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Training on the Use of 3D Printing-Based Dummy Cakes and NFC as an Innovative Product Display at UKM Rayu Manis

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ABSTRACT

Culinary SMEs have a significant contribution to national economic growth but still face challenges in marketing, particularly due to limited display space and insufficient provision of transparent product information. This community service program was carried out with UKM Rayu Manis through training on the use of 3D printing technology to produce dummy cakes and the integration of Near Field Communication (NFC) as an interactive medium for product information delivery. The method involved preparation, implementation, and evaluation stages, engaging owners and staff in practical training sessions. The results showed the creation of 10 PLA-based dummy cakes, with 7 units successfully equipped with NFC chips containing digital product information. The application of this innovation not only provides a more attractive and durable display alternative but also enhances information transparency and consumer interactive experience. Evaluation results indicated an average training score of 4.59, demonstrating high effectiveness in improving partner competence. Overall, this activity has proven relevant in strengthening digital marketing strategies, enhancing product display appeal, and supporting the competitiveness of culinary SMEs in the creative industry era.

Keywords: *Culinary SMEs, 3D printing, dummy cake, Near Field Communication (NFC), digital marketing, community service*

1. INTRODUCTION

Culinary SMEs in Indonesia play a crucial role in promoting national economic growth, not only through job creation but also by strengthening the local economic base and supporting community food security **(Arwani et al., 2023)**. Data from the Ministry of Cooperatives and SMEs shows that the SME sector, including culinary SMEs, contributes over 60% to the national Gross Domestic Product (GDP) and absorbs the majority of the workforce in Indonesia **(Kementerian Usaha Mikro Kecil dan Menengah Republik Indonesia, 2025)**.

One of the challenges faced is the limited display space and the need for detailed product information for consumers. Despite their potential, culinary SMEs often encounter various constraints, especially in marketing and product display strategies. A key limitation is the restricted display area, making it difficult to arrange products attractively, along with a lack of innovative presentation media to capture consumer attention. Additionally, the need for detailed product information, such as ingredients, nutritional content, and food safety certifications, is often not optimally fulfilled. This condition impacts the competitiveness of culinary SMEs amid increasing market competition and consumer trends demanding greater information transparency **(Azis et al., 2025)**.

Technological innovation can be an effective strategy to overcome the limitations faced by small and medium enterprises in promoting and marketing their products **(Rivaldi et al., 2024)**. The use of 3D printing technology allows the creation of dummy cakes or food replicas resembling the actual product, with advantages in durability, cost-efficiency of display production, and design flexibility to match branding needs **(Manivelkumar & Kalpana, 2025)**. By using dummy cakes, businesses no longer need to display perishable food products, thereby improving product visualization effectiveness in various promotional media and exhibitions.

Meanwhile, the integration of Near Field Communication (NFC) technology enhances interactive experiences for consumers **(Razak et al., 2024)**. With a simple touch on a smartphone, customers can access various product information, from ingredients, nutritional content, halal certification, to creative serving recommendations **(Yesmaya & Darmawan, 2013)**. NFC implementation not only increases product information transparency but also builds consumer trust and strengthens digital marketing strategies. Combining 3D printing and NFC innovations offers the potential for more modern, interactive, and adaptive marketing solutions in the creative and culinary industry **(Azhar et al., 2025)**.

UKM Rayu Manis, as the program partner, has great potential in developing healthy food products but still faces several marketing challenges. One major constraint is the limited storage facility (chiller), making it impossible to display products in large quantities or for extended periods. This condition results in less attractive product displays and reduced market competitiveness. Additionally, the need for clear product information, such as nutritional content, ingredients, and healthy product advantages, has not been fully met, while transparency is crucial in building consumer trust **(Melania & Handayani, 2023).**

To address these issues, training on the use of 3D printing-based dummy cakes and NFC integration was implemented as an innovative solution. 3D printing-based dummy cakes provide replicas resembling the original product with greater durability, making them more effective for promotional displays without requiring refrigerated storage **(Ramadhan et al., 2025)**. Meanwhile, NFC allows consumers to access detailed product information simply by tapping their smartphone on the display, supporting information transparency and enhancing interactive consumer experiences **(Simanjuntak et al., 2018)**. With this technological combination, it is expected that UKM Rayu Manis can enhance product display appeal, accelerate service, and strengthen adaptive digital marketing strategies in the creative industry era **(Hidayatulloh et al., 2025).**

2. METHOD

The program was structured to address partner issues while achieving the set objectives. The method was divided into several main stages: preparation, implementation, and evaluation **(Musbani, 2019)**, as illustrated in Figure 1.

