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Digital Startup "Veggie Fresh" using Code Igniter and Design Thinking Method

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Muhammad Lutfi Mahasinul Akhlak[1,*], Andri Winanto[2], Devi Yuliana[2], Anastasia Riesa Ayuningtyas[2]

[1] Department of Information Technology, STMIK Bina Patria, Magelang, Indonesia
[2] Department of Information System, STMIK Bina Patria, Magelang, Indonesia

*Corresponding author:
Email: hmlutfima@gmail.com

Abstract

This study aims to create a digital startup with an e-commerce platform named VeggieFresh that provides fresh vegetables directly from farmers to consumers. This startup has effectively answered user needs by making it easier for customers to buy fresh and quality vegetables without having to leave home. The VeggieFresh startup also helps farmers market their agricultural products more effectively and efficiently. The method used is Design Thinking, which focuses on a deep understanding of user needs and creating innovative solutions. Design Thinking stages such as Empathize, Define, Ideate, Prototype, and Test are applied to identify challenges customers and farmers face, formulate appropriate solutions, and test the prototypes created. The analysis used is SWOT analysis and TELOS feasibility analysis. The user interface design uses the GSTALT principle to make the appearance more elegant and responsive. The prototype developed got a positive response from users with the results of the Usability Heuristic test of 82%. This shows that this startup has met user needs with an intuitive and user-friendly interface. Thus, VeggieFresh has great potential to become an effective e-commerce solution that connects farmers and consumers and increases efficiency and convenience in shopping for fresh vegetables.

Keywords: Digital Startup; VeggieFresh; Design Thinking; e-commerce; TELOS

Introduction

Advancements in information and communication technology have inspired numerous ideas about managing all aspects of business through various Internet platforms. These platforms enable users and businesspeople to access new markets by transforming traditional businesses into digital, internet-based services, such as website and mobile application services (Akhlak et al., 2023; Setiawan & Widaryanto, 2018).

Many customers, including housewives, struggle to shop for vegetables because they lack the time to visit markets or vegetable stalls. Furthermore, shopping for vegetables in traditional markets is often seen as less sanitary and less comfortable. Customers also encounter challenges in finding fresh, high-quality vegetables. Meanwhile, farmers face difficulties in marketing their agricultural products and cannot effectively reach a broader market.

"Startup VeggieFresh" aims to leverage information technology by creating a digital platform that enables farmers to sell their products directly to consumers. The VeggieFresh startup focuses on e-commerce, offering a wide selection of fresh vegetables. This application will simplify the process for customers to purchase high-quality, fresh vegetables from home, saving time and effort. The VeggieFresh startup will empower farmers to market their agricultural products effectively, reduce their reliance on traditional distribution channels, and give them greater control over their sales and marketing.

Literature Review

Digital Startup

The term "startup" refers to a newly established or recently operating company. A startup is either in the development stage or has recently begun its operations (Akhlak et al., 2023; Lahadcni et al., 2024). It is a growing company seeking a unique business model to create a new market. The initial stage involves operational processes, typically funded by individuals or groups. A startup is a dynamic entity driven by innovation and technology. The founders prioritize developing products and services based on their belief in demand for both (Nelloh, 2017).

User interface (UI) and User Experience (UX)

The user interface (UI) is what users interact with as part of an experience. UI involves more than just colors and shapes; it focuses on presenting the right tools for users to achieve their goals. Additionally, UI encompasses more than just buttons, menus, and forms that users must fill out. It serves as the connection between the user and the experience, creating both the first impression and the lasting impression. Good UI design must balance appealing aesthetics with seamless interactivity (Firmansyah et al., 2024; Muthia et al., 2024). According to Fadeyev, user interface design includes not only buttons and menus but also the interaction between the user and the application. This indicates that user interface design is not solely about the product's appearance; rather, it emphasizes how the product functions. For instance, it is essential to consider designing elements to work properly rather than merely selecting colors or shapes without a clear justification for their benefits (Syamsuar & Nurrobi, 2023).

User Experience (UX) originates from the terms "user," which refers to an individual, and "experience," which denotes exposure to a product or service. UX encompasses the user's journey while interacting with a product or media. It is crafted to facilitate users in fulfilling their needs when seeking information through a product or media, supported by an effective UI. Beyond providing convenience, good UX should also offer a pleasurable and engaging interaction with products or media. UX is equally as important as UI, as it can enhance business profitability by improving user convenience (Angela & Erandaru, 2022; Sani et al., 2023).

Design Thinking Method

Design thinking is a collaborative method that gathers ideas from various disciplines to develop a solution. It not only focuses on what is seen and felt but also emphasizes the user experience. Design thinking aims to find the most effective and efficient solution to complex problems. The process involves comprehensive thinking to arrive at a solution. Design thinking consists of five stages (Stanford d.school): Empathize, Define, Ideate, Prototype, and Test (Judijanto et al., 2024; Lutfi et al., 2024; Muthia et al., 2024).

GSTALT Principle

This theory is rooted in pattern-seeking. According to this theory, humans naturally perceive and interpret objects in an organized and sequential manner. They categorize separate stimuli into groups based on proximity, similarity, closure, continuity, and symmetry. Visual perception and Gestalt theory are closely intertwined. Structured and sequential visual perception enables us to derive structure and meaning from our visual experiences. Gestalt theory provides

guidance on how these components are structured into meaningful forms and structures (Kim, 2022).

Research Method

Design Thinking

This research is descriptive. The data used in this study is secondary data. Researchers obtained data sources from journals on startup creation and the challenges faced in everyday life. Additionally, other supporting sources include printed books, official websites, journals, and articles that have been identified, analyzed, clarified, and interpreted.

