Designing a Public API-Based Order Delivery Service System for the Food and Beverage Industry

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ABSTRACT

The food and beverage (F&B) industry aims to satisfy customers' needs by providing food and beverages while continuously developing creative and innovative steps to stay competitive. However, the COVID-19 pandemic has had a detrimental impact on the industry's survival, with a reduction of more than one-third of their daily income. One reason for this decline is the decreased interest of customers to dine in restaurants. To mitigate further losses, the F&B industry must innovate its services to meet the needs of customers who prefer to enjoy food at home or work. Delivery service is a critical aspect that must be developed, and adopting the appropriate information technology (IT) for service delivery automation can provide an economical solution and added value to the F&B industry. This study proposes using public APIs to support and enhance the F&B industry's delivery service system. Specifically, the WhatsApp API is selected to automatically notify drivers to process deliveries. This paper presents the design of a public API-based order delivery service system for the F&B industry that can be integrated with existing systems.

1. INTRODUCTION

The COVID-19 pandemic has had a profound impact on various industries in Indonesia, including the food and beverage (F&B) industry, services, and retail. In particular, the hotel and food services industry experienced a significant decline of 53% in employment between February and April 2020 [1]. Similarly, the F&B industries in China and India also suffered losses, including declines in businesses, revenue growth, total profit growth, gross value added, and export value growth during 2019-2020 [2]. Moka, a digital cashier service startup operating in Indonesia, provided internal data showing that the most significant impact of the pandemic on the F&B industry is the decline in daily income. Their observations in 17 cities across Indonesia revealed that 13 cities experienced a substantial decrease in daily income, including Bandung [3, 4]. This decline is attributed to a shift in consumer behavior, with people preferring to eat at home rather than dine in restaurants, cafes, coffee shops, or bars/lounges [4, 5]. This shift in behavior is a reaction to the government's program to curb the spread of COVID-19, such as the Large-Scale Social Restrictions (PSBB), which limit social interaction in the community [6].

Burhan's research [7] found that the culinary sector experienced a substantial decline of 37% in daily income during the pandemic. Aside from the financial impact, the pandemic has also disrupted supply chain operations, sustainable economic growth, and supply chain environmental performance in the F&B industry [8-12]. Therefore, it is crucial to identify the challenges faced by the industry and explore potential strategies to mitigate these challenges [13]. One approach is to leverage information technology (IT) to enhance services in the F&B industry. Public Application Programming Interfaces (APIs) have been developed by service developers to automate services in the F&B industry. These APIs can be integrated with other technologies, such as web or mobile applications, to automate the delivery service system.

This study focuses on designing an order delivery service system using public API in the F&B industry during and post-pandemic. This approach has not been comprehensively examined in previous research, making this study significant.

The delivery service system is a critical component for boosting sales in the F&B industry during the COVID-19 pandemic [14, 15]. Online F&B delivery is a sustainable strategy for improving food supply chains, as shown in Figure 1. This study aims to fill a research gap by focusing on a specific area, namely the F&B industry players around the Telkom University campus who need to survive and compete during the pandemic and post-pandemic period. To overcome the common issues faced by these players, the study proposes the design of an Order Delivery Service System for F&B using Public API, which leverages the academic community's high level of IT proficiency and can provide accurate information on delivery times for both the F&B industry and customers.

The DKampus service design was developed to meet clients' requests by partnering with MSMEs. Software developers can use this service design as a roadmap to create a service system that is compatible with third-party services such as Google Maps and WhatsApp.

This paper is structured as follows. Firstly, the literature review covers the F&B industry's specific areas. Secondly, the research methodology is explained based on the Service Engineering Framework. The third section presents the study's findings. Finally, the study concludes by outlining its limitations and suggesting directions for future research.
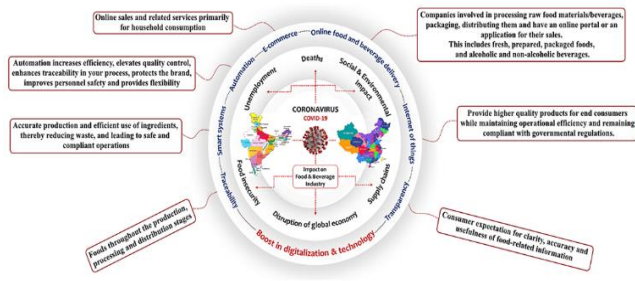
Figure 1. Graphical abstract on investigation of COVID-19 impact on the food and beverages industry: China and India perspective [2]

2. LITERATURE REVIEW

The following are supporting theories for research related to the service blueprint for delivery order services using public API in the F&B industry.