Figure 1. Implementation Method

2.1. Preparation Stage

The initial stage began with surveys and observations at UKM Rayu Manis to identify partner problems and needs **(Kustanto et al., 2025)**. Key issues identified were limited product display space, the need for more attractive displays, and insufficient consumer education media.

Based on the results of the field survey and direct observations, the next stage involved producing dummy models of the food items that required improved display visibility and clearer consumer education as illustrate in Figure 2. The production process began with the development of 3D digital models for several selected products. Once the digital models were completed, they were printed using a 3D printer with a hollow-printing technique to create an internal cavity within the dummy. After the printing process, each dummy underwent a painting and finishing stage using an airbrush to achieve a realistic appearance that closely resembled the original product. When the surface finishing was completed, an NFC chip was embedded inside the hollow cavity of the printed dummy.

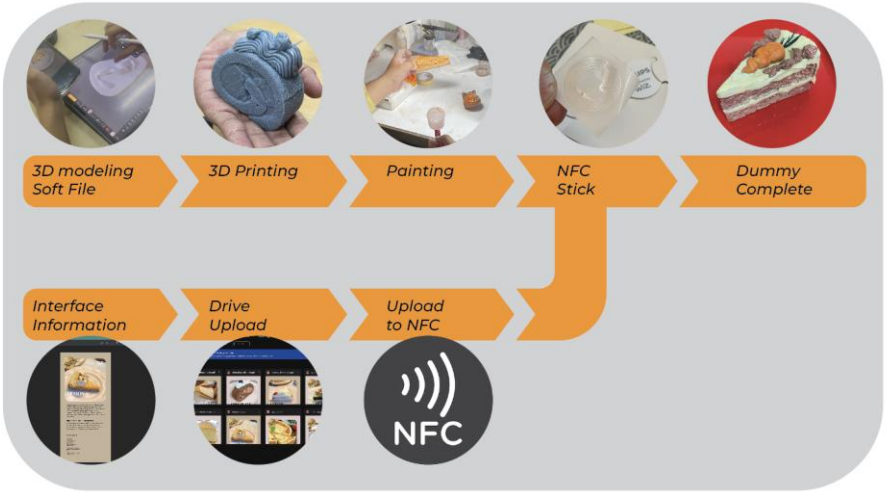

Figure 2. Preparation Step

In parallel with the 3D modeling and printing process, a digital interface was developed to present essential product information accessible via smartphone, including product name, ingredients, storage instructions, and serving recommendations. This digital information was

then programmed into the NFC chip using NFC-authoring software, enabling the dummy to function as an interactive educational display. Through this integrated approach, the dummy models provide both visual representation and instant digital information, enhancing consumer understanding while supporting the operational needs of the small-scale food enterprise.

2.2. Implementation Stage

The implementation stage involved mentoring and training designed according to UKM Rayu Manis' needs **(Wibowo et al., 2022)**. Activities focused on 3D printing, dummy cakes, and NFC as product display innovations. Training was conducted over three consecutive days, 16–18 September 2025, with experts in relevant fields. Twelve participants, including owners and staff, attended the sessions.

Training consisted of three main activities:

a. Dummy and NFC Usage Training
Held on 16 September 2025 by Miftahul Adi Suminto, S.Sn., M.Med.Kom., covering dummy creation principles, NFC chip installation, and simulation on displays.

b. NFC Infographic Content Update Training
Held on 17 September 2025 by Yudha Delonix Renzina, S.T., M.Sn., covering digital content management, infographic updates, and educational video creation.

c. Digital Marketing Training
Held on 18 September 2025 by Hariadi Yutanto, S.Kom., M.Kom., focusing on branding strategies, social media management, and promotional content creation using digital design applications.

The training was designed to provide participants not only with theoretical understanding but also practical experience through direct simulation, enabling optimal application in enhancing UKM Rayu Manis' competitiveness.

2.3. Evaluaton Stage

In the third stage, the team conducted an evaluation by trialing the dummy cakes and NFC technology directly at UKM Rayu Manis. This provided partners and customers the opportunity to experience the benefits of the implemented innovations **(Maulidia et al., 2024)**. Evaluated indicators included customer response to dummy cake displays and digital information via NFC, service efficiency before and after technology implementation, and staff understanding in managing and updating NFC content. Feedback was also collected through open discussions and assessment forms, serving as guidance to analyze program strengths, weaknesses, and improvement potential.

