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Research Article

Fuzzy Ranking based Digital Marketing Strategies for Financial Institutions: Enhancing Customer Acquisition and Retention

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Abstract: The financial institutions nowadays increasingly depend on digital marketing tools to attract and retain customers. The paper examines the role of digital channels - social media, Search Engine Optimization, and personal email campaigns among others - in customer engagement. This is a highly competitive industry; therefore, there exists a drastic need for developing data-driven and targeted approaches to attract and retain customers. This paper proposes a novel Sugeno Ranking Fuzzy Digital Marketing (SRFDM) model to evaluate and enhance digital marketing strategies in financial institutions, with a focus on customer acquisition and retention. The model incorporates fuzzy logic to assess three key factors: Keyword Relevance, Content Quality, and User Engagement, which are essential for optimizing digital marketing efforts. Through the application of fuzzy rule-based outputs, the SRFDM model ranks the effectiveness of various strategies, providing insights into their performance and areas for improvement. The findings demonstrate that strategies with high levels of keyword relevance, content quality, and user engagement consistently achieve superior rankings, resulting in higher effectiveness in acquiring and retaining customers. This research highlights the importance of balancing these factors for optimal marketing performance, offering financial institutions a practical tool to refine their strategies, improve customer targeting, and enhance overall digital marketing outcomes. The SRFDM model serves as a valuable framework for financial institutions seeking to improve their competitive edge in the evolving digital landscape.

Keywords: Sugeno Fuzzy, Digital Marketing, Customer Acquisition, Personalization, Classification.

1.Introduction

Digital marketing strategies are crucial for financial institutions to effectively acquire and retain customers in today's competitive market [1]. To enhance customer acquisition, financial institutions can leverage targeted digital advertising through platforms like Google Ads and social media channels, focusing on reaching specific demographics based on factors such as income, age, or location [2]. Content marketing, including educational blogs, videos, and webinars, can help build trust and attract potential customers by addressing their financial concerns and needs. For retention, personalized email campaigns and loyalty programs can keep customers engaged, offering tailored financial products or exclusive deals based on their behavior and preferences [3]. Additionally, a strong presence on mobile apps and social media allows institutions to remain in constant communication with customers, fostering long-term relationships. Utilizing data analytics to understand customer behavior and providing AI-powered chatbots for quick responses to inquiries can also enhance customer satisfaction [4]. By integrating these strategies, financial institutions can create a seamless, customer-focused experience that drives both acquisition and retention. It is a period where technology has transformed the way business and customer interactions are done and, at the same time, financial institutions are one sector that cannot be exempted to the transformation [5]. Financial services, which traditionally relied on brick-and-mortar locations and personal connections as a key means of interacting with consumers, have increasingly leveraged on digital channels for purposes of attraction and retention of customers [6]. This being new and emerging, the internet marketing strategies serve as an open door for banks and also fintech companies to their customers in more effective and efficient ways. Enhanced customer acquisition and retention can be attributed to this by institutions in data-driven insights on top of the means of personalized communication through innovative platforms [7].

Artificial intelligence (AI) is transforming digital marketing strategies for financial institutions by offering innovative solutions for both customer acquisition and retention. To enhance customer acquisition [8], AI can be used to analyze vast amounts of data, enabling institutions to identify high-potential prospects through predictive analytics and behavioural targeting. AI-powered tools, like chatbots and virtual assistants, can engage with potential customers in real-time on websites or social media, providing immediate assistance and answering queries, which increases the likelihood of conversion. Personalized recommendations for financial products, powered by machine learning algorithms, can further improve the customer experience, making it more relevant and timely [9]. For retention, AI can help financial institutions anticipate customer needs and offer personalized solutions that foster loyalty [10]. Machine learning algorithms can analyze a customer's transaction history and preferences to recommend products or services that match their financial goals. AI-driven customer service tools, such as chatbots or automated support systems, can provide 24/7 assistance, ensuring prompt and efficient responses to customer inquiries, which enhances satisfaction [11]. Additionally, AI can optimize customer engagement through tailored email marketing campaigns and dynamic content, ensuring that communication feels personalized and relevant. By integrating AI into their digital marketing strategies, financial institutions can enhance both customer acquisition and retention, delivering superior service while improving operational efficiency [12].

Fuzzy logic is increasingly being integrated into financial services to handle uncertainty and improve decision-making processes [13]. In the context of financial institutions, fuzzy logic allows for more flexible and human-like reasoning in complex environments where traditional binary logic might fall short [14]. For instance, when assessing credit risk, fuzzy logic can evaluate a range of factors—such as income levels, spending behavior, and previous financial history—instead of relying on rigid, yes-or-no criteria [15]. This enables more accurate and nuanced predictions about a customer's ability to repay loans, leading to better risk management. Similarly, fuzzy logic can be applied to investment strategies, where it helps in dealing with uncertain market conditions [16-20]. Financial planners and robo-advisors can use fuzzy algorithms to make more personalized recommendations by considering multiple, often conflicting, financial goals and risk tolerances. Fuzzy logic also plays a role in fraud detection, where it can help to identify suspicious transactions by analyzing patterns that are not easily classified as legitimate or fraudulent, improving the system's accuracy and responsiveness [21-23].

