Development of e-wallet application "DASIGU" - based teaching factory

Vrisko Putra Vachruddin [1] * iD **, Abdulloh Hamid** [1] iD **, Nashudi Nasril** [2]

[1] Universitas Islam Negeri Sunan Ampel, Indonesia.
[2] SMK YPM 3 Taman, Sidoarjo, Indonesia

* Corresponding Author. Email: vriskoputra@gmail.com

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ABSTRACT

The trend of non-cash or cashless payments through e-wallet applications is increasing because the application presents the ease of transacting features accompanied by discounts and cashback that are attractive to its users. Not realizing it increases people interest in transacting and shopping both it increases their interest in transacting and shopping online and offline, which will encourage the country's economic growth. So many start-ups and institutions are vying to develop digital wallet applications. Likewise, SMK YPM 3 Taman Sidoarjo is an educational institution based on vocational or expertise to support teaching factory learning and facilitate consumers in transacting it is necessary to develop e-wallet applications in schools. The purpose of this study is to provide an overview of the importance of developing e-wallets in schools aimed at improving the quality of schools through online transactions on products by students. This type of research and development (R&D) with a 4D development model. The stages in this research are defined, designed, developed, and disseminated. The application's assessment instrument uses a Likert scale questionnaire distributed online. A sample was randomly selected from users of the e-wallet application, some teachers and students. The results of the digital wallet application product trial "DASIGU" to 173 students responded with 26 user experience questionnaire indicators resulted in a figure of 73.4% and belonged to the category of "Worth" use. Through the development of this e-wallet application, it will be easier for the school community to transact support products in the form of student services and goods.

INTRODUCTION

The rapid development of technology accompanied by creative innovations produces a variety of technologies and products that make it easier for human work. Technology is generally tasked with facilitating all human activities. From the productive work sector in the form of machines or tools in factories, transportation tools to human needs ranging from clothing, food, and residence can be easily met with application features (Austin et al., 2014).

One of the applications that are trending and is a large market share is the existence of e-wallet applications or digital wallets. If, in the past, to buy, we need to bring money in cash, now

click through mobile phone, we can easily buy according to non-cash payments. This e-wallet greatly facilitates human work in reducing the risk of loss and does not need to bring money with a large nominal for a transaction of great value (Kalyani, 2016).

Many of us still need to understand the difference between e-wallets and e-money, although they are related (Widiyati & Hasanah, 2020). The main difference between an e-wallet and e-money is in the form its shape. E-money is usually in the form of a chip implanted on a card or other media. In other words, e-money uses chip-based (Mulyana & Wijaya, 2018). Meanwhile, digital wallets or e-wallets are electronic money from servers or so-called server-based systems, so a mobile phone must be connected first to the publisher's server, meaning that internet access is needed for its use (Mulyana & Wijaya, 2018).

Another difference is the limit on the balance amount in e-wallets and e-money. The maximum balance amount in e-money is 1 million Rupiah only, while the maximum balance e-wallet can reach 10 million Rupiah (Rosmayanti, 2019). In addition, security features in e-money have yet to be available so that e-money can be used easily by others. At the same time, an e-wallet has security features in activating mobile numbers and pin codes. If we are transparently based on history, e-money comes first, then the e-wallet application. E-wallets emerged and were introduced due to the increasingly sophisticated development of smartphones through digital transactions and weaknesses related to the security features of e-money itself (Fitria et al., 2022; Shetty et al., 2014). So e-wallet is a reincarnation of e-money with various narrowing features that are not contained in e-money.

E-wallets are proliferating with government support. The Indonesian government has long planned efforts to safely use non-cash payment instruments until, in 2014, Bank Indonesia launched the GNNT program (non-cash national movement) so that Indonesians become less cash society (Sari et al., 2019). The policy is a continuation of the program in 2009, which refers to three essential aspects: increasing the distribution of safe, reliable, and efficient money, improving excellent cash services, and improving the quality of goods (Austin et al., 2014).

Based on Bank Indonesia's record in 2018, transactions that occurred using e-wallets in Indonesia reached 21,3 trillion Rupiah (Anggraeni, 2019). Until February 2019, there were the five highest local e-wallets in transactions, namely: Go-Pay in the first place with a transaction value of 89.5 trillion Rupiah, followed by OVO, DANA, LinkAja, and iSaku (Safarudin et al., 2020). It is estimated that this value will continue to grow, accompanied by the development of the less cash society trend. The magnitude of the e-wallet platform business opportunity, accompanied by growing interest in the cashless trend, makes start-ups compete with e-wallets by cooperating with online and offline market share (Tasci, 2017). This can be seen by the increasing number of online and offline stores that provide non-cash or cashless payment systems.