3. RESULT AND DISCUSSION

The activity began with a survey and observation at UMKM Rayu Manis to gather information and identify the problems faced by the partner as shown in figure 3. This stage involved the owner and staff of the UMKM as the main sources of information. The results revealed that UMKM Rayu Manis encountered limitations in displaying its healthy food products, as they could only be showcased in limited quantities depending on the availability of chillers. In addition, information regarding nutritional content, raw materials, and product advantages had not been optimally conveyed to consumers. These limitations became obstacles in efforts to expand market reach and strengthen product image. Therefore, the partner requires a solution in the form of alternative display media and more interactive strategies for delivering information to consumers.

Figure 3. Observation Activity at UMKM Rayu Manis

The community service program was carried out in two main stages. The first stage (Figure 4) consisted of training delivered by the resource persons to the participants. At this stage, the trainers provided materials and skills tailored to the partner's needs, such as creating dummy cakes using 3D printing technology, utilizing NFC chips, and applying digital marketing strategies. This material was expected to enhance the knowledge and skills of the UMKM Rayu Manis staff in managing product promotion. The second stage was the evaluation of the program, aimed at assessing the effectiveness of the training implementation as well as measuring the participants' understanding and responses to the materials provided. The evaluation was conducted through product trials, discussions, and feedback from participants to obtain valuable insights for the program's sustainability.

The training program began with an opening session marked by a welcoming speech from UMKM Rayu Manis as the partner of the activity. The speech expressed gratitude for the support provided through the community service program and conveyed hopes that the training would help improve the competitiveness of the business. In addition, a speech was also delivered by the head of the community service team as the representative of the organizers. On this occasion, the team leader explained the objectives of the activity, the implementation stages, and the expected benefits of the program.

The training materials were delivered under the direct guidance of lecturers and students, combined with practical activities to strengthen participants' understanding. The first material provided was training on creating dummy cakes using 3D printing technology. In this session, participants were introduced to the digital design process, the operation of 3D printing machines, and the product finishing stage. Participants not only received theoretical explanations but also had the opportunity to directly observe the dummy cake printing process. The outcome of this activity was the creation of 10 dummy cake units made of PLA, with 7 units successfully printed and equipped with NFC chips, while the remaining 3 units were still in the finishing stage. These dummy cake products provide a more durable and cost-efficient display alternative that does not rely on cold storage facilities. To strengthen understanding, participants were also involved in the practice of installing NFC chips on the dummy cakes, enabling them to comprehend the integration process between physical technology (dummy cakes) and digital media (NFC).

Figure 4. Training on the Use of Dummy Cakes and NFC

The second material delivered was training on the integration of Near Field Communication (NFC) technology to support digital marketing strategies. In this session, participants were introduced to the programming of NFC chips to display product information in the form of infographics or educational videos, which consumers could access simply by tapping their smartphones on the dummy cake. Participants were taught the basic steps for linking NFC chips with digital content, starting from data input, link configuration, to access testing through mobile devices (Figure 5).

Figure 5. Training on Replacing Infographic Content on NFC

In addition, participants were also trained to independently update and customize NFC content so that product information could be adjusted according to evolving promotional needs. Thus, the final outcome of this stage was an interactive medium in the form of a dummy cake equipped with an NFC chip, through which the process of delivering product information became more practical, innovative, and modern compared to conventional promotional methods.

This training aimed to equip participants with the skills to utilize NFC as a medium for marketing communication, while also understanding the potential of the latest technology to enhance the appeal and interactivity of healthy culinary product promotion. Through hands-on practice, participants were expected to master the steps of NFC integration, ranging from programming and content management to its implementation in digital marketing strategies.

Figure 6. Digital Marketing Training

The final stage of this community service activity was mentoring in social media management as part of the digital marketing strategy (Figure 6). In this session, participants were guided to integrate the use of 3D printing–based dummy cakes and NFC chips with digital campaigns through social media. Through hands-on practice, the staff of UMKM Rayu Manis were trained to create promotional content, update materials on the NFC chips, and integrate them into a more interactive and modern communication strategy.

1.Dummy Cake Product 2. NFC Simulation 3. NFC Display

Figure 7. Dummy Cake Products Integrated with NFC Technology

Figure 7 part 1 presents the production results of 3D printing–based dummy cakes in various cake slice shapes. These products serve as an alternative display that is more durable, cost-efficient, and resembles the appearance of real food, thereby attracting consumer attention. Furthermore, Figure 7 part 2 illustrates the simulation of Near Field Communication (NFC) technology usage, namely the interaction process between a smartphone and a dummy cake

embedded with an NFC chip. Through this simulation, consumers can directly access digital product information simply by tapping their devices. Meanwhile, Figure 7 part 3 shows the display of digital content accessed via NFC on a smartphone screen. The information presented includes product descriptions, raw materials, advantages, and promotional content that can support the digital marketing strategy of UMKM Rayu Manis.

