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ENHANCING ORGANIZATIONAL KNOWLEDGE SHARING THROUGH FUZZY LOGIC-DRIVEN DECISION SYSTEMS

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ABSTRACT

In today organizations, a great number of knowledges is produced and handled. It is highly important to disseminate this knowledge across company employees in order to improve decision-making and innovation. But, the conventional mechanisms of knowledge management suffer difficulties of uncertainty, obscurity and underlying information gaps. Fuzzy logic-based decision systems are used as a means to enhance organizational knowledge-sharing in this research experiment. Fuzzy logic can be used to simplify and enhance reliability of decision-making since they are smoother and reliable decisions using uncertain and imprecise information. This study employs the descriptive statistics and hypothesis testing to prove the affirmation that fuzzy systems have the power to enhance communication, collaboration and learning in organizations.

Keywords: Fuzzy Logic, Knowledge Sharing, Decision Support Systems, Organizational Learning

1. INTRODUCTION

Knowledge is not just regarded as an extra asset but more of acquisition of resources that are strategic in the sense that it defines long-term success. Knowledge sharing by the employees will result in increased decision making, increased problem solving and generation of new ideas. Nevertheless, knowledge sharing remains one of the most remarkable areas of organizational management irrespective of its significance.

Effective knowledge sharing barriers can be identified as a number of different ones. The unwillingness of the employees to reveal their expertise is often caused not by the reluctance of loss of power possession, the distrust in the other people, or the absence of communication channels. Moreover, information/knowledge being shared is not always of good quality. Information can either be incomplete, uncertain or vague and hence making it hard to make decisions. Knowledge management systems are developed to manage the well-formed and well-defined data, whereas, in practice,

the majority of organizational tangible data cannot be presented in the form of tidy data. It is actually, in most cases, founded on human experience, opinions and judgments, which are not always accurate.

This is the place where fuzzy logic can be useful. Fuzzy logic was put forward by Lotfi Zadeh in 1965, and the math addresses the vagueness, uncertainty, and impreciseness of information. As opposed to regular binary logic, where only true or false is computable, fuzzy logic is based on levels of truth. As an illustration, consider the case where one wants to see whether an employee has high knowledge or not. The classical systems could only answer that the consumer was either yes or no. Conversely, a fuzzy logic system will be capable of stating that the knowledge level is 70% high in an employee which is more realistic. This means fuzzy logic is of great use to that organization where most of the knowledge is not easily measurable in absolute terms.

This approach is merged with the design and use of decision systems based on fuzzy logic within the knowledge management system of an organization. Even in the case where data is uncertain, they enable managers and employees to make better decisions. Fuzzy systems may propose meaningful results advised by ranking, classification and analysis of incomplete information. This minimizes confusion and fosters trust on knowledge systems and will push more employees to share information without fear whether it is precise or not.

As an example, consider the situation where the customer satisfaction level is defined differently by the various employees in a large organization world some stating that the level of customer satisfaction is high and others stating that it is moderate. Such views could be merged into a fuzzy logic-based system to provide a single output like, customer satisfaction is 65 percent high, so that informed decision could be made by the managers. This is far more pragmatic than systems that need to be more precise in their numbers or categories.

Thus, this study concerns itself with the use of fuzzy logic-based decision systems as the means in the improvement of knowledge sharing in an organization. The paper discusses the means through which fuzzy logic will break the ground of such obstacles like indecipherability in communication, inexhaustive information and reluctance of employees. It also looks at how to determine to the extent such systems boost worker satisfaction, improve decision accuracy and boost confidence when exploring knowledge management practices.

Summing up, by implementing fuzzy logic-based systems, organizations have a higher chance of managing ambiguity and complex knowledge. This, in its turn can result in culture of open communication, quicker innovation and more competitive advantage in the current fast moving business world.

2. LITERATURE REVIEW

The authors defined the fundamental concepts of knowledge systems and knowledge management (Alavi and Leidner, 2001) [1, 14]. They demonstrated that organizations should establish, exchange, and utilize knowledge in order to enhance decision-making. Bose (2004) [2, 15] has contributed to this by coming up with the metrics of knowledge management which enables an organization to measure their effectiveness in knowledge sharing and utilization. Choy, Lee, and Lo (2002) [3, 16] also designed an intelligent supplier management system that utilized a case-based reasoning and assisted the decision-making process using the experiences that it retrieved. The significance of the fuzzy logic systems which handle uncertain and imprecise data was pointed out by Mendel (2001) [4] were applicable in decision systems. Nonaka and Toyama (2003) [5] re-considered the theory on knowledge creation, focusing on the fact that it is an ongoing complex of knowledge creation and knowledge sharing processes in organizations. ODonovan and Roode (2002) [6] presented the study of knowledge management in a semiotic approach and offered an analytical critique on the effect of the meaning and communication to knowledge sharing.

