# MOBILE APPLICATION FOR PRODUCTS COMMERCIALIZATION IN PULAU TUBA, LANGKAWI USING AGILE DEVELOPMENT

**MUHAMMAD AZIZI MOHD ARIFFIN[1], MOHAMAD YUSOF DARUS[2], MUHAMMAD ADLAN AKMAL ABDUL AZIM KHOR[3]**

[1 2 3]Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Shah Alam, Selangor,

Malaysia

E-mail:  [1]mazizi@fskm.uitm.edu.my, *[2]yusof@fskm.uitm.edu.my, [3]adlan@gmail.com

## ABSTRACT

Digital Divide is one of the factors which cause income inequality and poverty among the rural population. In Malaysia, one of the poorest rural communities is Pulau Tuba Langkawi. The Island is located 5 kilometres away from the main Pulau Langkawi island, rich with forest herbs, seafood, and natural beauty. Although the island has basic infrastructure such as electricity, running water and a telecommunication tower, the population lived in poverty as half of the population has a monthly income of RM500 although they have an abundance of natural produce. To address the problem and poverty among the Pulau Tuba population, this paper proposed an easy-to-use e-commerce application using a dynamic mobile and web-based framework for commercializing the rural area product to the external market. The design of the proposed e-commerce application will incorporate a simple interface to help users with a limited ICTs skillset. The development of the mobile application uses Agile methodology to enable continuous features development to cater for the needs of the rural population at the later stage of deployment. Moreover, the application was developed using the Ionic framework, Angular for frontend and Firebase for back-end implementation. After the mobile application has been developed, several individuals in Pulau Tuba are chosen as a tester for the Beta version of the mobile application. Based on tester feedback, the majority agree that the apps help them to market their product and the apps are easy to use even for individuals with no ICTs skills. This has the potential to ease the process of commercializing the rural area product and eventually reduce the poverty among the island population.

**Keywords:** *E-Commerce, Digital Divide, ICTs, Rural Area Development, Internet, Agile Methodology*

## 1. INTRODUCTION

This research paper is an extension of our previous work, in which study the digital divide in Pulau Tuba, Langkawi by examining internet accessibility and IT literacy [1]. One of the recommendations of the previous work is to introduce a simple and easy e-commerce system or mobile applications for marketing the rural products of the Pulau Tuba, Langkawi. The Pulau Tuba is a hilly island located 5 kilometres away from a more modern and prosperous Pulau Langkawi. This island is a traditional fishing village and not fully developed thus contain a natural home ground for wildlife and has an ample growth of herbs and shrubs. Based on a survey conducted by [2], the Pulau Tuba population is among the rural communities in Malaysia which have a high unemployment rate and low education attainment, and due to that, it will be difficult to lift themselves out of poverty. Poverty also causes many of the population to migrate to other areas which have caused a demographic problem for the island [3]. Thus, in line with the UN's sustainable development goals (SDG) to eradicate poverty [4], there is a need to use technology to reduce the poverty rate among the Pulau Tuba population.

E-commerce, also known as electronic commerce or internet commerce, refers to the buying and selling of goods or services using the internet, and the transfer of money and data to execute these transactions. In China, we have seen the success of using e-commerce applications to sell the product to the poorest rural population such as in the Shandong province to lift them out of poverty [5]. The e-commerce program in rural China begins with the government providing basic training such as online store management, photography skills and online marketing to the population. A similar e-commerce success could also be implemented in the

population of Pulau Tuba, Langkawi. They are offering various exotic and unique delicacies, not to mention unique crafts, products and even services that are only available there. The Pulau Tuba is rich with a lot of seafood and agricultural produce which has commercial value [6]. If the products are being promoted to the outside market it will potentially increase the income of the population. However, as the island is underdeveloped, most of the island residents lack the knowledge or ICT skills to operate technology, especially e-commerce platforms. The study conducted by the work of [7] and [1] has concluded that the rural population in Malaysia has limited ICT skills. Thus, an easy and simple e-commerce application is one of the major requirements for such a system to be accepted by the population.

Besides lacking the ICT skills, developing an application for the public population is often plagued with creeping or changing requirements [8] to follow the needs of the rural population. According to a study [9] conducted on agriculture and digital in a rural area, the rural population has various needs to address for digital adoption and acceptance. The requirement during development may need to be changed to cater for the different levels of digital literacy during the acceptability test. Moreover, the requirement may also change to cater to various business situations and products of Malaysia's rural population [10]. Therefore, the development method of the proposed mobile application must be flexible such as the Agile development [11] methodology to allow changing requirements at the later stage of the software deployment.