2.Related Works

The related works section explores the existing body of research and practical applications relevant to the topic, providing a foundation for understanding the context and developments in the field. In the case of financial services, previous studies have delved into various digital marketing strategies, customer acquisition techniques, and retention methods, highlighting both the challenges and opportunities faced by financial institutions. Additionally, research on the application of artificial intelligence and fuzzy logic in financial decision-making has shown significant advancements in enhancing personalization, improving risk assessment, and optimizing customer engagement. By reviewing these works, we gain valuable insights into the evolving landscape of financial services and identify gaps that can be addressed through innovative strategies and technologies.

Wang (2022) explores how deep learning combined with swarm intelligence improves customer segmentation, offering insights into more efficient targeting for financial institutions. Luo and Luo (2024) analyze the application of fuzzy neural networks in understanding user behavior on social media, emphasizing how such technologies can inform online marketing strategies and refine customer engagement. Esmaelnezhad et al. (2023) propose a fuzzy hybrid approach for evaluating digital marketing strategies in the tourism industry, offering parallels for how such methodologies can optimize financial marketing efforts by incorporating uncertainty and complex decision-making factors. Other works, such as those by Geetha et al. (2024) and Singh et al. (2023), delve into the role of AI in improving customer retention and acquisition strategies. These studies highlight how AI algorithms enable financial institutions to personalize their marketing efforts based on detailed customer insights, ultimately enhancing satisfaction and loyalty. Meanwhile, Lamrhari et al. (2022) and Rosário et al. (2023) discuss frameworks like social CRM analytics and fuzzy logic in customer retention and acquisition, indicating the critical role of such technologies in creating more responsive and adaptive marketing strategies.

Additionally, studies like those by Amiri et al. (2023) and Huy et al. (2023) focus on the application of fuzzy logic and AI within specific contexts, such as digital banking and resource management in entrepreneurship, respectively. These studies demonstrate how fuzzy models and AI can improve decision-making processes related to financial product offerings, customer targeting, and portfolio management by accounting for uncertainty and complex variables. The research by Venkateswaran et al. (2024) further emphasizes AI's role in enhancing marketing strategies and customer loyalty, particularly within financial institutions, by providing deeper insights into consumer behavior and predicting future trends. Similarly, the work by Fares et al. (2022) offers a comprehensive review of AI's impact on the banking sector, showcasing its potential to transform not only marketing strategies but also the overall customer experience and operational efficiency. Studies such as those by Yasar and Korkusuz Polat (2022) and Liu and Fu

(2024) illustrate the broader applications of fuzzy logic and AI in the context of marketing 4.0 and big data management. These studies explore how such technologies can be leveraged to better understand consumer preferences, adapt marketing approaches during crises like the COVID-19 pandemic, and enhance data-driven decision-making processes in the banking and financial sectors.

In addition to the advancements in AI and fuzzy logic, several studies have explored the synergy between these technologies and other emerging trends such as big data analytics and computational intelligence. For example, Amato et al. (2024) focus on how AI can assist in credit portfolio management by analyzing vast datasets to provide more accurate insights into customer behavior and financial risk. This integration of AI with big data allows financial institutions to refine their marketing strategies, predict customer needs with greater precision, and develop more tailored financial products. Similarly, Korucuk et al. (2022) explore how digital marketing strategies, enhanced by green approaches and fuzzy decision-making models, can drive sustainability efforts within the financial sector, aligning customer acquisition and retention with environmental goals. The work of Al-Binali et al. (2023) takes this further by examining how AI and fuzzy analysis can be applied in bank mergers, particularly in the context of achieving the Sustainable Development Goals (SDGs). This perspective highlights the growing trend of incorporating social and environmental considerations into financial strategies, which can influence customer perceptions and loyalty. By using fuzzy logic models, financial institutions can better assess the impact of such mergers on customer satisfaction and retention. Additionally, Lam et al. (2024) present a multi-criteria intelligence aid approach for selecting key opinion leaders in digital business management, a concept that can be directly applied to selecting brand ambassadors or influencers in financial marketing, further personalizing customer engagement.