In this study, the development model utilized is the "design thinking" method; this method is recognized as a comprehensive thinking process that focuses on creating solutions starting with the Empathy process for a specific, human-centered need, aiming for sustainable innovation based on user needs. Originally, this method comprised three stages: inspiration, which identifies the need or problem that drives the search for a solution or innovation; ideation, which involves generating, developing, and testing ideas; and finally, implementation, which refers to the application finalization for users. Over time, these three stages have evolved into five, which are not significantly different but place emphasis on certain aspects to yield a more detailed procedure (Figure 1) (Akhlak et al., 2023).

Figure 1. Diagram of stages in the Design Thinking method
according to Plattner (2010) in Akhlak et al (2023)

Research activities.

Research activities refer to the stages of the Design thinking model.

The first stage is Empathy, regarded as the core of the human-centered design process. This method aims to understand users within the context of the designed product by conducting observations and interviews, and integrating these findings with an initial scenario. The analysis employed is a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats). The second stage is Define, which involves analyzing and understanding the various insights gained through Empathy, with the goal of determining the problem statement as a point of view or main concern of the research. During this stage, the researcher formulates How Might We (HMW) questions and carries out a Feasibility Analysis using TELOS analysis (Technical, Economic, Legal, Operational, Scheduling).

The third stage is ideating, which serves as a transition process from problem formulation to problem-solving. This ideation phase focuses on generating ideas as a foundation for creating a prototype design. This stage involves analyzing user needs using data from the HWM (How Might We) process to develop features for the application through team brainstorming sessions. The results from these brainstorming sessions resulted in several prioritized features that address the needs of prospective users. The fourth stage is the prototype, the initial design of a product that aims to identify errors early and explore various new possibilities. The initial design will be tested with users to gather appropriate responses and feedback to refine the design. The final stage, known as testing, collects user feedback on the various final designs developed in the previous

prototype phase. Though this process is the last stage, it is inherently cyclical, allowing for repetition and revisiting earlier design stages if errors are found.

Testing the Usability Heuristic Method with 10 Evaluation Parameters: 1) Visibility of System Status: Does the user always know the system's status? 2) Match Between System and the Real World: Are the terms and application interface easy to understand? 3) User Control and Freedom: Can users easily correct errors? 4) Consistency and Standards: Are the application elements consistent? 5) Error Prevention: Are there features designed to prevent user errors? 6) Recognition Rather Than Recall: Is navigation easy to remember? 7) Flexibility and Efficiency of Use: Is the application accommodating for both beginners and experienced users? 8) Aesthetic and Minimalist Design: Is the design clear and informative? 9) Help Users Recognize, Diagnose, and Recover from Errors: Are error messages straightforward? 10) Help and Documentation: Does the application provide assistance or guidance?

The tasks to be tested include registering or creating an account on the Veggie Fresh application, adding products (for farmers) or searching for products (for the general public), simulating transactions (ordering products or adding items to the shopping cart), using the product search or filter feature, and contacting customer service through the application (if available).

Results and Discussion

The results of the study are stated in the research stages below.

Empathize: From the observation day, it was concluded that several factors contributed to solving problems related to the distribution of fresh vegetables, including:

1. Consumers need an application that can make it easier for customers to buy quality and fresh vegetables without having to leave home so that they can save time and energy.
2. Consumers need ease of use of the application, so the application needs to be designed intuitively and available on the Playstore to update statuses such as the price of fresh vegetables ordered in real-time
3. Consumers need detailed, accurate, and accountable information about fresh and quality vegetables by synchronizing vegetable farmer data with consumers/the community in one application
4. Farmers hope to market their agricultural products widely and effectively, reduce dependence on traditional distribution channels, and have greater control over the sales and marketing of their agricultural products.

Through this solution, both farmers and customers can feel significant benefits, creating a more efficient and comfortable agricultural ecosystem. Furthermore, the researcher conducted several analyses of the problem at this stage. The analysis method used is SWOT analysis (Akhlak, 2021; Febrian et al., 2024). The following Table 1 shows the results of the SWOT analysis of Digital Startups:

Table 1. SWOT Analysis of Digital Startup VeggieFresh

STRENGTH	Provision of fresh vegetables directly from farmers, convenience for customers, and support from the government.
WEAKNESS	Large capital requirements, cash flow problems, and infrastructure and customer trust challenges.
OPPORTUNITY	There is no tight competition in the startup sector, and there is Strong and continuous market demand. Social media is a fast, cheap, and impactful marketing medium for vendors who can meet needs well.
THREADS	With the emergence of competitors with lower selling prices, vendor prices often change, financial institutions lack interest in funding, and market trends always change very quickly.

Define: The main factors that contribute to solving problems related to consumer needs are:

1. Ease of use of the VeggieFresh website is designed intuitively so that customers can easily search for and buy fresh vegetables without difficulty. A user-friendly interface will increase convenience and efficiency in shopping for vegetables.
2. Accurate and detailed information so that customers get accurate and detailed information about the vegetables they buy, including the product's origin, quality, and freshness. Reliable and transparent data will help customers feel confident and satisfied with their purchases.
3. Updates and consultations so that customers get regular updates on the availability of vegetables and the latest promotions. In addition, providing product consultation services will help customers choose vegetables that suit their needs, nutrition, and cooking recipes. VeggieFresh can provide added value, such as vegetable recommendations based on customers' nutritional needs or health conditions. This will also make it easier for customers to monitor their nutritional intake and support a healthy lifestyle.