2.1 Food and beverage industry

In today's world, the food and beverage service industry has grown a lot. It has spread to all walks of life, from hotels, restaurants, industrial canteens, hospital canteens, trains, and airways; all are now part of the food & beverage service industry. The basic function of this industry is to serve food & beverage to people to fulfill their various types of needs. The main goal is to achieve customer satisfaction. The needs of the customer that it might try to satisfy are [16]:
1) Physiological: special dietary needs;
2) Economy: the need for the best value for the price paid;
3) Social: a friendly atmosphere, frankly expressing feelings;
4) Psychological: the need to increase self-esteem;
5) Comfort: the desire of others to do the work.

This need plays a large role in determining factors and is responsible for determining the various types of service methods in the food & beverage service industry [16].

In the food and beverage industry, customer satisfaction is the main concern. One way to increase customer satisfaction is by utilizing delivery services. The food and beverage industry are one of the industries that has been able to survive in the midst of the Covid-19 pandemic. The growth of the food and beverage industry has consistently increased since the second quarter of 2020, as can be seen in Figure 2.

2.2 Food and beverage (F&B) online

Food and Beverage Online refers to the process by which food ordered online is prepared and delivered to consumers. The development of online F&B is supported by the development of integrated online F&B platforms, such as Uber eats, Deliveroo, Swiggy, and Meituan. The online F&B platform serves a variety of functions, including providing consumers with various food choices, taking orders and relaying these orders to food manufacturers, monitoring payments, organization of food delivery, and providing tracking facilities, as can be seen in Figure 2 [17]. A food delivery app works within the wider Online (F&B) context
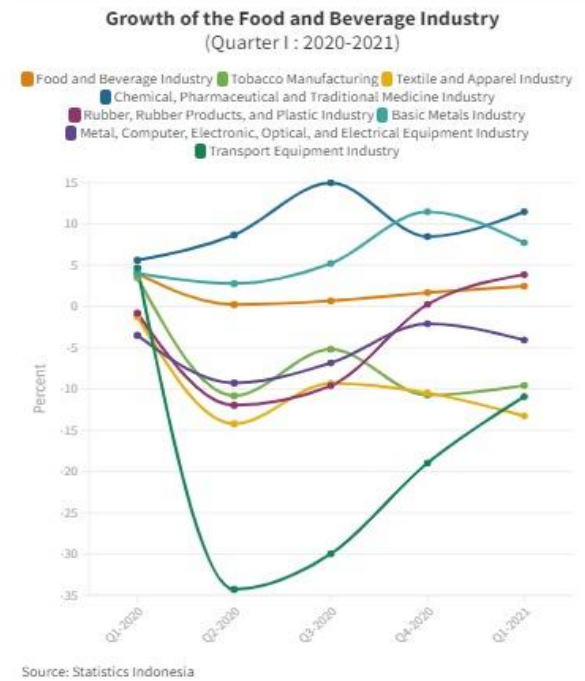
as it allows ordering food via a mobile app [18].

Figure 2. The growth of the processing and food-beverage industry [19]
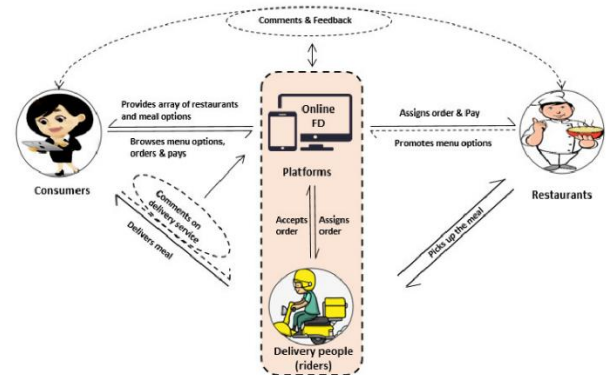

Figure 3. The functions associated with online food delivery (FD) platforms [17]

Food delivery service providers can be categorized as Restaurant-to-Consumer Delivery or Platform-to-Consumer Delivery activities as shown in Figure 3. Restaurant-to-Consumer Delivery providers make food and deliver it, as denoted by providers such as KFC, McDonald's, and Domino's. Orders can be made directly through the restaurant's online platform or through a third-party platform [17].