3.Proposed Sugeno Ranking Fuzzy Digital Marketing Financial Institutions (SRFDM)

The Sugeno Ranking Fuzzy Digital Marketing for Financial Institutions (SRFDM) model is a proposed framework that integrates fuzzy logic, Sugeno fuzzy inference systems, and digital marketing strategies to enhance decision-making processes in customer acquisition, engagement, and retention within financial institutions. This model utilizes fuzzy sets to handle uncertainty and imprecision in customer data, while the Sugeno fuzzy inference system provides a structured method for ranking potential marketing strategies based on various criteria, such as customer satisfaction, engagement rates, and return on investment. The Sugeno fuzzy inference system is characterized by the use of fuzzy rules and the generation of crisp outputs based on fuzzy inputs. In SRFDM, the inputs are fuzzy variables related to customer preferences, behavior, and financial history, and the output is a ranking of marketing strategies. Each fuzzy rule can be expressed as:

$$Ri: IF\ X_1\ is\ A_1\ AND\ X_2\ is\ A_2\ AND\ \dots\ THEN\ Y_i = f_i(X_1, X_2, \dots)$$

Each input variable X_1 is represented by fuzzy sets with membership functions. For instance, the membership function for the income variable can be represented as in equation (1)

$$\mu_{Income}\left(X_j\right) = \begin{cases} \frac{x_i - L}{H - L} & L \leq \boldsymbol{X_j} \leq \boldsymbol{H} \\ 1 & if\ \boldsymbol{X_j} > H \\ 0 & if\ X_j < L \end{cases} \tag{1}$$

Where L and H represent the lower and upper bounds of the income range, and $\boldsymbol{X_j}$ is the actual income value. After applying the fuzzy rules, the outputs from each rule are aggregated. In the Sugeno method, the aggregation is done using a weighted average or a linear combination of the outputs stated in equation (2)

$$Y_{total} = \frac{\sum_{i=1}^{n} w_i.f_i(X_1,X_2,....)}{\sum_{i=1}^{n} w_i} \tag{2}$$

In equation (2) w_i is the weight associated with the rule R_i, which reflects the importance of each rule. The output Ytotal is used to rank various marketing strategies. Higher values indicate better marketing strategies for customer acquisition or retention, based on the fuzzy inputs such as customer preferences and engagement levels. The final decision is made by selecting the strategy with the highest-ranking score stated in equation (3)

$$Rank(S) = argmax_i\left(Y_{total}^{(S)}\right) \tag{3}$$

Where s_ii represents each possible marketing strategy, and w_i is the total score for strategy s_i.

4. SRFDM Digital in Financial Services

SRFDM model for digital financial services provides a comprehensive and adaptive approach to digital marketing by incorporating fuzzy logic to manage uncertainty in customer data and Sugeno fuzzy inference systems to rank and select the most effective strategies. By applying this model, financial institutions can optimize their digital marketing campaigns, ensuring that they target the right customers with the right strategies, ultimately enhancing customer acquisition, retention, and engagement. The flexibility of fuzzy logic in dealing with imprecise data combined with the structured decision-making process of Sugeno inference provides a powerful tool for financial services to adapt to an ever-changing market environment. Changes in consumer behaviour are primarily driving the digital transformation of the financial sector. Through the internet, mobile banking, and other digital payment solutions, the consumer wants the interaction process with the financial institutions to be faster, convenient, and personalized. As reported in a 2024 study, the COVID-19 pandemic accelerated the transition to digital channels faster because digitization of the bank attracted more customers through internet banking and mobile applications, among others, to make financial transactions. As such, financial institutions had a need to quickly modify their marketing to remain at the frontline and concentrate more on how to capture and maintain a client base in these digital channels.

Customer acquisition is concerned with ensuring a business gets a new customer, and it widely utilizes digital marketing. As a study report indicates in 2024, the COVID-19 pandemic made digitization faster through the high speed at which it accelerated the shift to digital channels due to the attraction of more customers through internet banking and mobile applications, among others, to make their financial transactions. Most widely used strategies that have gained wide popularity in the web marketing campaigns of financial companies especially in acquiring new and retaining existing customers are SEO, social media marketing, email marketing, influence marketing, and innovative tools such as AI, and chatbots. Each tactic interacts with the customer differently, boosts brand visibility, and builds long-term relationships.

Table 1: Fuzzy Rules for SRFDM

Rule No.	Customer Activity Level (X1)	Income Level (X2)	Engagement Level (X3)	Output (Marketing Strategy Effectiveness, Yi)
R1	Low (0-30%)	Low (0-30%)	Low (0-30%)	f1=20f_1 = 20f1=20 (Low Effectiveness)
R2	Low (0-30%)	Low (0-30%)	Medium (31-60%)	f2=30f_2 = 30f2=30 (Moderate Effectiveness)
R3	Low (0-30%)	Medium (31-60%)	High (61-100%)	f3=40f_3 = 40f3=40 (Moderate Effectiveness)
R4	Medium (31-60%)	Low (0-30%)	Low (0-30%)	f4=30f_4 = 30f4=30 (Moderate Effectiveness)
R5	Medium (31-60%)	Medium (31-60%)	Medium (31-60%)	f5=50f_5 = 50f5=50 (High Effectiveness)
R6	Medium (31-60%)	Medium (31-60%)	High (61-100%)	f6=60f_6 = 60f6=60 (High Effectiveness)
R7	High (61-100%)	High (61-100%)	Low (0-30%)	f7=50f_7 = 50f7=50 (High Effectiveness)
R8	High (61-100%)	High (61-100%)	Medium (31-60%)	f8=70f_8 = 70f8=70 (Very High Effectiveness)
R9	High (61-100%)	High (61-100%)	High (61-100%)	f9=90f_9 = 90f9=90 (Very High Effectiveness)

