that engaged and well-supported employees are more responsive to customer inquiries and issues, leading to enhanced customer satisfaction. This responsiveness is crucial for maintaining customer trust and loyalty in a time when face-to-face interactions are limited.

The fuzzy logic model underscores the complex relationship between employee engagement and customer satisfaction in the post-COVID era. The findings suggest that communication, management support, work-life balance, and perceived productivity are directly linked to customer satisfaction outcomes. IT companies must adopt an integrated approach that enhances employee engagement to sustain high levels of customer satisfaction. This involves investing in communication tools, providing robust management support, and promoting work-life balance. By doing so, organizations can foster an engaged workforce capable of delivering exceptional customer service, ensuring long-term success in the post-pandemic world.

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