To address the issues which have been identified in the Pulau Tuba population. this project proposed an e-commerce application using a dynamic mobile and web-based framework for commercializing the rural area product to the external market. The design of the proposed e-commerce application will incorporate a simple interface to help users with a limited ICTs skillset. This paper consists of 5 sections: Introduction, Literature Review, Methodology, Results and Discussion and Conclusion. In the literature review section, the related topics regarding rural area commercialization, e-commerce and mobile apps development are being discussed. In the methodology section, the agile development methodology is being discussed in detail and the overall design of the proposed mobile application. Meanwhile, the results and discussion section

discuss the survey results to verify the mobile app usability.

## 2. LITERATURE REVIEW

This section will review topics related to Pulau Tuba Langkawi, the digital divide, mobile applications, and e-commerce All the topics are fundamental for the research.

### 2.1 Pulau Tuba Langkawi

Pulau Tuba, is a hilly island and the only inhabited one, besides the main Langkawi Island. It is a strikingly beautiful Island located 5 kilometres from Kuah Jetty and a 20-minute boat ride. It is a traditional fishing village, and the villagers prefer the old ways of drawing water from the wells although it provides all the other facilities like power, freshwater supply, telephones, and they also provide several homestay programs unionized by Malaysia's Fisheries Development Authority. Pulau Tuba isn't exactly as luxurious or prosperous as Langkawi is. Even though it is just a few kilometres away from Langkawi, Pulau Tuba is an underdeveloped and poor island.

At Pulau Tuba, the fisherman occasionally goes to the forest to collect herbs, medicinal roots, wild fruits, wax, and honey and sell them to complement the family income. The women are also very skilful and keep occupied in weaving Pandan, coconut leaf mats and other handicrafts for basic usage and to support the family income. In previous research, we have identified that Pulau Tuba is equipped with basic infrastructure such as electricity, running water and internet connectivity. The cellular Internet coverage on the island is mostly available in the town centre and around the school area, while the wired internet coverage is available in the Government's Internet cafe facility called Pusat Internet 1Malaysia.

Although the island is equipped with basic infrastructure and rich with natural resources such as exotic plants, wild herbs, seafood, and natural beauty attraction, most of the population lived in poverty. Half of the population has a monthly income of below RM 500 (120 USD). Furthermore, only a small amount of the population finished their secondary school education [3]. Moreover, most of the population has no basic digital literacy skills such as using a computer, creating a website, maintaining social media sites, or using an e-commerce site. Although there is basic internet infrastructure on this island, they cannot utilize it to increase their income due to a lack of skills, this is known as the digital divide.

## 2.2 Digital Divide

The digital divide is referring to the gap between demographics that have access to information and communications technology, and those that have restricted access to such technology [12]. The barrier to accessing such ICTs technology can be due to many factors, but in the case of the Pulau Tuba population, it was due to a lack of digital literacy skills and the availability of the infrastructure. ICT technology has the potential to alleviate poverty on the island, as ICTs can be used to sell unique local produce, agricultural product, and seafood and promote the natural beauties of the island for tourism. The digital divide occurring due to lack of ICTs skills can be reduced by introducing easy to use e-commerce system which requires only minimal ICT skills for its operation. E-commerce, also known as electronic commerce or internet commerce, refers to the buying and selling of goods or services using the internet, and the transfer of money and data to execute these transactions [13]. An E-commerce application is one of the directions the project will be taking forwards. Using E-commerce applications, we can use it to commercialize products produced by the locals to the outside world.

## 2.3 Mobile Application and E-Commerce

Meanwhile, a mobile application, more commonly known as an app or mobile app, is a type of application software or computer program designed to run on a mobile device, such as a smartphone or tablet [14]. Apps were originally intended for productivity assistance such as email, calendar, and contact databases, but expanded into other areas such as mobile games, factory automation, GPS and location-based services, order-tracking, and ticket purchases so that there are now millions of apps available. With over 2.7 billion smartphone users across the world, it's no surprise that the mobile app industry is thriving. App usage and smartphone penetration are still growing at a steady rate, without any signs of slowing down in the foreseeable future. Experts predict that there will be a 25% increase in global app downloads between 2018 and 2022. To make an e-commerce system easier to use and access, it is usually being developed based on mobile applications.