Therefore, as a school engaged in the vocational or expertise sector, SMK YPM 3 Taman wants to develop an e-wallet application integrated with all school digitization systems and other supporting facilities. In addition to being a non-cash payments tool, this e-wallet is expected to become a teaching factory (Tefa) based learning media that is an industry-based learning concept (products and services) that refers to standards and procedures applicable in the business and industrial world (DUDI) (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2012).

Teaching factories can also be interpreted as a combination of competency-based learning and industry learning, with a process of expertise or competence designed and implemented based on working procedures and standards that produce products following the market or consumer demands (Puspita et al., 2020). The resulting products can be in the form of services or goods (Fajaryati, 2012). The implementation of teaching factory (Tefa), according to the Directorate of Vocational Development, can be applied in various studies of expertise, among others: Agribusiness and Agrotechnology, Business and Management, Technology and Engineering, Information Communication and Technology (ICT), Craft Arts and Tourism (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2012).

Previous research conducted by Andri et al. (2019) regarding e-wallets was the development of mobile and web-based E-Canteen applications at Microskil University, Indonesia. The canteen owned by Mikroskil University is already equipped with WiFi internet with a payment system through GoPay e-wallet, but the booking system is still conventional. The purpose of the study was

to develop an E-Kantin app that makes it easier to order food and beverages. The app was developed on an Android-based platform for visitors and booth tenants to access and a web-based app for use by canteen managers. System development uses waterfall methodology. Systems testing through the black box method shows that the functional system is functioning correctly to improve service and comfort to visitors and facilitate the management of the canteen by getting accurate transaction reports of each booth (Andri et al., 2019).

Another research is about the Android-based e-wallet application on the bus Transmetro Pekanbaru City conducted by Tendra and Suwarti (2020). The development of an e-wallet application on Transmetro bus Pekanbaru City aims to facilitate passengers' transactions because cash payments are needed in return if there is no money right. Charging the balance can be done through two methods: through the Bank account of the Transmetro bus that is entered on the application or through charging the balance to the operator in charge (Tendra & Suwarti, 2020).

Payment is enough through a QR code scan at the time of the transaction and will be recorded automatically in the Transmetro database without the need to recap the data. The QR code provided by each transaction is sometimes different because every second, the application will create a QR code automatically according to passenger data and some additional codes. This is done in anticipation of cheating (Tendra & Suwarti, 2020).

From some previous research, e-wallet applications have been widely developed in universities and public transportation facilities. However, the development of e-wallet applications in the world of secondary education has yet to be implemented, so the development of digital wallets (e-wallets) is a new thing that must be introduced and developed. In addition to being a non-cash payment tool that facilitates every transaction, this digital wallet will encourage the school digitization system so that the school's financial system statements become more transparent and accurate.

RESEARCH METHOD

This type of research is included in research and development (R&D) using a 4D (define, design, develop, disseminate) development model. Model 4D development is a model developed by Thiagarajan et al. (1974). This development model consists of 4 stages: define, design, develop and disseminate (Thiagarajan, 1974). In the first stage, the definition starts from the initial analysis, analysis of tasks and concepts, characteristics of application user targets, and the formulation of application development goals. A preliminary analysis is needed to discover what needs and problems need to be solved through this research and development. Analysis of tasks and concepts is necessary to find out the potential and skills of the school that will later be identified in the main concepts to be developed. The characteristics of the application's target users are intended so that the development of the application is in accordance with the intended target. Then the formulation of the purpose of application development must be carried out so that the context of the application development runs following the original purpose of the formulation.

The second stage is the design stage of the e-wallet application, with the selection of the initial format and the application's design. This stage is closely related to the selection of the application name, the primary color of the application, and the menus in the application. The e-wallet application is designed using the "Visual Studio Code" application. In addition, at the initial design stage of the application, it is determined how the system tops up (fills) e-money and at least fills it up.

In the third stage, the development stage goes through two stages: expert validation and product development trials. Expert validation is required to ensure the safety and comfort of application users (Wong & Li, 2010). Expert judgment will be the basis for product revision and improvement of deficiencies found in the application to be developed (Khotima et al., 2022). Product development trials were conducted on a small sample of some teachers and students. From this stage, the final storyboard will be generated from the e-wallet application.