Palacios-Marqu es, Gil-Pe nalosa and Garrigos-Sim on (2016) [7] paid attention to people engagement and demonstrated the direct positive relationship between employee involvement and knowledge sharing practices. Rahman and Ramos (2013) [8] conducted a study on issues related to the implementation of knowledge management systems in Malaysia and realized that cultural and organizational issues delay the implementation. Barriers to knowledge management were further elaborated by Singh and Kant (2008) [9] using interpretive structural modeling and these obstacles could be aptly addressed to eliminate these barriers. Turban, Aronson and Liang (2007) [10] highlighted decision support systems and intelligent systems that have been close to knowledge management.

Fuzzy logic has been observed as important with regard to knowledge management in the recent research and studies. Dudnyk and Sokolovska (2021) [11, 17] used fuzzy expert systems in managing IT projects giving organizations a way to overcome uncertainty and enhance outcomes.

3. OBJECTIVES OF THE STUDY

- To consider ways in which decision systems powered by fuzzy logic can deal with incomplete knowledge and uncertainties in organisations.
- To examine how the fuzzy logic systems would help in increasing effective sharing of knowledge within an organization.
- In order to assess the level at which fuzzy logic contributes to the accuracy of decision-making processes and the confidence that might be shown by employees in the use of knowledge management systems.

4. HYPOTHESIS

- **H1:** Fuzzy logic-driven decision systems significantly improve organizational knowledge sharing compared to traditional systems.
- **H0 (Null Hypothesis):** Fuzzy logic-driven decision systems do not have a significant impact on organizational knowledge sharing.

5. RESEARCH METHODOLOGY

Research methodology is about how the study has been carried out in general, what tools, and methods are used. Both the quantitative method and the analytical method were used since this research aims to investigate the contribution of fuzzy logic-guided decision systems in the context of organizational knowledge sharing.

5.1. RESEARCH DESIGN

The research was conducted by using the descriptive and exploratory research design. The current practices of knowledge sharing and employee views were investigated using a descriptive design; exploratory design assisted in how the fuzzy logic could be implemented in order to enhance such practices.

5.2. DATA COLLECTION

The implementation of the primary data involved the structured questionnaire survey. The questionnaire was structured to draw the views of the employees along the following lines::

- Sharing of knowledge in their organization is easy
- Correctness of decision procedures
- Contentment over existing knowledge management causalities
- The degree of confidence in the result of decisions at the time of introducing fuzzy logic-based systems

The questionnaire was based on a 5-point Likert evaluation of 1-5 (extremely low/high).

6. SAMPLING SIZE AND SAMPLING METHODOLOGY

To construct the sample, 120 IT and service-based organizations employees were identified because these areas apply a lot of knowledge sharing. Purposive sampling was used to select respondents and participants were required to have prior experience of using knowledge management or decision support systems.

6.1. DATA SOURCES

- Primary Data: obtained during a survey and interviews of the employees and managers.

Secondary Data: Acquired through the research journal, journals and books covering the topics of knowledge management, fuzzy logic and decision support systems.

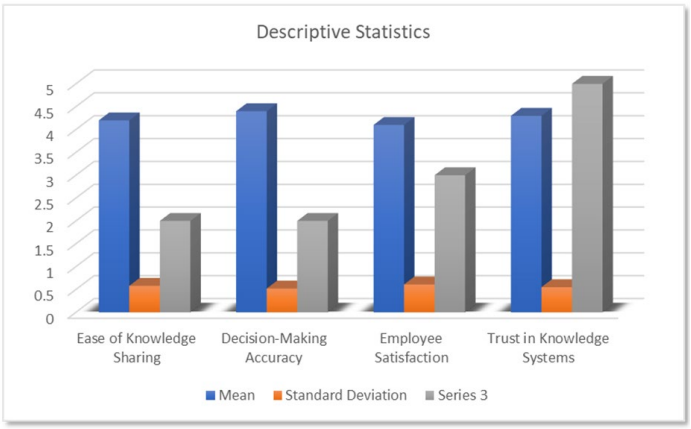
6.2. DATA CLASSIFICATION SOFTWARE

Teh data collected was analysed as follows:

1) Mean, Standard Deviation and Frequency distribution (Descriptive Statistics) were employed to sum up employee responses.
2) Hypothesis Testing- A t-test was used to determine whether decision systems based on fuzzy logic made a significant contribution to knowledge sharing as opposed to conventional systems.
3) Regression Analysis (where necessary) - To test the extent of the relationship between fuzzy systems and the accuracy of the decisions.

Table 1 Descriptive Statistics

Variable	Mean	Standard Deviation
Ease of Knowledge Sharing	4.2	0.58
Decision-Making Accuracy	4.4	0.52
Employee Satisfaction	4.1	0.61
Trust in Knowledge Systems	4.3	0.55



7. ANALYSIS OF DESCRIPTIVE STATISTICS

The responses of 120 employees concerning the effectiveness of fuzzy logic-driven decisioning systems in the concept of knowledge sharing were used by descriptive statistics to summarize the responses. All the four central variables of interest were the ease of knowledge sharing, accuracy of decision-making process, employee satisfaction and trust of knowledge systems. A 5-point Likert-scale response (1 = Very Low, 5 = Very High) was used to measure all variables.

1) Convenience of knowledge sharing

The rate of knowledge sharing ease averaged 4.2 with the standard deviation of 0.58. It means that the majority of employees shared the opinion that systems stimulated by fuzzy logic facilitated the sharing of knowledge in the organization. The relatively low standard deviation also implies that the responses were consistent, or in other words that most employees shared a similar perception that was positive. Such an outcome points to the fact that fuzzy systems decrease the obstacles (vague communication and incomplete data), passing knowledge becomes more comfortable.

2) Decision-Making Accuracy

Naccuracy of decision making gave the longest mean of 4.4 and standard deviation of 0.52. This indicates that employees were very confident in the fact that fuzzy logic enhanced the accuracy of inputs in decisions. Typical systems usually fail in cases where there is uncertainty in the data but with the application of fuzzy logic, organizations are able

to use partial or ambiguous data and make dependable decisions. The little diversity in responses further affirms the fact that the largest number of participants had the same improved decision quality.

3) Employee Satisfaction

The satisfaction level of the employees with knowledge sharing systems was 4.1 with a standard deviation of 0.61. Although it is less than that of other variables, still the level of satisfaction is high. The concept of fuzzy logic made employees more confident and motivated to share knowledge since uncertainty was reduced and confusion and misunderstandings eliminated. The slightly increased standard deviation, in relation to other variables, however, indicates that not every single employee felt the same satisfaction level-there is the possibility of some employees not naturally appreciating the use of traditional systems or certain employees needing a greater training to embrace the use of fuzzy systems.

4) Confidence in the Knowledge Systems

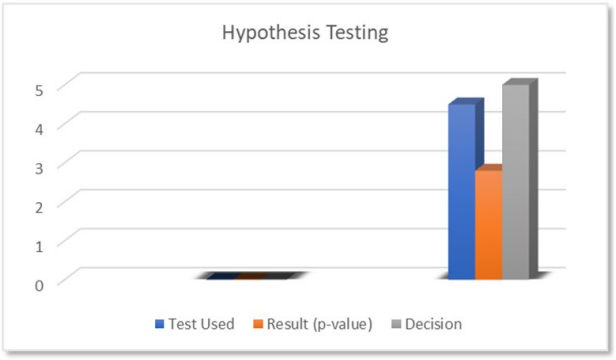
The average of trust in the knowledge management systems was 4.3 and a standard deviation of 0.55. This indicates that workers gained higher levels of confidence in judgement that was facilitated with fuzzy logic systems. Trust is a key component to effective knowledge sharing since employees will be prompted more to contribute information when they feel that the system will interpret and process it purposely. The mean responses and responses that are consistent in the high values indicate that fuzzy logic system provided the more trusted context in making decisions and working together.