Table 2. Formulation of HWM (How Might We) Digital Startup VeggieFresh

How?	Might?
How can the application be easily used to search for fresh vegetables	By creating a website with intuitive features that suit customer needs
How can the application update the status of fresh vegetables and consult the nutritional content of vegetables	By creating a website with features that provide product price updates and news
How can the application integrate consumers with vegetable farmers	By creating a website with features that provide communication with vegetable producers and farmers
How to make it easier for users to input locations?	By creating a location feature that is integrated with Google Maps

After the SWOT analysis, the next step is formulating HWM (How Might We) (Table 2). Ideate: At this stage, the designer conducts an evaluation that will later become a description of the features on the VeggieFresh website by combining ideas with the team to create the required features. This stage refers to analyzing user needs from the data from the HWM (How Might We) process to create a feature that will be used in the application by brainstorming with the team. The results of the brainstorming carried out with the team gave results to several features that have been prioritized from all aspects of the needs of prospective users; these features are shown in Table 3.

Table 3. Results of the VeggieFresh digital startup brainstorming

	System Requirements	Manufacturer Features	Customer Features
Software	Windows 10, 11 Software Browser: Chrome, Mozilla etc. Windows 10, 11 Software Browser: Chrome, Mozilla etc.	Login and register, location permission feature, admin chat, product display feature, delivery feature, change address, history, edit profile, Gallery, upload files, track courier, Google Map	Login and register, location permission feature, admin chat, product display feature, delivery feature, change address, history, edit profile, Courier phone chat, voucher claim, cart, Google Map
Hardware	Personal Computer with minimum 8 GB RAM and 100 GB memory Android smartphone with minimum 1Gb memory	Global Positioning System, Data security, Area covered by provider signal.	Global Positioning System, Data security, Area covered by provider signal

Table 4. TELOS Feasibility Analysis of Digital Startup VeggieFresh

Technical feasibility	The new system is feasible regarding software (database and UI), hardware, and network devices.
Economic feasibility	The new system is feasible in terms of cost and benefit analysis
Legal feasibility	The new system is feasible regarding legal certainty and does not violate IPR and licenses.
Operational feasibility	The new system is feasible in terms of operations and falls into the "User-Friendly" category.
Schedule feasibility	The new system is feasible in terms of schedule, the research stages are not too long. Starting from the Empathize, define, ideate, and prototype to the testing stages

Feasibility analysis is an analysis of the system to be implemented that has technical and business feasibility (Table 4). Therefore, the startup that will be created is easy to use, has no legal risk, has low operating costs, and is free. The next step is to create a Visual Flow Map Structure; this system is divided into 2 Flow Map parts. Here is the Flow Map for Farmers (Sellers):

Login/Register → Dashboard → Add/Manage Products → Incoming Orders → Shipping → Payment → Customer Support

While this is the Flow Map for the General Public (Buyers):

Login/Register → Home → Search Products → Product Details → Shopping Cart → Checkout → Payment → Order History → Customer Support

Prototype: At this stage, the researcher created the startup name, logo, user flow, and user interface. The startup name is VeggieFresh, derived from the words "vegetable," referring to vegetables, and "Fresh," indicating freshness. Therefore, the meaning of "VeggieFresh" is fresh and high-quality vegetables, with the startup motto being "Quality Life with VeggieFresh." The following are the logo and design stages of the VeggieFresh startup (Figure 2).

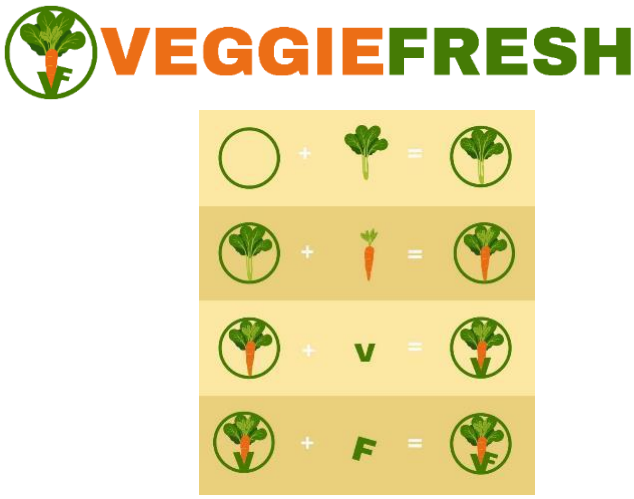

Figure 2. VeggieFresh startup logo and stages of its creation

The VeggieFresh logotype is a mascot depicting a carrot surrounded by fresh leaves, with the letters "V" and "F" interconnected. This symbolizes VeggieFresh's commitment to providing fresh and quality vegetables to customers. The carrot and fresh leaf symbols show the startup's focus on natural and healthy products. The green color in the logo symbolizes freshness and health and the trust and professionalism VeggieFresh holds in every aspect of its service. The dynamic design reflects the startup's commitment to providing fast and timely service, ensuring fresh vegetables reach customers quickly. VeggieFresh always fulfills customer needs wholeheartedly and maintains customer trust and satisfaction with friendly and professional service.

At this stage, the researcher designed the startup name, user flow, and user interface. The design principle uses the Gestalt principle, which explains the process of creating interpretations by arranging components with relationships in form, pattern, and similarities that can be combined into one unit. This Gestalt theory was built and developed by three people, namely Kurt Koffka, Wolfgang Köhler, and Max Wertheimer (Sandesara et al., 2022). The Gestalt Principle and Visual Perception are very helpful in understanding the main visual methods of developing visual strategies for graphic design and visual communication design today. The Design Principles Using Gestalt Principles are Proximity, Similarity, common region, Focal point, Continuity, Closure, and Figure/ground (Kim, 2022)

This application is built with the Code Igniter framework, which consists of PHP, HTML, Bootstrap, CSS, Jquery, and Javascript programming languages. The first stage is to design the User Interface using HTML, Bootstrap, and CSS programming. Here are the results of the User Interface design (Figure 3).