In the last stage, namely the deployment, three stages of validation testing, packaging, diffusion, and adoption are carried out. At the validation testing stage, the revised e-wallet application at the development stage is implemented in the target application users, namely school residents. The

packaging stage, through the launching of the application, was festively accompanied by cashback and discounts to give a positive impression on the development of the e-wallet application. Later, it is hoped that the e-wallet application can be absorbed and adopted by school residents as a digital transaction tool.
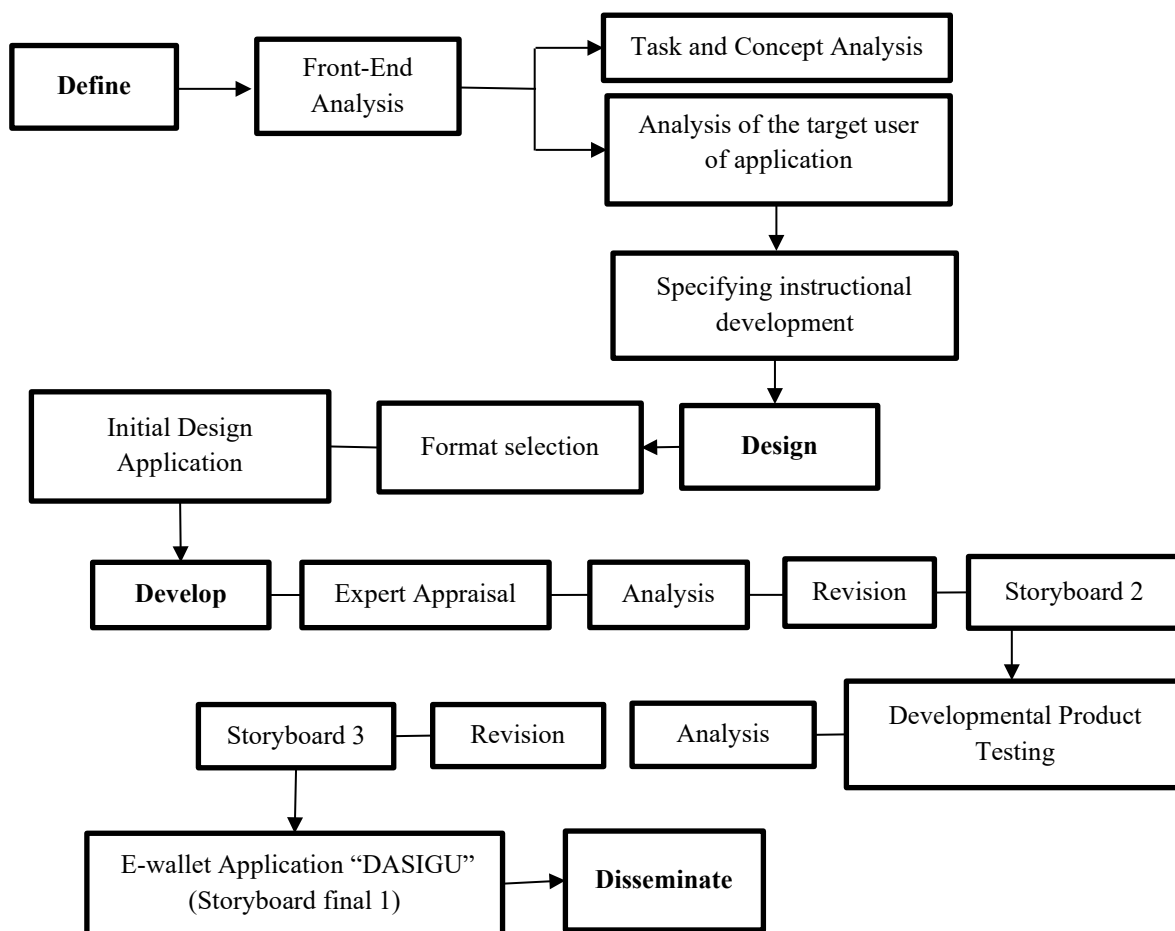

Figure 1. Research Stages

This research and development were carried out at SMK YPM 3 Taman. The school is located at Jl. Ngelom Megare No. 30, Sidoarjo, Indonesia. SMK YPM 3 Taman is a private school under the auspices of the Ma'arif Education and Foundation (YPM) Sepanjang, Sidoarjo. The target of the development of this application is all school residents ranging from student guardians, educators, education personnel, and all learners.