Another study by Shankar et al. [20] in the paper "Online food delivery: A systematic synthesis of literature and a framework development" shows that there are four interrelated segments when discussing research related to "food delivery." The first segment is related to the concept of 'consumer,' which consists of consumer-related words, such as emotion, trust, engagement, hedonic, awareness, and engagement. The second segment relates to the concept of 'technology' which consists of technology-related words, such as mobile phones, telephones, devices, acceptance, and innovation. The third group focused on the concept of

'intention,' which consists of attributes of consumer behavior, such as willingness, attitude, usefulness, convenience, effort, performance, and relationship. The fourth segment focuses on the concept of 'service,' which consists of words related to satisfaction with food delivery services, such as satisfaction, expectation, and friendliness [20]. Thus, the similarity analysis shows that in food delivery service research, there are various concepts that need to be considered, such as consumer aspects, technology acceptance, service-related problems, and purchase intentions as shown in Figure 4.
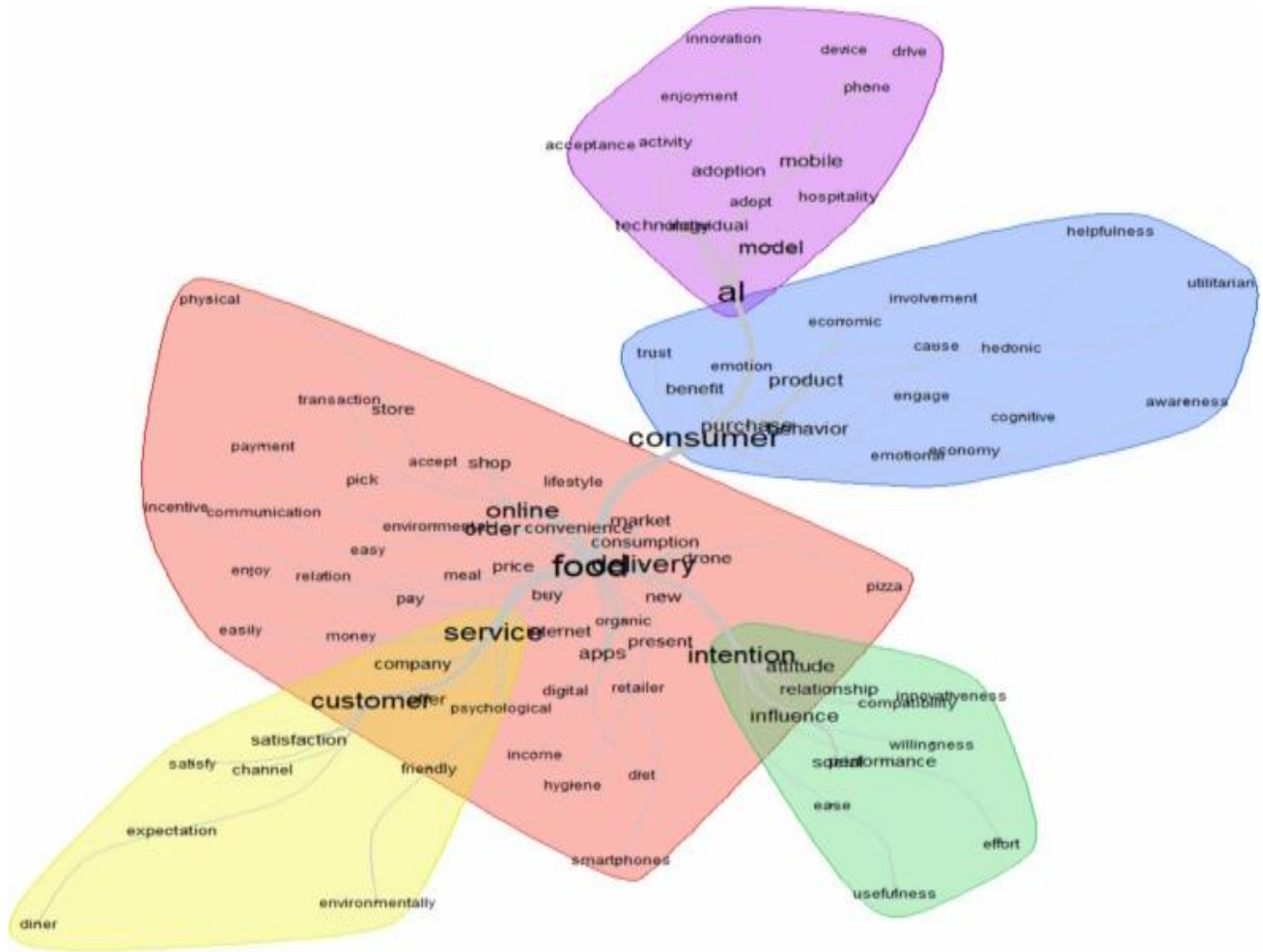