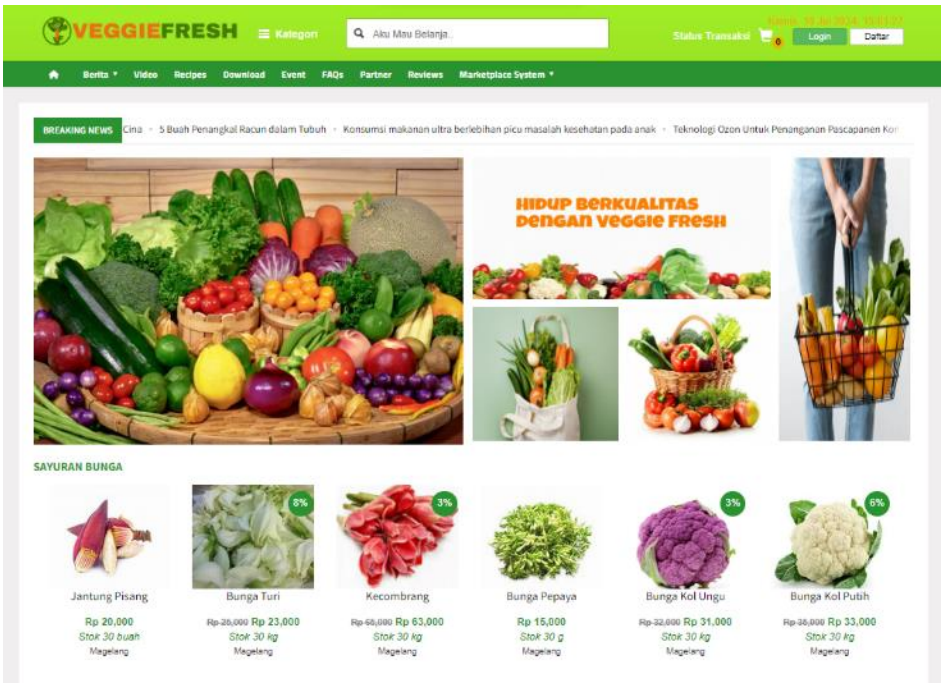

Figure 3. Main page view of the VeggieFresh website

VeggieFresh is an innovative platform that connects farmers and consumers of fresh vegetables, offering easy and intuitive navigation through the dropdown menu on the navbar. In the Category menu, users can find various types of vegetables that are classified in detail. They are categorized based on the part of the vegetable consumed, such as leaf vegetables, fruit vegetables, root vegetables, flower vegetables, and stem vegetables. By pressing the vegetable category, all products will be displayed based on our chosen vegetable category.

On the main page of VeggieFresh, an e-commerce application made by the nation's children, the principles of Gestalt, namely Continuity, are applied. Continuity is usually found in the dropdown menu in its secondary options to facilitate navigation. When scrolling through the list of product categories, VeggieFresh arranges the products in a continuous vertical arrangement. This Continuity helps users intuitively follow and browse products without losing context.

First, users need to fill in their information during registration (Figure 4). After that, they will be taken to the login page. VeggieFresh is divided into two service sections: services for consumers seeking fresh vegetables and other agricultural products, and services for farmers who supply these products.

In Figure 4, the registration page design uses the Closure approach, concluding a pattern of forms by using negative space. VeggieFresh uses easily recognizable icons and graphic elements, such as a simple category icon or brand logo, that effectively convey the information users need. On this page (Figure 5), the GSTALT principle is also applied to proximity, which states that objects close to each other appear more related than those far apart.