The data used in this study is qualitative and quantitative data (mix) that is concluded descriptively. Using qualitative and quantitative data (mix) aims to provide a detailed picture of planning, developing, and implementing (Greene et al., 1989) e-wallet applications as a legitimate transaction tool in schools. The data analysis techniques used in this study are descriptive verbal data analysis, expert validation data sheets, and product feasibility trial data.

Descriptive verbal data obtained from interviews and observations are analyzed by transcribed oral verbal data, selecting and making classifications, analyzing data, and formulating the conclusion of analysis results as the basis for the preparation of developed products (Hanafi, 2019). Depth interviews and observations need to be conducted to obtain valid data on the planning, development, and implementation of the e-wallet application.

Data on the feasibility trial of e-wallet products are obtained through the questionnaire assessments given to a sample of teachers and students. A sample was randomly selected from users of the e-wallet application, some teachers and students. The number of samples used in this study was 173 learners. The questionnaire model used is a user experience questionnaire model with 26

indicators that aim to determine the feasibility of e-wallet products based on the Likert scale. The Likert scale measures individual behavior by responding to five preferred points on each question item with a linear scale model (Likert, 1932). The Likert scale is not a data type that measures individual traits but a measurement of knowledge or attitude using a total score of question items based on the interval measurement scale (Budiaji, 2013).

RESULT AND DISCUSSION

The development of digital wallet applications or e-wallets uses a 4D model consisting of several stages: define, design, develop and dissemination. Each of these stages will be detailed into several development processes.

Define

This stage is done to determine the school's needs and the purpose of developing e-wallet applications. This stage is divided into several development stages: front-end analysis, task and concept analysis, characteristics of the target user of the application, and specifying instructional development.

Front-end Analysis

Front-end analysis is done to discover what needs and problems can be solved through this research and development. The results of the front-end analysis based on interviews with the principal stated that SMK YPM 3 Taman has a school-owned business entity or teaching factory. The existence of this teaching factory facilitates learners to be able to carry out learning based on procedures and standards that produce products both in the form of services and goods (Fajaryati, 2012).

Three school-owned business entities in SMK YPM 3 Taman-based teaching factory involve students in its management: UPJ (service unit), which serves the graphic design, printing, and photography services. In addition, the business entity routinely holds youtube podcast activities by bringing in sources from inside and outside the school.

The second business entity is BNI (Bank Nurul Islam) banking laboratory, a mini-bank owned by the school that serves savings transactions and money laundering. In its management, both related administration and bookkeeping involve learners. The last school-owned business entity is SMART, a mini market that provides school supplies and necessities, food, and beverage products produced by students and guardians of students. The payment system in this mini market is already integrated with computers.

Through the e-wallet application, each individual will have an account. These individual accounts will store your personal information and account balance. The balance can purchase goods or services from merchants or sales access points. Non-cash transactions are carried out using the buyer's smartphone will scan the seller's QR code through the camera and transfer funds according to the transaction made. Later automatically, the buyer's account funds will be channeled to the seller's account (Shetty et al., 2014).

The development of an e-wallet integrated into the teaching factory will facilitate every transaction. In addition, it will encourage the digitization of the school's financial system to be more transparent and accurate.

Figure 2. Banking Laboratories and S-MART Mini Market

Task and Concept Analysis

SMK YPM 3 Taman must apply a learning-based teaching factory as a vocational or skill-based school. There are three expertise departments at SMK YPM 3 Taman, namely multimedia (MM), which is included in the study of information and communication technology expertise, accounting and financial institutions (AKL), and automation of office governance (OTKP). Both majors are included in the study of business and management expertise.

Schools engaged in the field of expertise must have a process of expertise and competence based on work procedures and standards to produce products according to market or consumer demand (Fajaryati, 2012). School-owned business entities issue products in the form of goods and services by involving learners in it. Product transactions produced in the form of goods and services can be done in cash and non-cash (cashless). For non-cash schools will provide e-wallet applications that can be accessed through the web and mobile applications based on android and iOS.

Characteristics of the Target User of the Application

Almost all school residents use a smartphone to communicate. In addition, most of these phones are already connected to the internet so that anyone can access the e-wallet application. However, some mobile phones do not support payment systems through QR code scans. Therefore, the development of e-wallet applications must pay attention to this so that additional menus that are transaction options other than QR code scans are needed.