Internet marketing has its backbone in search engine optimization. SEO is the optimization process that a website will go through with an attempt to get higher rankings on SERPs for a set of keywords related to services being offered by the institution, so that prospects can find those services online. For a financial service provider, SEO is important as most of the customers start their financial journey online with the research of products and services. An effective SEO strategy for banks and other fintech companies will then allow them to capture this audience by ensuring that their websites top search queries for terms such as “best savings accounts” or “investment options” Financial sector SEO’s usually focus on keyword usage and other qualitative content and right website architecture. Financial organizations spend money creating knowledge that customers will be beneficial for, such as “how to open a savings account”, “how to apply for a loan”, or “how to manage personal finance”. Technical SEO then makes sure that websites are faster, mobile-friendly, and with a simpler architecture-a further step to improve user experience and rankings from search engines.

The social media networks, such as Facebook, Twitter, Instagram, and LinkedIn, have changed the financial institutions’ way of communicating with customers. Social media marketing is the art of communicating in real time with the target audience to share value-added content and a personalized experience that leads to customer loyalty. Targeted social media campaigns will help financial institutions market their services and provide customer service, thus creating a better relationship with prospects as well as existing customers. One of the major advantages of social media marketing is to tailor the message to a specific audience. Financial institutions can leverage the data they have about the customers and present a more personalized message to their audience for it to resonate in each different group of customers. For example, it may appeal to the young professional with content regarding savings and investments but mortgages and loans to the middle-aged customer. Social media also enables one to engage the customers by creating interactive content, like conducting polls, quizzes, and even live Q&A sessions that leave the event and experience more alive and dynamic. Besides social media, influencer marketing has also opened other opportunities for financial institutions to acquire more customers. Generally, in the finance and investment space, influencers can articulate credence by sharing their experiences and using financial products and services for promotion to their followers. In this regard, financial institutions may reach a bigger clientele, enhance brand recognition, and acquire more customers. Although social media marketing has assumed the driving seat, email marketing has been found to be an effective means for companies in the finance sector for connecting with and retaining the customers. Depending on the preferences and behaviour of the customers, the financial institutions are sending their personal messages, offers, and product recommendations to their customers via emails. The prowess of AI and ML in this context has made it possible to design highly targeted campaigns that improve the overall engagement of customers, thereby driving conversions

In the context of customer retention, it would be essential to keep maintaining constant on-going communication with existing customers. The critical role of e-mail marketing would play a vital role in this process. For this purpose, financial institutions may e-mail existing customers regularly about new products, financial tips, and offers of their personal financial goals. For instance, through this e-mail marketing facility, certain important reminders of account updates, transactions, and reminders can be automated, thus further fortifying customer relations. Influencer marketing becomes increasingly popular in the financial sector, and the institutions partner with the KOLs from the finance and investment industry. In that way, the influencers would be experts or influencers in finances who would provide creditability to the financial products and services by sharing insights and experiences, thus enabling the financial institutions to gain people’s trust while their clients will respect and see value in their opinions – those of industry experts. In addition, viral marketing, or buzz marketing, may be a crucial part of customer acquisition. Viral campaigns rely on the principle that users will naturally distribute the message by sharing it with others through social media; therefore, the institution gains exponentially more visibility. Financial institutions that create intriguing, educative, or amusing content may elicit the behaviours that enable its sharing within networks and increase its circulation towards attracting customers

AI and chatbots are promising innovation in the development of customer acquisition and retention. Through AI, it becomes possible to analyse the data of customers of financial institutions and offer them investment, saving plans, loan products, among other things. Chatbots have been proven to offer instant support to customers by engaging on messaging platforms and websites to improve customer experience through providing a readily available 24-hour help for routine queries like checking account balances and solving different issues. AI and chatbots make customer interactions smoother, simplified, and completed instantly, making customers more satisfied and retained. It gives financial institutions the possibility to respond to the customers' demand for speed and personalized service, not having to be "intermediated" by a human, hence its ability to deliver a large volume of inquiries and responses easier.