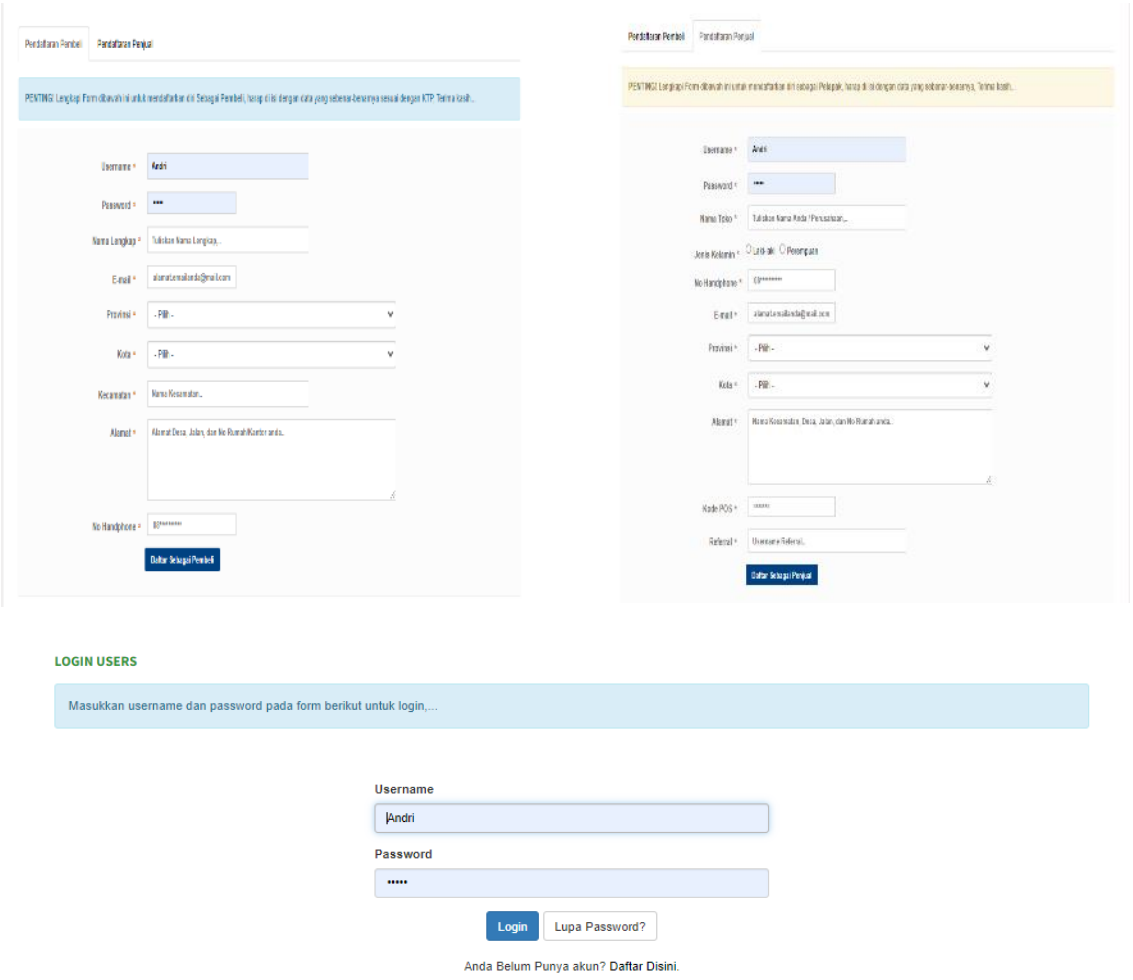

Figure 4. View of the registration page and login page

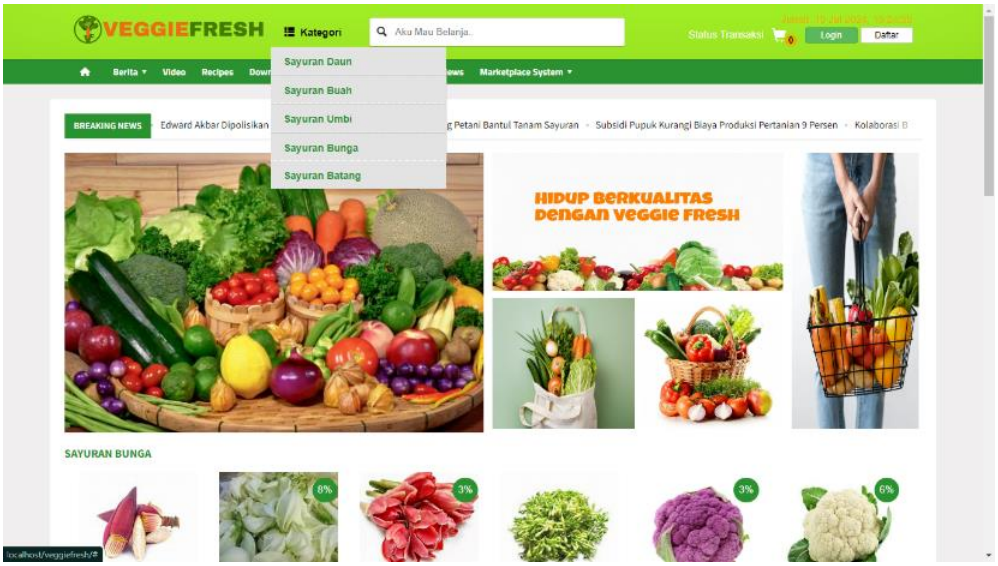

Figure 5. Main page display containing category menu

The focal point principle is also applied in the VeggieFresh startup UI. These principal designs that anything that stands out will always be the main center of attention for anyone who

sees it. This Gestalt Principal rule is used for UI design when there is something important for users to see first. Furthermore, VeggieFresh also has several feature designs that start from the main page and display products at the VeggieFresh startup. Furthermore, users can enter the next page, namely the "Register" page; if the user is not registered as a farmer or consumer, then during the registration process, the user is asked to choose the type of user account, whether as a farmer or

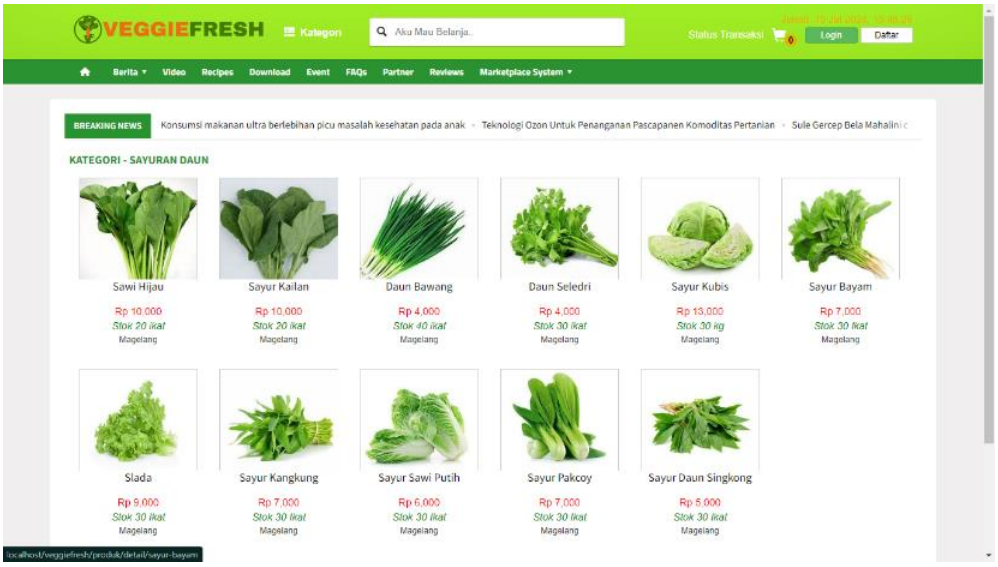

Figure 6. The product display page will be displayed based on the selected category.

On the product display page in Figure 6, VeggieFresh uses the Similarity principle, which uses consistent colors, typography, and icon styles throughout the application. Consumers can see four menu icons at the bottom with the same visual characteristics. In addition, the common-region principle, which is a law related to the law of proximity, is applied on this page. Objects are in a close area; the brain automatically considers them the same group. If given a divider, it will be immediately visible that the group is separate from the others.