A lot of studies have been done on the topic of e-commerce and rural area development. The work of [15] uses secondary data to study the current position of e-commerce in India, analyze the future of electronic business in India and study the challenges faced by e-commerce players in India. Even though in their study, the authors consider the e-commerce penetration in India's rural areas, it does not capture the challenges and technical requirements to increase e-commerce adoption. Moreover, the work did not provide a practical solution to the challenges of e-commerce in the rural area. The work of [16] and [17] study the holistic approach to the development of E-commerce for youth in India and insights into the government of India's e-commerce policy, it was a comprehensive study and the same study should be conducted in Malaysia so that we can get a clear view on the state of e-commerce adoption in Malaysia. But the work scope is more towards discussing the digital policy framework and not focusing on the technical aspect of the e-commerce platform to make it easy to use for the rural population. The work did not address the challenges faced by changing the requirements of the rural population when developing an application that requires a flexible or agile development method.

Moreover, some works study the e-commerce ecosystem in Malaysia, for example, [10] review the challenges and advantages of Malaysia's e-commerce and have pointed out that IT infrastructure and security are among the challenges of E-commerce implementation in Malaysia. But the work scope did not discuss leveraging e-commerce technology for the benefit of Malaysia's rural population and did not consider the limited ICT skills among the population. Lastly, the work of [7] investigates the problem of e-commerce adoption among small and medium businesses (SMEs) in rural areas. They have identified that due to lack of ICT skills, internet access and funding cause a significant barrier to e-commerce adoption. Although the study has identified the determinants, it doesn't propose or suggest a solution to the problem and how technology can be leveraged to reduce poverty in rural areas and how the natural product can be marketed via the Internet.

In the mobile application development lifecycle, the widely adopted methodology is Agile as follows the iterative approach that breakdown features or requirements into smaller iterative which minimized development risk and allows more efficient development of complex software [18]. In this project, agile allows new features to be added incrementally and the new features being tested thoroughly by the island population. The work of [19], analyses the behaviour of a team of developers when applying the agile methodology to

build an e-commerce app. Based on their findings, agile is the most efficient for apps with many requirements and inspires IT industries with better means of achieving business goals. The work of [20] also draws the same conclusion that developing an e-commerce application using an agile framework is flexible and efficient. But the work did not consider using the Agile method to address the need of the rural population as its end-user. Meanwhile, the work of [21] proposed an agile-based software application to benefit rural or small communities. The approach shows that agile is suitable for developing an application for small communities and able to improve their quality of life. Based on the review of the related work, a lack of work has been done to leverage e-commerce technology to reduce poverty among the rural population in Malaysia, especially in Pulau Tuba, Langkawi. Without an effort to use technology, the Pulau Tuba population will continue to live in poverty and consider an underdeveloped area.

## 3. METHODOLOGY

The development of the proposed e-commerce system is conducted based on the Agile Development methodology which consists of meeting, planning, designing, developing, testing, and evaluating phases. The Agile methodology will ensure the app development doesn't end up in a one-way street, instead continuously adding and upgrading the features, Figure 1 shows the Agile methodology development life cycle.
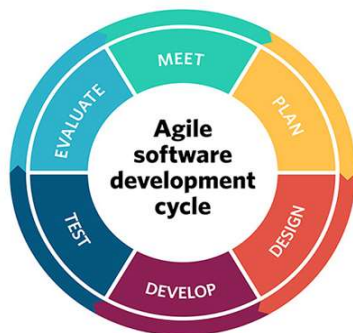


*Figure 1: Agile Methodology Development Cycle* [22]*.*

### 3.1 Meet Phase

During the meet phase, the e-commerce requirement was gathered by interviewing the local population of Pulau Tuba island. Based on the initial interview conducted with the stakeholders, the stakeholders' main issue is the lack of global

reach of their products. This is mainly because of their lack of technology and Malaysian tourists' lack the knowledge of Pulau Tuba. Based on their initial thoughts, the lack of knowledge of Pulau Tuba and their culture are one of the hurdles to the commercialization of products to the outside world. After the requirement has been gathered from the end-user, the project moves to the Plan phase by planning how to turn the requirements into a prototype.