Figure 4. Similarity analysis using the word "food delivery" [20]

2.3 Process automation using chatbot

The adoption of IT to support service automation has become part of the business process in the F&B industry. According to a survey conducted in the study [21], the existence of food delivery services has succeeded in increasing the productivity and effectiveness of customers in their daily lives. As a complement, customers expect convenience in learning and using applications that are equipped with delivery services. Built an application based on Android-based mobile technology to help make it easier for restaurant owners to manage orders made by buyers. The resulting application is equipped with an order delivery service but is not equipped with information on estimated delivery times.

Improving service quality in the F&B industry using IT can be done through the use of chatbots. The F&B industry should consider incorporating chatbots into its business processes so as to reduce labor costs and errors caused by human negligence [22]. Chatbots to support automating the delivery of delivery time information on order delivery services can be built using the public API provided by

WhatsApp. WhatsApp, as a chat application, can find two or more entities through text, offering more advanced features in the form of providing features such as responding to questions sent by users [23] with answers that have been provided according to certain patterns. WhatsApp bots can work automatically to send text messages to customers, recognize commands and execute them. Moreover, it can be set to configure various needs, such as delivery times and updating lists via the command line [24]. Another advantage of using a chatbot is its ability to operate at any time as long as the server is active, so users can freely get the information they need immediately [25]. Chatbot systems can be developed with various programming languages, such as Python [24, 26], and Node JS [25]. Using the public API made available by WhatsApp, it is possible to create chatbots that can assist in the automation of the provision of delivery time information on order delivery services.

3. RESEARCH METHODOLOGY

The research method used to guide the research is the

Service Engineering Framework [27]. This research method consists of 4 stages, as presented in Figure 5, where the two initial stages in the method are used in this study. Identification is the initial stage of service system development. To determine business service requirements, this stage entails an examination of the organization's issues and opportunities for the application of advanced technology. In addition, the service design stage specifies the business service requirements within the context of information technology, which serves as the foundation for the developing of an IT service system.
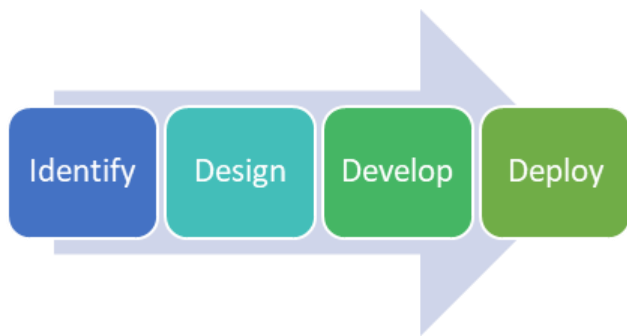

Figure 5. Stages in the service engineering framework

The research begins with identifying potential services that can increase the value of B&F industry players, designing services with a service process design approach and Service-Oriented Architecture (SOA) design, building and testing prototypes, and finally deploying prototypes in the operational environment.

4. RESULT

4.1 Identification of system requirements

Dcreative Indonesia is a delivery service that comes with a mission to help activists of Micro, Small, and Medium Enterprises (MSMEs) and the younger generation to increase the profits of the businesses they run. The presence of Creative Indonesia since 2021 cannot be separated from the impact of COVID-19, which has disrupted MSME activities in marketing their products. Large-Scale Social Restrictions (PSBB) and various other restrictions make it difficult for customers to move towards MSMEs to carry out the buying and selling process. MSMEs are also constrained by limited marketing and promotions, so they cannot bring their products closer to customers. On the other hand, the real impact of the COVID-19 pandemic has also been felt by transportation media, one of which is motorcycle taxis. Restrictions on the mobilization of people have significantly reduced the income of motorcycle taxis [28]. Based on these conditions, Creative Indonesia presents solutions through the provision of promotion and branding for local MSMEs, digital marketing of MSME products with the shop marketplace, and the provision of delivery services for product delivery.