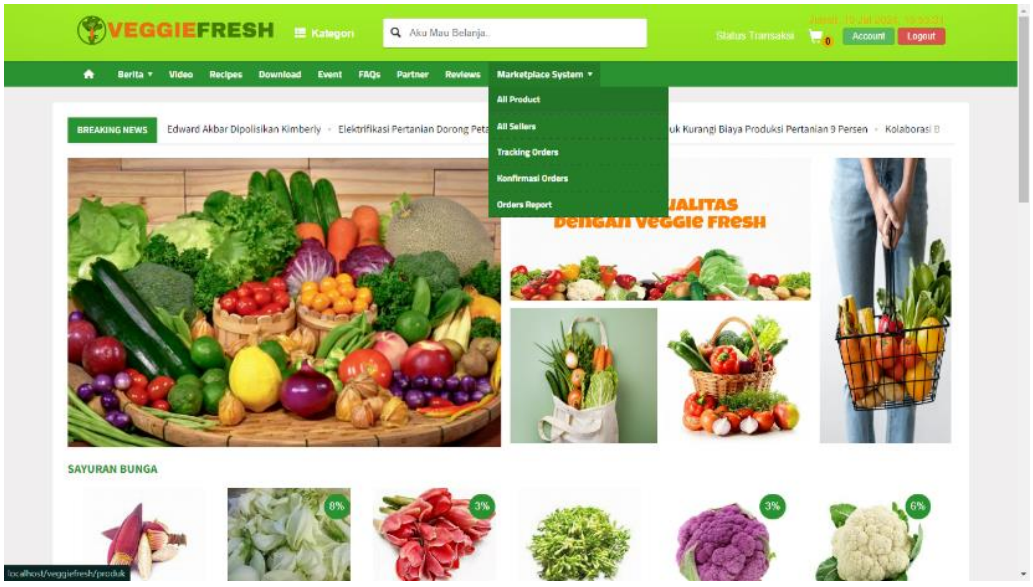

Figure 7. Main page view showing the Marketplace Systems menu

The Marketplace System's menu, shown in Figure 7, has various features that support online transactions at VeggieFresh. In the All Products section, users can view all products available on the platform, allowing them to browse and select products easily. All Sellers displays

a complete list of sellers, allowing consumers to get to know and select sellers based on reputation and location. The Tracking Orders feature helps users track the delivery status of their orders in real time, providing peace of mind and transparency. The Confirmation Orders section allows users to confirm their orders before delivery is made, ensuring the accuracy and suitability of the order. Orders Reports provide a detailed report of all transactions made, helping users manage and analyze their purchases as in Figure 6 below, which shows the display when the All-Sellers menu is clicked.

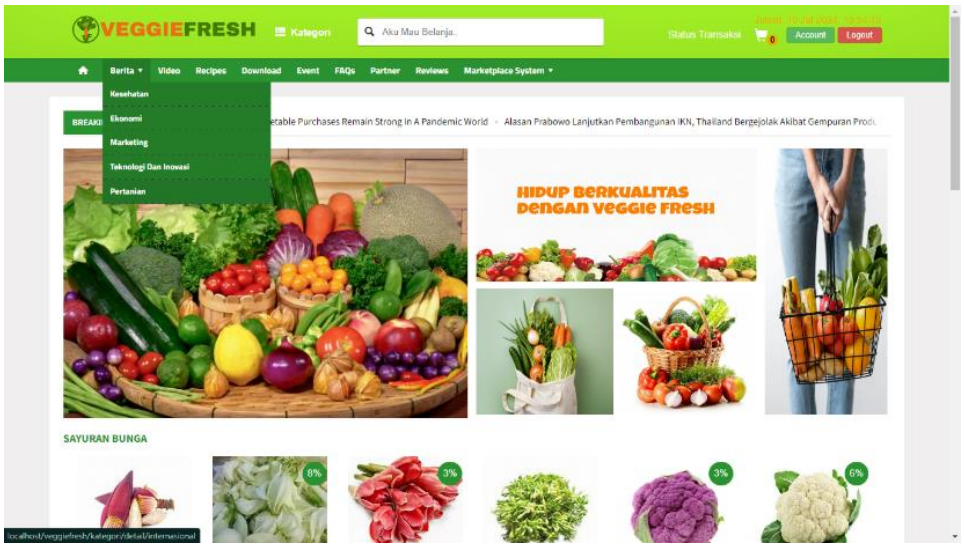

Figure 8. The main page display with the News menu

Next, the News menu on VeggieFresh offers access to the latest and relevant information on various topics (Figure 8). The health section features articles and news about the health benefits of vegetables, diet tips, and healthy lifestyles. In the Economy section, users can discover news about agricultural market developments, commodity prices, and economic trends affecting the agricultural sector. The Marketing category presents marketing tips and strategies for farmers and sellers, assisting them in increasing sales and reaching more consumers. The Technology and Innovation section showcases the latest advances in agricultural technology, new tools and applications, and innovations that enhance agricultural productivity and efficiency. Meanwhile, the Agriculture category delivers information on sustainable agricultural practices, farming techniques, and news from the farming community (Figure 9).