### 3.2 System Design

The next phase is system design. In this phase, the project moves into the design stage by detailing the user's use case, system flowchart, sequence diagram and entity relationship diagram or ERD. The use case diagram summarized the users of the system and how they use and interact with the system. Figure 2 shows the use case diagram for this project. Based on the use case, two end-users have identified the customer and seller who are the island population marketing their product.
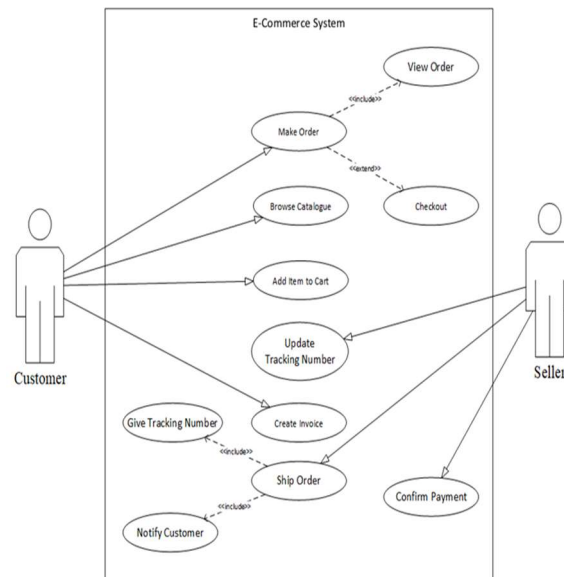


*Figure 2:* The System Use Case Diagram.

### 3.1.1 First Use Case Scenario: Customer

Customers will be able to use the system to make orders for products. Customers will not only be able to browse through a variety of products, but they can also add to the cart to purchase later. The list of customer interactions and activities are listed below:

- Customer logs in.
- Customers browse the catalogue.
- Customers add an item to the cart.

- Customers make an order.
- Customer checkout.
- Customer can view orders.
- Customer receives tracking number.
- Customer notified of shipment.
- Customer receives an order.

### 3.1.2 Second Use Case Scenario: Seller

Sellers will use the system to sell products. Products can be advertised by the seller and all the details are displayed. Once payment is confirmed, the seller can ship the order and give the tracking number to the respective customers.

- Seller logs in.
- Seller advertises a product.
- Seller receives an order.
- Seller creates an invoice.
- seller confirms payment.
- Seller ship order.
- Seller notifies the customer of shipment and gives tracking number.
- Seller receives a rating from customer.

Figure 3 in the appendix shows the flowchart diagram for this system. A flowchart is a type of diagram that represents a workflow or process in a system. The flow starts with the authentication of users. Which proceeds by a condition based on whether the user wants to buy or sell products. If the user chooses to buy, the user can decide to buy it now or add it to the cart for later purchase

Figure 4 in the appendix shows the sequence diagram for this system. A sequence diagram shows object interactions arranged in a time sequence. The sequence diagram consists of actors, lifelines, activations, and messages. A sequence diagram can have multiple actors. For this system, three active actors are the seller, system, and customer. Although the seller and customer are both users, there is always one seller and one customer in a single transaction.

The proposed e-commerce system being developed will feature a login system for both the customer and seller, which is why it needs a table for login, customer, and seller. The seller will sell products, all of which will have their table. The customer will make orders and each order made will be stored on the order table. Each product being ordered will have its details in the Order_Product table. Figure 5 shows the entity-relationship diagram summarizing the system database design.
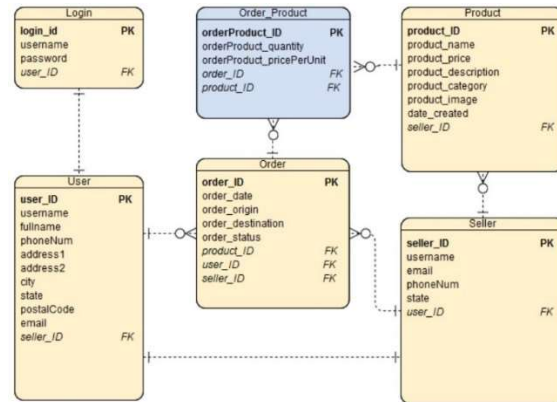


*Figure 5:* System Entity Relationship Diagram.

### 3.1.3 Interface Design

The User Interface (UI) design for the system is minimalistic as it is focused on simplicity and user-friendliness to cater to non-technical users. It has less text in the interface and more graphics. The UI is more object-oriented, allowing users to click on symbols, pictures, and icons more than text would. The UI has a lot of vibrant colours to attract the eyes of the users. It is limited to 2 or 3 colours to avoid the UI looking too messy. All the text and icons are placed strategically to maintain their high discoverability which allows the users ease of navigation through the system.