The output of this mentoring activity was the increased independence of the partner in continuously updating product information and producing more innovative promotional strategies. The initial consumer responses tested with the dummy cake showed positive results; customers felt more attracted to the product's realistic appearance and found it easier to understand the information through the NFC media.

At the end of the mentoring, participants were also asked to complete a training evaluation form to provide feedback regarding the effectiveness of the methods and materials delivered. This evaluation process aimed to assess the quality of delivery, the relevance of the material, and the practical benefits gained by the participants. The evaluation results, as shown in Figure 8, indicate that overall, the training received very good ratings from the participants. This is reflected in the average scores above 4.59 across all assessment aspects, with the highest score of 4.90 for the aspect of satisfaction with material delivery and the lowest score of 4.36 for the availability of exercises or examples.

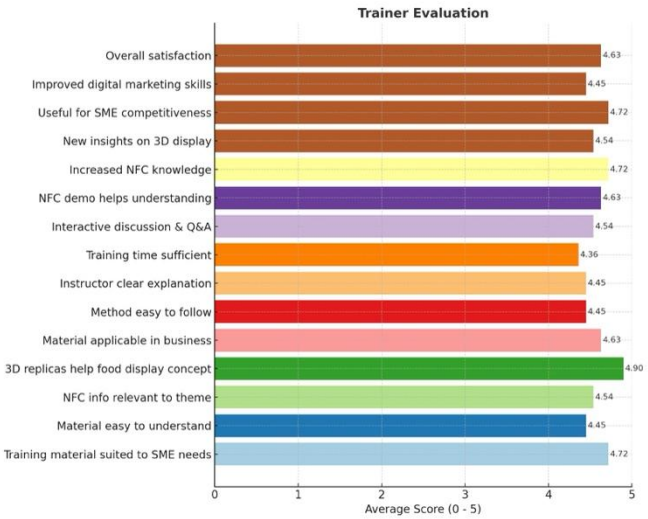

Figure 8. Training Resource Person Evaluation Data

Overall, the average evaluation score was 4.59, indicating that this community service activity was highly effective in improving the partner's competence. The innovation through 3D printing–based dummy cakes and NFC integration has proven to be a creative solution that addresses the limitation of display space while simultaneously strengthening the image and branding of UMKM Rayu Manis in the digital era.

In the aspect related to the use of the dummy cakes, participants assigned a high score to the item *"3D replicas help food display concept"* with a value of 4.90. This indicates that the cake replicas play a significant role in enhancing the visual quality of the product display, enabling customers to better understand the shape and characteristics of the products without requiring the actual cakes to be removed from the chiller. This effect not only improves the aesthetic appeal of the display but also increases operational efficiency, as staff can provide explanations more quickly and no longer need to perform time-consuming physical demonstrations. Initial field measurements showed a reduction in service duration from an average of 5 minutes to 3–4 minutes, representing an efficiency improvement of approximately 20–30%.

Conversely, the NFC application contributes primarily to enhancing customer comprehension and the quality of information delivery. The evaluation scores for *"NFC demo helps understanding"* (4.63) and *"NFC info relevant to theme"* (4.54) indicate that the technology is capable of presenting information in a more structured and accessible manner. Its impact is evident in the improved clarity of communication between staff and customers, particularly for new buyers who require detailed explanations about ingredients, storage, and serving procedures. Through NFC, customers can access information directly via their smartphones, reducing the potential for miscommunication and accelerating the educational process. Beyond improving service quality, the use of NFC also strengthens Rayu Manis' image as an SME that is adaptive to digital technologies.

4. CONCLUSIONS

The community service program in the form of training on the use of 3D printing–based dummy cakes and NFC integration at UMKM Rayu Manis has provided significant benefits for the partner. Through this training, the UMKM staff acquired practical skills in arranging product displays more professionally, integrating NFC technology for interactive information delivery, and utilizing more effective digital marketing strategies. These skills enable the UMKM to produce product innovations that not only attract consumer attention but also add value to the customer experience.

The evaluation results of the training activities showed excellent achievements, with an average score of 4.59. This feedback indicates that participants not only understood the material but were also able to independently apply the technology that had been taught. In general, this activity was relevant in providing practical skills that can be immediately utilized by the partner to strengthen branding, enhance product appeal, and expand marketing reach. With these skills, UMKM Rayu Manis can not only increase creativity in promotion but also gain higher competitiveness amid the healthy culinary industry competition.

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We also extend our respect and appreciation to our partner, UMKM Rayu Manis, for their active participation and collaboration during the activity. It is our hope that this collaboration will continue and bring long-term benefits for business development and the enhancement of the partner's competitiveness in the future.

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