Specifying Instructional Development

As explained above, the development of this e-wallet generally aims to facilitate every payment transaction at a school-owned business entity based on a teaching factory. Payment in the payment system in cash be overcome with the application. In particular, the application will encourage the school's financial digitization system to be more transparent and accurate. In addition, coding classes will gradually be developed to equip learners to develop an application.

Design

Format Selection

Format selection is related to the selection of application names, the design of the appearance of the developed application, as well as the composition of the menus available in the application. Based on these discussions, the IT developer and management of SMK YPM 3 Taman came up with a name for the e-wallet application, "DASIGU." It stands for "Dana Siswa dan Guru" as the target of the application development.

The application's appearance in design is exciting and includes some of the characteristics of the school in the e-wallet application. The characteristics of schools implemented in e-wallet applications are related to color selection. Scouting purple and white as the primary color is a characteristic of SMK YPM 3 Taman. In addition, the location of the school is included in the initial display menu by connecting to google maps.

Apss can be accessed via the web, android based mobile apps, and iOS. Payment methods and bookings are through QR code scans, but we provide a "Transfer" menu to facilitate mobile phones that do not yet support barcode scan payment systems. The programming language used in developing this e-wallet is a visual studio code application.

Initial Design

In the initial appearance of the menu on the web, there is an application recognition feature related to the usability of the e-wallet application, introduction of application features, teacher and student login, and application user registration menu. To access an e-wallet, users must first activate the application by registering themselves on the web. Self-registration must be done on the web and can not be on android mobile applications or iOS. Android and iOS mobile apps can be used for login and transaction only. To log in, use the email registered in the application and the password verified during registration. Here is the web link to the e-wallet application "DASIGU": https://dasigusmkypm3.com/
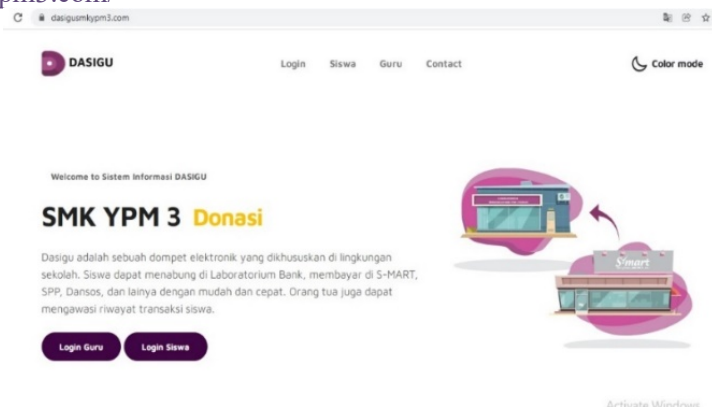

Figure 3. View App Start Menu

Based on the application development results and with the approval of the school leadership, there are several menus in the e-wallet application "DASIGU," namely: scan QR code, donation, SPP (school fees), transfer, transaction history, change password, and logout.

Scan QR code, QR code is a type of two-dimensional matric code developed by Japanese company Denso wave in 1994. The main functional QR code is to be easily scanned by a quick response scanner (QR) (Mulyana & Wijaya, 2018). QR codes automatically hold more information, such as website address, contact number, email, or plain text (Tendra & Suwarti, 2020).

Figure 4. QR Code

Donations are made regularly to provide relief to underprivileged learners, natural and non-natural disasters, and death compensation. The addition of the donation menu is a micro context of integration of character values implemented in an e-wallet application (Hamid & Sudira, 2013). With the menu, students can learn to share through donations managed by the school. The donation menu can be accessed when provided by the server, accompanied by the purpose of donation later.

This menu will display the amount of SPP (school fees) numbers each month that the student guardian must pay. After the payment is made, automatically, the SPP statement every month will be written, "it has been paid off."
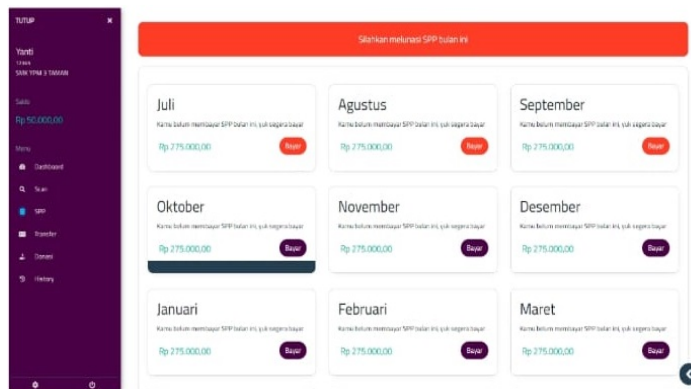
Figure 5. Transfer Menu on the Application