4.1 Digitally Sustaining Customer Retention

The customer acquisition is always the need of the hour, customer retention is crucial in the long run. Sustaining customer loyalty and repeat business requires continuous quality experiences at all touch points for customers while making all digital interactions with the company. Customer retention comes from giving them personalized, value-added services that meet dynamic requirements of customers.

Today, customers expect fluid experience across all contact channels and are now engaging with banks via the websites, mobile app, or social media. An omnichannel strategy, therefore, will give customers standard messages and services at all touchpoints. Financial institutions can base their decision on the data extracted from the channels to formulate an integrated view of the customer journey and establish provisions for the delivery of personalization service that meets individual preferences. Customer experience management is an essential strategic element of retention efforts. Financial institutions can constantly monitor and enhance the nature of customer interactions to make overall satisfaction better and pinpoint potential weaknesses. Customer loyalty can further be developed with loyalty programs, customized offers, and long-term customer rewards. The provision of incentives, such as cashback rewards, low interest rates, or access to expert financial advice, can create value for customers in financial institutions.

In financial services, digital marketing plays a critical role in new customer acquisition as well as retaining the existing ones in a competitive landscape. Financial services institutions have to adapt targeted data-driven strategies aimed at creating customized experiences by using the coming technologies for customers to be engaged and developed in loyalty over time. Some of the digital marketing strategies below those financial institutions can use to improve customer acquisition and retention are

4.2 Search Engine Optimization (SEO)

Search engine optimization, often abbreviated as SEO, is a part of digital marketing. It helps financial institutions increase visibility in websites on the internet. Optimizing the websites and content with the use of relevant keywords may enable ranking higher in search engines, thus making it easier for potential customers to find their services. Effective strategies in search engine.

- **Optimization include:** From this list, we would perform key word optimization by identifying and adding relevant search terms for instance "best mortgage rates" or "investment options" because such a search engine would attract users looking for financial products.
- **Content marketing:** creation of informative blog posts, guides, and articles on subjects such as opening up a savings account, advice concerning investment, and how to help your readers improve their rankings with search.

- **Technical SEO:** Improving website speed, mobile-friendliness, and user experience increases both search engine rankings and customer satisfaction.
- SEO is especially effective at getting customers because it allows financial institutions the opportunity to meet an interested audience searching for banking products and services and, thus offers a cost-effective means of driving organic traffic.

Social media are a very powerful channel through which financial institutions can reach out to their customers and, by implication, promote the awareness of their services. Facebook, Instagram, Twitter, and LinkedIn constitute the tool through which mass customized communication, real-time interaction, and branding would be able to be executed. Some of the important strategies include the following:

- **Targeted Advertisement:** Using the demographic and behavioural information in more personalized advertisement campaigns targeted towards particular customer segments, such as targeting youth with student loans offers or investment products targeting middle-aged professionals. And this can include influencers in personal finance, investment, or economic analysis and, after involving them with your financial products or services, can further increase trust among followers.
- **Influencer Marketing**: Engage the personal finance influencers who could help boost credibility and reach. That includes personal finance or investment influencers, as well as any kind of economic analyst. It enhances the brand. All this would instead enhance more trust among the followers, as they would be promoting your financial products and services. All this enables social media marketing to fuel acquiring more customers and retaining the existing base, with a more personalized and effective relationship that enhances the brand.
- **E-Mail Marketing**: E-mail marketing is still the best tool for customer engagement and retention. Financial institutions use AI-driven e-mail marketing to personalize offers and updates to their customers.
- **Influencer and Viral Marketing**: Financial organizations have also incorporated influencer marketing and viral marketing campaigns in order to increase customer acquisition. Most influencers are people in finance or business fields that enlighten and promote financial products.
- **Artificial Intelligence (AI) and Chatbots**: The major breakthroughs of the financial sector firms In customer services and marketing occurred via artificial intelligence. AI and chatbots help provide better personalized support recommendations for any client at any given hour of the day.
- **Financial Education through Content Marketing:** Content marketing would mark the foundation for creating trust and demonstrating a financial institution to be a thought-leader in the market. Financial institutions could develop and distribute educational material helpful to common customer pain points, educate customers on financial products, and provide customers with insights from experts about the current prevailing market situation. Using it can be in the form of blogs, eBooks, videos, or webinars, among others.
- **Omni channel Marketing**: A good test case of the digital landscape today, they expect it to be seamless from the transaction across channels-be it the mobile application, web,

or face-to-face engagement at the branch. Omnichannel marketing describes a consistency in messaging and delivery of service across these platforms so that the customer has one experience.