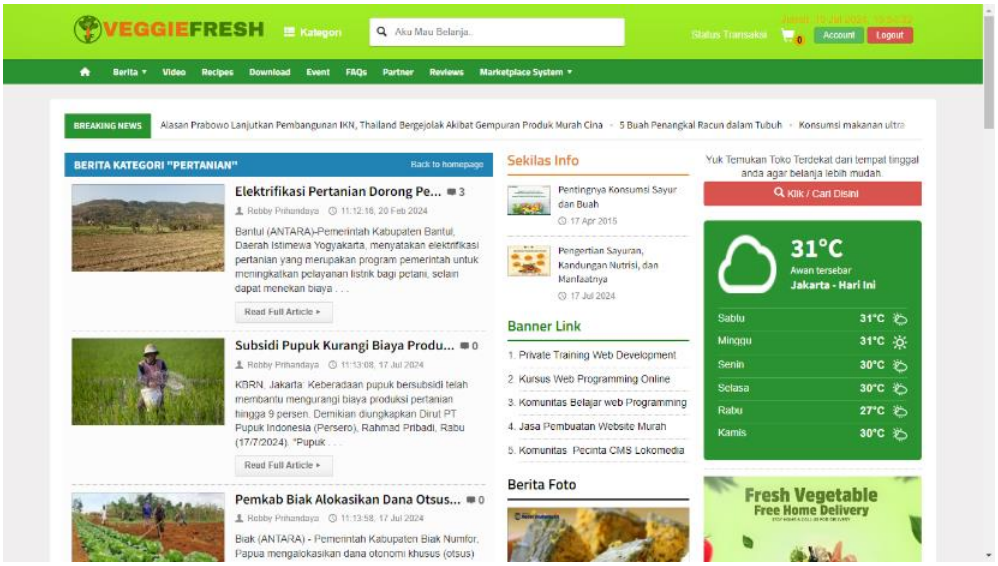

Figure 9. Page view based on the Agriculture News category.

Additionally, VeggieFresh offers a variety of useful menus for users, including videos with educational tutorials and interviews, recipes featuring a selection of fresh vegetable dishes, and downloadable educational materials about vegetables and agriculture. The Events menu shares information about webinars and workshops, while the FAQs address common questions about platform usage. The Partners menu highlights information regarding VeggieFresh's partners, and the Reviews section allows users to read and share their experiences. Moreover, on the partners page, you can find a list of products offered by partners along with details for each item. If a product is desired, it can be added to the cart for later purchase (Figure 10).

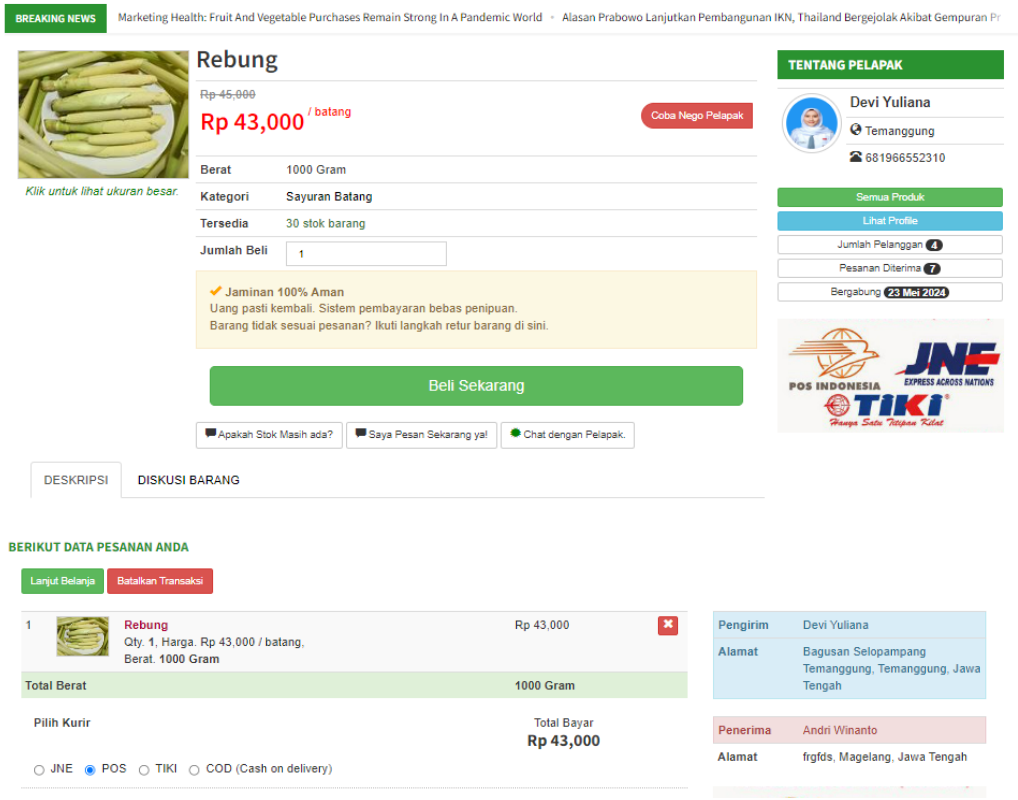

Figure 10. Product page and purchase page display

Once a transaction occurs, the order data report will be visible on the Orders Reports page. After clicking the confirmation button, we will be taken to the payment options with various banks or payment partners. Following that, the order details page will appear for confirmation (Figure 11).

With these features, VeggieFresh offers a platform for buying and selling fresh vegetables while serving as a source of information and support for farmers and consumers, ensuring they remain informed and connected in a dynamic agricultural environment ecosystem.

Testing: This stage is part of the application testing process that has been developed. In this study, the UI design testing process employs the Usability Heuristic indicator to observe user activity. The purpose of this test is to assess the interface and user experience of the Veggie Fresh application, a digital platform that connects local farmers with the public for the direct purchase of crops. The Respondent Criteria for Farmers include the following requirements: at least 2 years of experience working as a farmer, familiarity with using smartphones for communication or daily tasks, and an interest in selling crops online. The Respondent Criteria for General Public consumers are aged 18–50 years, experience or frequent shopping for groceries online, and possession of a smartphone with messaging or online shopping applications.