In line with its business development, Dcreative Indonesia plans to open DKampus services in 2022. DKampus services facilitate delivery services for areas around the Telkom University campus through collaboration with MSMEs as partners and the academic community as customers.

To support the business run by Dcreative Indonesia, a business model has been compiled as outlined in the Business Model Canvas, as shown in Figure 6.

Figure 6. Dkampus business model

The value to be achieved in DKampus services is to facilitate the process of monitoring orders by customers, facilitate the process of taking orders by drivers, and transparency. Order delivery recapitulation. The DKampus service targets the Telkom University academic community as the main customer who will use the delivery service, while the Partner/MSME acts as the main supplier of products that can be ordered by the customer and the driver as a partner in delivering the order. DKampus services are supported by providing channels that can be accessed by customers and partners through 3 (three) alternative technologies, namely: web-based applications, mobile platform-based applications, and social media. Through the provided channel, customers will pay for services in accordance with the order transactions made and get various discounts and rewards offered by suppliers. To provide support for operational processes, administrative staff or customer service are provided who are connected through an information system to help resolve problems related to product ordering and order delivery, which are the main activities of DKampus services. DKampus services target revenue from 3 (three) sources, namely: commissions from Partners/MSMEs, commissions from couriers, and consumer handling fees. At the same time, the expenses that must be borne by DKampus services include the cost of subscribing to hosting information systems, employee salaries, and maintenance costs for developing information systems.

4.2 Service system design

Analysis of system requirements that have been modeled using the Business Model Canvas, as presented in Figure 6, becomes the main basis for designing the right service system for DKampus. In service system design, it is important to describe the relationship between service components involved in a system. By using the service blueprint, the steps or sequence of actions taken by the customer in a service process can be visualized so that it is easy to understand.

Service blueprints make it possible to help organizations explain the design of a service and ultimately improve the processes it runs and provide a more enjoyable and memorable customer experience.

Figure 7 describes the delivery order service design, which is the main service at DKampus. In Figure 7, it can be illustrated that the main media used to support interaction between the customer and the delivery order service is the website. The delivery order service begins with Customer activities accessing the DKampus website. Through the website, customers can view categories and products, select products to order, determine the quantity of each product item purchased, monitor the order delivery process, and validate order receipts. To support the presentation of product catalogues and categories, a system is provided that has the ability to manage products offered by Partners/MSMEs. When the customer confirms the order (checkout), the system will calculate the amount of the bill charged to the order. The bill charged is the accumulation of the total price of the product purchased plus customer handling fees. Furthermore, the order information will be forwarded to the Driver via text message using WhatsApp. Through this message, the Driver can confirm to make delivery of the order. The customer can monitor the order delivery process using the website after the driver confirms the order delivery. After the order is received, the customer must provide confirmation so that the entire series of delivery order services can be declared complete.