Transaction history helps know incoming and outgoing funds. The student's guardian can access his child's transaction history by simply checking through the application and logging in according to his email account and password. This menu is expected to prevent and avoid misappropriation of funds, especially SPP (school fees) student payments. In addition, the menu is equipped with access to printing transaction history that has been done.
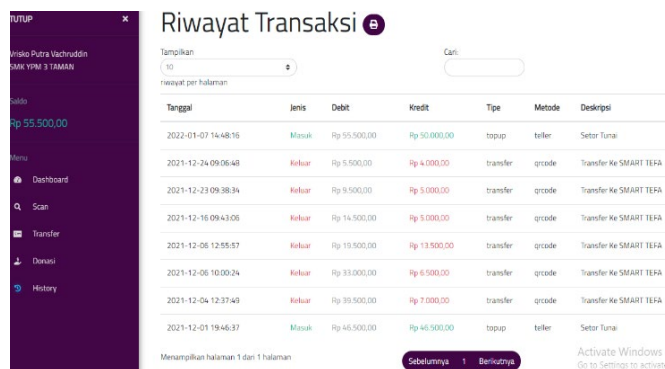

Figure 6. Transaction History on the Application

Charging funds on the e-wallet application "DASIGU" or top can be done in the banking laboratory "Mini Bank" SMK YPM 3 Taman located on the first floor of SMK YPM 3 Taman building adjacent to min market S-MART. The minimum number of top-up transactions on e-wallet applications is 10 thousand Rupiah.

Develop

Expert Appraisal

After the initial design of the e-wallet application "DASIGU" has been done, conducting a product development trial to a sample of application users required expert appraisal. There are two experts, namely the content validator and the media validator. The instrument prepared for expert assessment is a validation sheet. On the validation sheet, there are 11 statement indicators for content validation. On the media validation sheet, there are 10 statement indicators, as well as comments and suggestions from content and media validators.

The percentage of scores generated from the 11 indicators on the content validation sheet reached 85%. Based on the Likert scale interval, the number falls into the category "Very Worthy" of use. The content validator suggests that it is necessary to add an image showing SMK YPM 3 Taman because if the school's identity is only in the form of a name, then it does not represent the school.

Table 1. Content Validation Indicator

Indicators	Score	Average
User Friendly	5	
App view	3	
Menu requirements with application needs	4	
Menu order layout	4	
Selection of logos on the app	4	
Practicality of DASIGU application	4	4,2
DASIGU app access speed	5	
Clarity and suitability of the language used (communicative) ini the DASIGU application	4	
The usefulness of the application as a payment medium	5	
Ease of transaction using DASIGU application	5	
Image clarity, graphic illustration, visual and verbal on DASIGU application	4	

While the percentage of scores generated from 10 indicators on the media validation sheet reaches 72%, based on the interval scale Likert, the number falls into the category of "Worthy" use. Media expert validator provides advice for developing e-wallet applications that optimize android version applications and needs to be created a guide module on how to use applications in the form of videos or others.

Table 2. Indicators on Media Validation

Indicators	Score	Average
Initial view on DASIGU application	4	
DASIGU app menu view (icon)	4	
DASIGU app content view	4	
Flexibility of DASIGU application	3	
Suitability of color proportions (color balance) application	4	
Practicality of DASIGU application	4	3,8
DASIGU app access speed	3	
Clarity and suitability of the language used (communicative) in the DASIGU application	4	
DASIGU application attractiveness	4	
Clarity of images and illustrations on the DASIGU application	4	
Initial view on DASIGU application	4	

Developmental Product Testing

The sample selected for the e-wallet product trial was 173 consisting of students in grades 10, 11, and 12. The total population of education educators and students in SMK YPM 3 Taman is 1.241. The technique used in selecting this sample is stratified random sampling, which is selecting a random sample whose population consists of levels or strata (Herdiansyah, 2019).