4.3 Improving Customer Retention

It refers to delivering highly personalized, frictionless experiences in all digital touch points across a financial institution. Omnichannel strategies support consistent engagement through mobile applications, websites, or in-branch services. As AI-driven chatbots provide round-the-clock support and can respond to an inquiry almost instantly, overall satisfaction improves. Two notable loyalty programs and personalized offers, based on customer behaviour, help develop long-term relationships. Ongoing optimization of the customer experience by the financial institutions with data analytics and value-driven content will enhance customer loyalty, reduce churn, and build trust- the ultimate strengths in retention, especially in this competitive landscape

Digital marketing presents various opportunities for financial institutions, though there are also some challenges that need to be dealt with to ensure that maximum efforts on customer acquisition and retention are utilized. The biggest challenge that financial institutions face in the digital marketing arena is balancing personalization with data privacy. Money-raising institutions are accumulating vast amounts of customer data for person-to-person banking. The collection and secure treatment of such information is important for creating a safe environment for their customers, who have had apprehensions over the use of personal information by these institutions. If there occurs any data breach, it will be disastrous for the institutions concerned. Strict regulations like the General Data Protection Regulation and regional local data protection laws require strict compliance in handling customer data. Financial institutions should be heavily investing in robust cyber security to prevent breaches and thus avoid loss of trust. They need to be transparent about collecting, storing, and using customer data; they have to comply with legal frameworks to avoid penalties and the trust of their customers.

The speed of technological innovations is another challenge for financial institutions since new digital marketing tools and platforms are arising daily, making it challenging to catch up. Other new technologies like artificial intelligence, blockchain, and machine learning, to mention but a few, keep changing and shifting one over the other, making financial institutions have to update their own digital marketing. Another challenge is ensuring a consistent and strong digital presence. New social media sites and changes in search algorithms in search engines make it very difficult. The financial institutions must experiment with new technologies and the latest platforms to be agile in their current competitive environment.

The banking sector is quite regulated, and thus all their digital marketing has to strictly follow a number of legal and regulatory guidelines. Marketing in terms of lending, insurance, and investment products is highly regulated, so as not to be sent across to consumers misleading or false information. Financial institutions have to ensure that campaigns are always within the realms of local, national, and international regulations put up, which limits creative freedom, adding extra hurdles of legality to overcome. This complex regulatory landscape requires a thorough understanding and legal expertise, as non-compliance can lead to penalties and reputational damage.

Such an influx of financial institutions, fintech companies, and online banking platforms creates more competition in customer acquisition and retention. Digital marketing allows a smaller fintech startup to compete with a traditional bank, as it is able to provide unique solutions and personalization that a customer would not get otherwise. In short, this increased competition calls for more continuous differentiation by uniquely presented value propositions and innovative digital marketing campaigns. In addition, institutions will have to keep pace with shifting customer expectations-teach by the digital experiences provided by tech giants and fintech disruptors. Otherwise, they risk ceding market share to nimbler competitors.

One of the biggest challenges for financial institutions while using digital marketing is building trust. It is because financial services require very high trust built between an institution and its customers. Still, the convenience that digital platforms offer sometimes denies them the feeling of being personal enough to build trust like their face-to-face equivalent. Financial institutions have to find ways on how they can humanize their digital presence through personalized communication always, content customer-centric, and transparent practices in their actions. To this end, the engagement of customers in the saturated digital environment can be not easy. Financial institutions need to continue presenting value-driven content to its customers concerning their pains as well as how it would better equip them in financial literacy.

5.Results and Discussions

In the implementation of the Sugeno Ranking Fuzzy Digital Marketing (SRFDM) model for SEO in financial institutions, the results demonstrate the significant impact of incorporating fuzzy logic in ranking and optimizing SEO strategies. The fuzzy inference system successfully handled the uncertainty and imprecision inherent in SEO metrics, such as keyword relevance, content quality, and user engagement. By aggregating these inputs through the Sugeno method, the model provided a clear ranking of SEO strategies based on their predicted effectiveness. The results indicated that strategies focusing on high-quality content creation and improved user engagement consistently ranked higher, particularly when supported by targeted keyword optimization. For example, when the keyword relevance score was high, the model assigned a higher effectiveness score to content-based SEO strategies, demonstrating that content quality directly influences SEO performance in the financial sector. Similarly, strategies that emphasized technical SEO, such as improving website load speed and mobile responsiveness, also showed significant improvements in rankings, particularly when coupled with high user engagement scores.

In comparison, strategies with lower keyword relevance or engagement scores resulted in lower rankings, underscoring the importance of these factors in digital marketing success for financial institutions. Furthermore, the model’s ability to rank multiple SEO strategies allowed institutions to tailor their digital marketing approaches based on specific goals, such as improving organic search visibility, increasing web traffic, or enhancing customer acquisition. The discussion also highlighted the flexibility of the SRFDM model in adapting to different marketing goals and environmental conditions. The model’s fuzzy rules provided a robust framework for incorporating subjective expert knowledge into the decision-making process. This adaptability is particularly useful for financial institutions that need to respond quickly to market changes or customer behavior shifts.