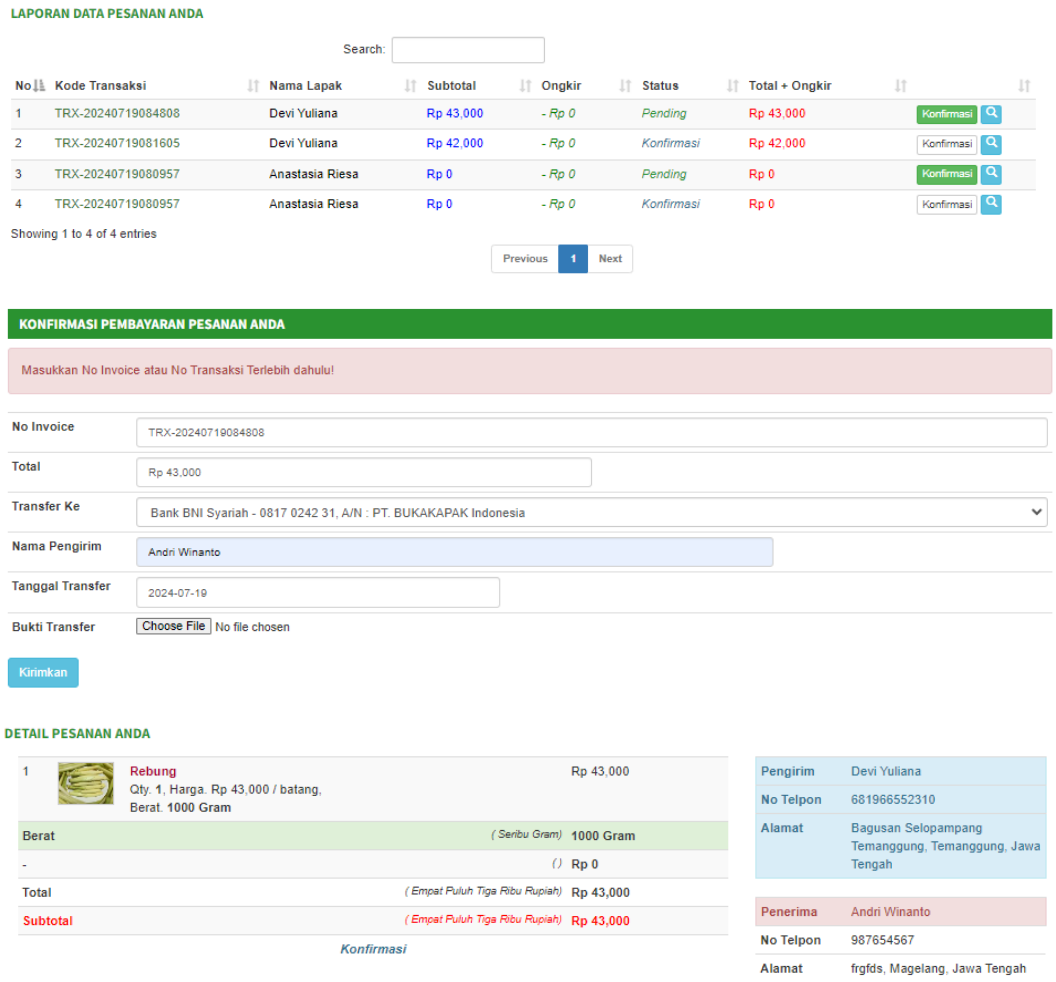

Figure 11. View of order data report page, order payment, and order details

The interview questions posed to respondents are as follows: Is the registration process easy to understand? Did you encounter any obstacles or confusion during this process? How was your experience finding a specific product or feature? Are the labels and icons in the application clear and as expected? Are the steps for making a transaction easy to follow? Is the information on the screen adequate to assist you in completing the transaction? What are your thoughts on the layout and design of the application? Does the application appear attractive and not overly complicated? Do you feel comfortable using this application? What do you like and dislike most about it?

Table 5. TELOS Feasibility Analysis of Digital Startup VeggieFresh

No	Usability Heuristic	Total	Ideal Value	Percentage
1	System Visibility	82	100	82%
2	Compatibility between System and Real World	83	100	83%
3	User Control and Freedom	82	100	82%
4	Standards and Consistency	83	100	83%
5	Helping Users to Identify, Diagnose, and Solve Problems	83	100	83%
6	Error Prevention	81	100	81%
7	Recognition	83	100	83%
8	Flexibility and Efficiency	83	100	83%
9	Minimalist and Aesthetic Design	82	100	82%
10	Help and Documentation Features	81	100	81%
	Total	823	1000	
	Average			82%

User activity observation occurs when the user and researcher are present in the same location simultaneously. This allows researchers to receive feedback on each activity performed by the user. The Usability Heuristic comprises 10 indicator variables that serve as a tool for measuring the designed UI. Following the testing process, the results indicated that all features operated according to the user flow, achieving a test score of 82% (see Table 5). This confirms that the developed digital startup meets user needs.

Conclusion

This research has successfully developed a digital startup with an e-commerce platform called VeggieFresh, which provides fresh vegetables directly from farmers to consumers. The method employed is design thinking, emphasizing a deep understanding of user needs and the creation of innovative solutions. It effectively addresses user requirements by simplifying the process for customers to purchase fresh, high-quality vegetables from the comfort of their homes. The VeggieFresh startup also assists farmers in marketing their agricultural products more effectively and efficiently. The analysis conducted utilizes SWOT and TELOS frameworks. The user interface design incorporates the GSTALT principle, enhancing its elegance and responsiveness. The prototype garnered positive feedback from users, achieving a score of 82% on the Usability Heuristic test. This indicates that the startup has fulfilled user needs with an intuitive and user-friendly interface. Thus, VeggieFresh holds significant potential to become an effective e-commerce solution that connects farmers and consumers, enhancing efficiency and convenience in purchasing fresh vegetables.

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