The product trial was conducted for a month by requiring students appointed as samples to fill the balance on the e-wallet application by top-up at the mini Bank SMK YPM 3 Taman Laboratory. Students selected as samples must fill in a minimum of 10 thousand Rupiah pulses and use this balance to make purchases at the S-MART SMK YPM 3 Taman mini market, which has integrated a non-cash payment system through the "DASIGU" e-wallet application. Transactions are made by scanning the QR code or transferring to the S-MART account code.

After conducting a whole month of products trial, the user experience questionnaire model was developed through google Forms with 26 indicators related to the development of e-wallet products. Then the questionnaire is distributed through google classroom and WhatApps to facilitate filling the questionnaire by a predetermined sample.

The percentage of scores generated from questionnaires filled by 173 samples with 26 user experience indicators resulted in a figure of 73,4 %. Based on the interval scale Likert, the number falls into the category of "Worth" use. For the lowest score, there is an indicator of the difficulty level in learning the concept of non-cash transactions through the e-wallet application "DASIGU," which

produces a figure of 65%. Therefore, clear guidelines must be made for using e-wallet applications in videos and other forms.

The highest percentage score of 26 indicators indicates e-wallet application development in support of school programs. This indicator produces a percentage of 85.6%. SMK YPM 3 Taman already has three business entities (UPJ, Mini Bank, S-MART), implementing non-cash payments via e-wallets to make it easier for consumers to make transactions. From the data that has been described, the developed e-wallet application can provide convenience in transactions. The questionnaire results the state that most e-wallet application users are satisfied.
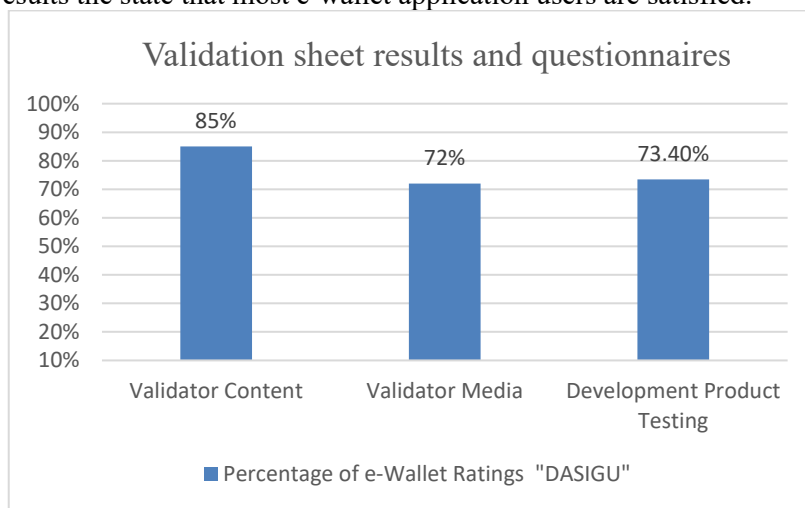

Figure 7. Percentage of e-Wallet Ratings "DASIGU"

Dissemination

The dissemination stage is the last in the research and development model of 4D development. This stage is divided into three stages of the process related to disseminating the e-wallet product "DASIGU" to the target market share, that is, all residents of SMK YPM 3 Taman ranging from educators and students. The stages in the dissemination process are validation testing, packaging, and diffusion and adoption.

Validation Testing

Based on the results of product development trials, it is necessary to revise the weaknesses in the e-wallet application. Improvements were made regarding the level of difficulty in learning the concept of non-cash transactions through the "DASIGU" e-wallet application, namely by making a guide in the form of graphic images presented on the initial appearance of the e-wallet web application. The next plan in this development is to include a video guide for using the e-wallet application. After several revisions, the "DASIGU" e-wallet application product is ready to be disseminated to users/application users, namely all teachers and students of SMK YPM 3 Taman Sidoarjo.

Packaging

Packaging is crucial to attracting consumers to use digital wallets or e-wallet applications for transactions. This packaging is related to the socialization and introduction of the e-wallet product "DASIGU." Product socialization and introduction are divided into two activities: launching and socialization. The launch or introduction of the "DASIGU" digital wallet application was attended by the Chairperson of the YPM Sidoarjo Foundation, Principals of schools around the entire YPM complex, teachers, and teaching staff at SMK YPM 3 Taman Sidoarjo.