As a service-oriented solution, DKampus services utilize various web services provided by third parties and can be used on a subscription basis. Google maps and WhatsApp were chosen as service providers that used on-campus services to support the calculation of the distance between the Customer and Partners/MSMEs, as well as broadcast notifications to Drivers when there are orders that must be delivered. In simple terms, the communication between DKampus services with Google maps and WhatsApp is presented in Figure 8.
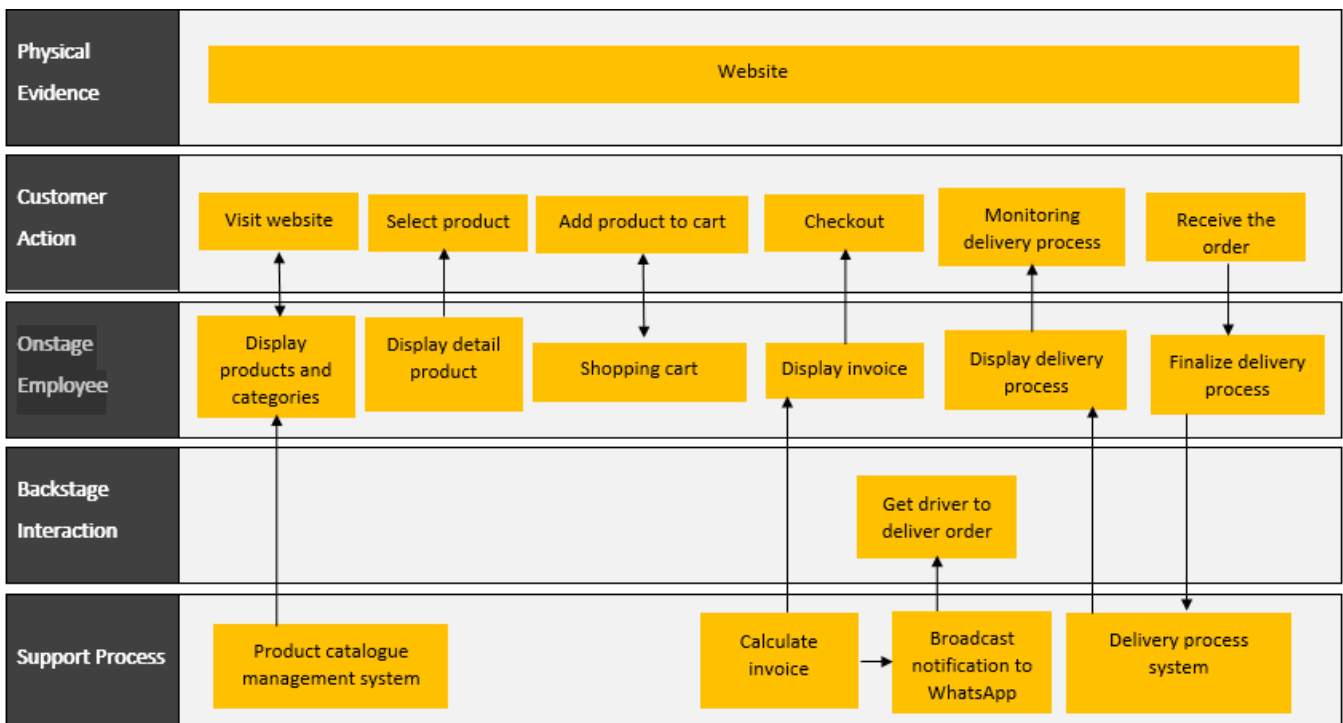

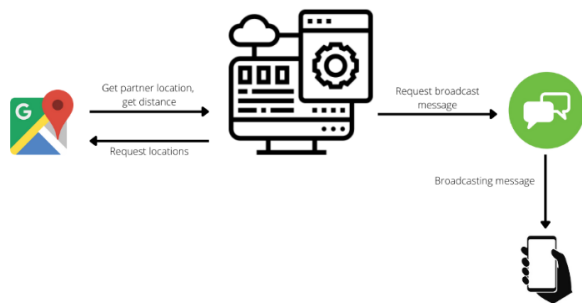**Figure 7.** Blueprint of delivery order service Dkampus

Figure 8. Dkampus service communication architecture with third-party service providers

DKampus service uses Google maps service to make it easier for Partners/MSMEs to fill in the location data (longitude and latitude) of their business. By using the Google maps service, users can more easily enter location data by simply pointing at the ordinates according to the points indicated on the digital map. The Google maps service is also used to calculate the distance for delivery when a customer places an order for products from partners/SMEs. The location of the customer shown on the map can also make it easier for the driver to go to the delivery location. In addition to using the Google maps service, the DKampus service also uses the WhatsApp service to broadcast (broadcast) notifications to drivers when there are orders that require delivery. In accordance with the notification received via the smartphone, the Driver can confirm the delivery using the DKampus service.

5. CONCLUSIONS

IT adoption is the answer for the F&B industry in maintaining its existence due to the impact of the COVID-19 pandemic. One of the important activities to be improved is the order delivery service. This service involves three main entities, namely: customers, partners/SMEs, and drivers. Communication between the three entities must be met so that the business objectives of the partners/MSMEs can be met. To answer this need, a DKampus service design has been produced that focuses on providing delivery services in accordance with orders that have been made by customers to partners/MSMEs. The resulting service design can be a guide for software developers to build a service system that is interoperable with services provided by third parties, in this case Google maps and WhatsApp. Furthermore, the development of service system software can be realized on multi-platforms such as web and mobile technology.

Due to the fact that the Google Maps service license is a free service, the available service features are restricted. One of them, to support order delivery, cannot be directly monitored. In the future, it is hoped that, in addition to increasing third-party service licenses, the order delivery system will be integrated with digital payment services to help customers pay their bills.

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