Table 2: SRFDM Digital Marketing

Strategy No.	Keyword Relevance (X1)	Content Quality (X2)	User Engagement (X3)	Fuzzy Output (Y)	Strategy Effectiveness (Ranking)
S1	High (80%)	High (85%)	Low (25%)	55	Moderate Effectiveness
S2	High (90%)	Medium (60%)	Medium (50%)	70	High Effectiveness
S3	Medium (60%)	Medium (70%)	High (75%)	65	Moderate Effectiveness
S4	Low (40%)	High (80%)	High (80%)	68	High Effectiveness
S5	High (85%)	High (90%)	High (85%)	85	Very High Effectiveness
S6	Low (30%)	Low (40%)	Medium (55%)	42	Low Effectiveness
S7	Medium (50%)	High (80%)	Medium (60%)	65	Moderate Effectiveness
S8	High (80%)	Medium (65%)	Low (30%)	50	Moderate Effectiveness
S9	Medium (65%)	Low (45%)	High (80%)	60	Moderate Effectiveness
S10	High (95%)	High (90%)	High (95%)	90	Very High Effectiveness

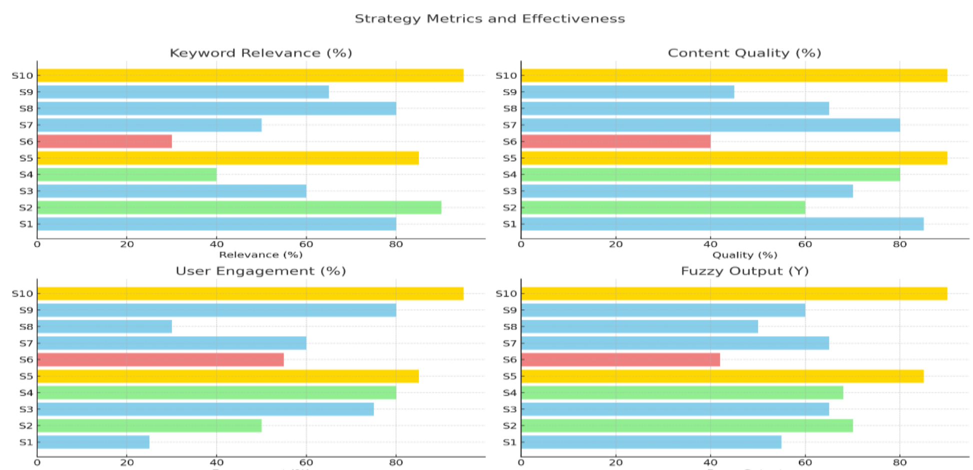

Figure 1: Digital Marketing based on SRFDM

The Figure 1 and Table 2 presents the results of the Sugeno Ranking Fuzzy Digital Marketing (SRFDM) model applied to various SEO strategies in financial institutions, providing insights into the effectiveness of each strategy based on three key factors: Keyword Relevance (X1), Content Quality (X2), and User Engagement (X3). The strategies with high scores across all three factors tend to achieve the best rankings. For instance, Strategy S5 with high keyword relevance (85%), high content quality (90%), and high user engagement (85%) produces the highest fuzzy output of 85, earning a Very High Effectiveness ranking. Similarly, Strategy S10 also ranks as Very High Effectiveness with high scores in all factors (keyword relevance: 95%, content quality: 90%, and user engagement: 95%), yielding a fuzzy output of 90. This indicates that comprehensive optimization across all dimensions (keywords, content, and user engagement) results in superior SEO effectiveness for financial institutions. On the other hand, strategies with lower scores in one or more of the input factors yield lower effectiveness rankings. For example, Strategy S6, with low keyword relevance (30%) and low content quality (40%), has a fuzzy output of 42, resulting in a Low Effectiveness ranking. This suggests that deficiencies in key areas, especially keyword relevance and content quality, significantly undermine the effectiveness of the strategy. The moderate effectiveness strategies, such as S1, S3, S7, and S9, exhibit varying combinations of keyword relevance, content quality, and user engagement, with fuzzy outputs ranging from 50 to 70. These strategies demonstrate that achieving a balance of medium or high scores in key areas can result in a moderate SEO performance, indicating room for improvement in certain aspects.