The second event was disseminating the e-wallet application to YPM 3 Taman SMK students, carried out in each class by the application development team. Outreach to students is carried out by explaining the various functions of the e-wallet application and monitoring students to register for the "DASIGU" e-wallet application. This socialization and introduction are expected

to optimize the use of applications in non-cash transactions. At SMK YPN 3 Taman, students must have and register their account with this e-wallet.
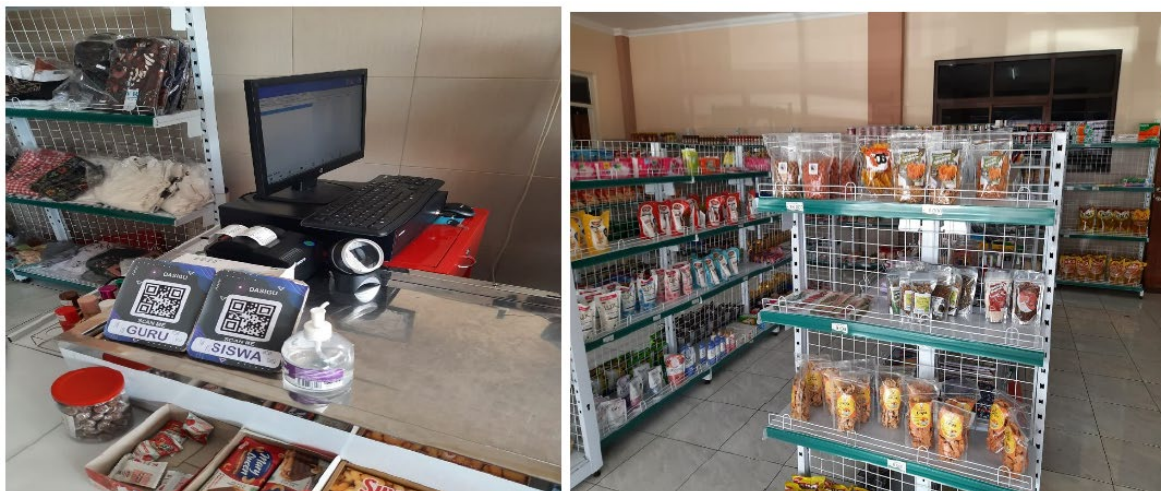

Figure 8. Transaction Process Through QR Code and Products Produced by Students

Difussion and Adoption

During the validation and packaging process, it is hoped that the e-wallet application can be absorbed (diffusion) and understood by all SMK YPM 3 Taman residents so that the e-wallet application can be used (adapted) for non-cashless. In addition to attracting the interest of SMK YPM 3 Taman residents in using e-wallet applications as a means of non-cash payment, the school made the policy in question to develop and advance school-owned business entities, among others: (1) A 5% discount for teachers and education staff are included in the balance of the e-wallet application so that teachers and education staff do not need to top up funds and can use the balance to make purchases at the S-MART SMK YPM 3 Taman minimarket; (2) Top-up obligations for SMK YPM 3 Taman students are at least 10 thousand Rupiah on each e-wallet application account. It is hoped that through this obligation, students can learn about how to system non-cash transactions through the e-wallet "DASIGU."; and (3) Giving special discounts and cashback on purchase transactions using the e-wallet application "DASIGU."

CONCLUSION

The school engaged in vocational expertise, SMK YPM 3 Taman Sidoarjo, has a business entity owned by a teaching factory-based school that is UPJ (unit service), Banking laboratory, and S-MART is a school mini market. The development of an e-wallet integrated into the teaching factory will facilitate every transaction. In addition, it will encourage the digitization of the school s financial system to be more transparent and accurate. This research includes a type of research and development using 4D development models. The stages in the development model include: defining, designing, developing, and disseminating. The e-wallet app "DASIGU" can be accessed via the web, android, and iOS-based mobile apps. We provide payment methods and bookings through QR code scans but a "Transfer" menu to facilitate mobile phones that do not yet support barcode scan payment systems. Charging funds on the e-wallet application "DASIGU" or top-up can be done at the banking laboratory of SMK YPM 3 Taman. The minimum money for top-up transactions on e-wallet applications is 10 thousand Rupiah. The product trial was conducted for a whole month on 173 selected samples by requiring students who were designated as samples to fill the balance on the e-wallet application and must use the balance to make purchase transactions in S-MART mini market SMK YPM 3 Taman that has integrated a non-cash payment system through the e-wallet application "DASIGU." The percentage of scores generated from questionnaires filled by 173 samples with 26

user experience indicators resulted in a figure of 73,4%. Based on the interval scale Likert, the number falls into the category of "Worth" use.

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