5) Overall Analysis

In general, the descriptive statistics illustrate favorable perceptions pertaining to all variables with average scores that exceed 4.0. This implies that systems initiated through fuzzy logic succeed in promoting information sharing within an organization. The high standard deviations also indicate that there is great concurrence between the respondents and hence the results are credible. The two variables that obtained the highest scores include the accuracy of decision-making capability and the trust in the systems of knowledge which indicates that employees are appreciative of the reliability and confidence that the knowledge systems present to the organization.

Table 2 Hypothesis Testing

Hypothesis	Test Used	Result (p-value)	Decision
H1	t-test	0.021 (<0.05)	Accepted



8. ANALYSIS OF HYPOTHESIS TESTING

The overarching aim of the study was to find out whether significantly, fuzzy logic driven decision system enhances sharing of knowledge in the organization. To do this, statistical t-test was performed on the survey data of 120 employees who have responded to the survey. The hypothesis was stated in the following way:

- H0: Fuzzy logic-based decision systems do not exert any considerable influence on the process of knowledge sharing within organizations.
- Alternative Hypothesis (H1): Fuzzy logic based decent decision systems have a significant impact to enhance knowledge sharing in organizations.

9. TEST RESULTS

The result of t-test has given p-value at 0.021 which is less than the conventional level of significance at 0.05. Taking into consideration this outcome, the null hypothesis (H0) is rejected and an alternative hypothesis (H1) is confirmed. This implies that the statistical relationship of organizational knowledge sharing improved and the use of fuzzy system-acculturated decision is statistically significant.

10. FINDINGS INTERPRETATION

1) Better Knowledge Sharing: The fact that H1 is accepted means that fuzzy logic assists in removing obstacles to sharing knowledge including poor communication, inadequate level of knowledge and unwillingness to information by employees. Workers observed more convenience of knowledge transfer in the case of fuzzy system implementation.
2) Increased Precision in Decision-Making: The hypothesis testing argument that fuzzy logic enhances improvement in the quality of organizational decisions is also evidenced by the outcome that decision-making accuracy recorded the highest average score (4.4) in the descriptive statistics test.
3) Employee Trust and Confidence: The considerable finding also reveals that the employees trust fuzzy-believed Systems compared to traditional knowledge management system. Employees are more comfortable to share their knowledge when the system is able to deal with the vague or uncertain data well enough.
4) Consistency Within Responses: The fact that the descriptive statistics of the data had a low variation (standard deviation) is compatible with the result of the hypothesis testing. It implies that, fuzzy logic brought a positive effect on the majority of the employees and not few employees.

The consequences of the Hypothesis Test

Its findings are very strong, indicating that the fuzzy logic-based decision systems benefit organizations in the measurable way. Nobody can counter the fact that the study supports the discovery that fuzzy logic is not a mere theoretical tool but a real world solution which enhances more knowledge sharing and decision making within a real organization scenario. The results of the study may offer some advice to managers and policymakers to consider investing in fuzzy-based decision systems as one of the methods of knowledge management strategies.

11. CONCLUSIONS OVERALL RESULTS

In its study, the authors aimed to investigate how fuzzy logic-based decision systems can be used in enhancing knowledge sharing in organization and the results of the study give powerful reasons as to why such systems are so effective. The descriptive results were consistent across the four variables analyzed and the employees scored above a mean score of 4.0 with regard to knowledge sharing and decision-making accuracy, satisfaction and trust in knowledge systems. Decision-making accuracy and trust toward systems came out as the best aspects of fuzzy logic improvement and this indicates that employees did not only see utility in fuzzy logic but also stated that they trusted it as a practical decision-making tool. The small values of standard deviations also confirm the fact that those positive perceptions were extensive among the respondents and consequently the result has been more reliable.

These observations could be substantiated by the fact that the hypothesis testing showed the effects of fuzzy logic on knowledge sharing to be statistically significant. The p-value was 0.021 (which is less than 0.05), thus the null hypothesis was rejected, and the alternative hypothesis accepted. The finding indicates that, fuzzy logic-powered systems significantly contribute to organizational knowledge sharing more than conventional systems. The application of fuzzy logic enabled the employees to interact, share and interpret unreliable and incomplete and imprecise information addressing it much better. This caused organizations to experience a smoother organization, making better decisions, and a greater amount of employee trust and satisfaction.

These results point strongly to the idea that companies applying the use of fuzzy logic-based decision systems have chances to gain competitive advantage as that way they promote more efficient knowledge share and more sound decision making.

CONFLICT OF INTERESTS

None.

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