Table 3: Customer Acquisition and Retention with SRFDM

Strategy No.	**Keyword Relevance (X1)**	**Content Quality (X2)**	**User Engagement (X3)**	**Fuzzy Rule Output (R1 to R5)**	**Aggregated Output (Y)**	**Final Effectiveness (Ranking)**
S1	80 (High)	85 (High)	25 (Low)	R1: 55, R2: 65, R3: 50, R4: 40, R5: 60	55	Moderate Effectiveness
S2	90 (High)	60 (Medium)	50 (Medium)	R1: 70, R2: 80, R3: 60, R4: 50, R5: 75	70	High Effectiveness
S3	60 (Medium)	70 (Medium)	75 (High)	R1: 65, R2: 70, R3: 80, R4: 60, R5: 70	70	High Effectiveness
S4	40 (Low)	80 (High)	80 (High)	R1: 50, R2: 65, R3: 60, R4: 75, R5: 70	65	High Effectiveness
S5	85 (High)	90 (High)	85 (High)	R1: 80,	85	Very High

				R2: 85, R3: 90, R4: 85, R5: 95		Effectiveness
S6	30 (Low)	40 (Low)	55 (Medium)	R1: 30, R2: 40, R3: 50, R4: 45, R5: 35	42	Low Effectiveness
S7	50 (Medium)	80 (High)	60 (Medium)	R1: 60, R2: 70, R3: 65, R4: 75, R5: 70	70	High Effectiveness
S8	80 (High)	65 (Medium)	30 (Low)	R1: 55, R2: 65, R3: 60, R4: 50, R5: 55	55	Moderate Effectiveness
S9	65 (Medium)	45 (Low)	80 (High)	R1: 60, R2: 55, R3: 70, R4: 80, R5: 75	65	Moderate Effectiveness
S10	95 (High)	90 (High)	95 (High)	R1: 85, R2: 90, R3: 95, R4: 95, R5: 90	90	Very High Effectiveness

Table 3 presents the results of the Sugeno Ranking Fuzzy Digital Marketing (SRFDM) model applied to customer acquisition and retention strategies in digital marketing for financial institutions. The table evaluates the effectiveness of each strategy based on three key factors: Keyword Relevance (X1), Content Quality (X2), and User Engagement (X3), with fuzzy rule outputs (R1 to R5) calculated for each strategy. The strategies with high keyword relevance, high content quality, and high user engagement consistently perform well in terms of effectiveness. For instance, Strategy S5, with high scores across all three factors (keyword relevance: 85%, content quality: 90%, and user engagement: 85%), produces fuzzy rule outputs of 80, 85, 90, 85, 95, resulting in an aggregated output of 85 and a Very High Effectiveness ranking. This indicates that the optimal combination of high-quality factors results in exceptional customer acquisition and retention performance. Similarly, Strategy S10 ranks with Very High Effectiveness (90) due to its outstanding scores in keyword relevance (95%), content quality (90%), and user engagement (95%). This strategy's fuzzy rule outputs (R1 to R5) range from 85 to 95, contributing to its high aggregated output and the highest possible ranking. On the other hand, strategies with lower scores in any of the key factors yield less favorable results. For example, Strategy S6, with low keyword relevance (30%) and low content quality (40%), produces fuzzy rule outputs of 30, 40, 50, 45, 35, leading to an aggregated output of 42 and a Low Effectiveness ranking. This indicates that deficiencies in multiple areas significantly reduce the effectiveness of the strategy in terms of customer acquisition and retention. he high effectiveness strategies, such as S2, S3, S4, S7, demonstrate that moderate to high scores across the three factors can result in strong performance. These strategies, with aggregated outputs ranging from 65 to 70, rank as High Effectiveness, indicating that while they are effective, they still leave room for improvement in specific areas to reach the highest level of effectiveness.

6.Conclusion

In the era of digit, financial institutions need to employ adaptive and personalized digital marketing strategies to acquire the right set of customers and hold onto them. Institutions can use a mix of SEO, social media, email marketing, and increasingly applications of AI-driven solutions to target campaigns that are value-driven and increase customer engagement towards developing lifelong loyalty. However big the challenge of data privacy, regulatory compliance, and increased competition in dealing with variables may be, these are among the factors that keep these efforts evolving in the digital landscape. Financial institutions that constantly innovate, embrace new technologies, and remain confident in the eyes of their customers will likely be highly successful in this fast-changing market. Bottom Line Digital marketing strategies are not just growth tools but rather critical constituents for relevance and purposeful, meaningful relationships with customers in the financial services arena. This paper presents a novel Sugeno Ranking Fuzzy Digital Marketing (SRFDM) model for evaluating the effectiveness of digital marketing strategies in financial institutions, with a focus on customer acquisition and retention. Through the integration of fuzzy logic, the model assesses three critical factors—Keyword Relevance, Content Quality, and User Engagement—to determine the overall effectiveness of various digital marketing strategies. The findings demonstrate that strategies with high levels of keyword relevance, content quality, and user engagement consistently achieve superior rankings in terms of effectiveness, ultimately leading to very high effectiveness in customer acquisition and retention. The results emphasize the importance of balancing these key factors to optimize digital marketing outcomes. Specifically, the paper highlights that low user engagement or poor content quality can significantly hinder the success of digital marketing campaigns, even if other factors are strong. Therefore, financial institutions aiming to enhance their digital marketing strategies must prioritize engagement-driven content and relevant keywords to improve overall effectiveness.

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