In this proposed app, the interface is designed to showcase only what the users want which are the products. It is made simple without any sections so that users can continuously scroll down while viewing products. The purpose of the account page is for users to access all pages and settings on one page. This page is created when users view a single product at a time. The page will display the image of the product, the name of the product, the price of the product and the description of the product. Users can also add the product to the cart for purchase later. The My Cart page keeps all the items that you want to purchase later. The page also displays the delivery destination to ensure the products are shipped to the right destination. The order History page keeps both the order and history section in one place for easy viewing. The order section is placed on top for orders that are still active, while the history is placed below it for orders that are completed. The history section keeps track of all the orders made by the user, alongside all the details such as seller information and product bought. Figure 6, 7 and 8 shows, the interfaces of our proposed mobile apps.
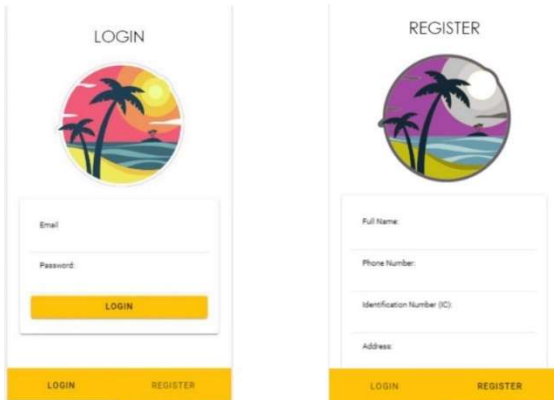
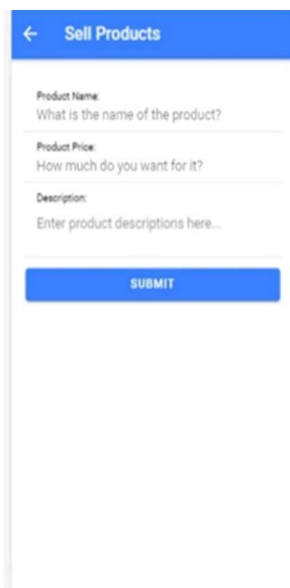*Figure 6:* Mobile Apps Login and Registration Interface



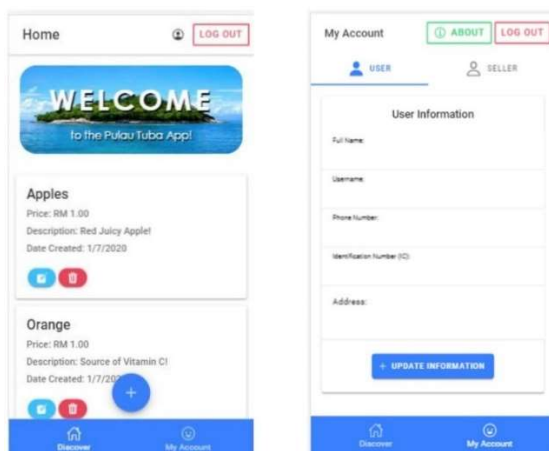*Figure 7:* Mobile Apps Adding Product Page



*Figure 8:* Mobile Apps Product Listing and User Profile Page

### 3.2 System Testing and Evaluation

The test phase is very crucial and will be conducted every sprint of the app development. The app will be given to multiple selected testers for the usability test. Each tester will test the app at a different location to test the connectivity of the app and functionality of the app in a rural area. During testing, the user's feedback was recorded for qualitative analysis. An example of questions being asked to users is "Did the e-commerce application helps to market your product?" and "Please provide a rating on the system's ease of use".

To verify the usability of the e-commerce mobile application developed in this project, several individuals in Pulau Tuba especially a small business have been chosen to test the apps. The beta version was installed on the individual smartphone for testing. After they have tested the apps, their feedback is recorded for analysis. Several questions have been asked to the tester but only two questions relevant to the app's usability will be highlighted in this paper. The first question asks the user about the usefulness of the apps by this question: "Did the e-commerce application helps to market your product?". The second question asks users to rate the app's ease of use by this question: "Please provide a rating on the system ease of use.", The scale of 1 represents very hard to use, while a scale of 5 represents very easy to use. A total of 73 respondent feedback has been recorded.

### 4. RESULT AND DISCUSSION

The proposed e-commerce system has been developed and implemented for the use of the rural population in Malaysia. The system was developed in Ionic Framework which allows the developer to develop a native mobile app using HTML, CSS3 and JavaScript. The front end of the system was developed using the Angular framework. To facilitate the design goal of simplicity and ease of use, the main page will display products in cards and navigation will be limited to scrolling up and down to simplify the UI. Users will be able to see the product details, add to favourites and add to the cart on the cards. While the back end of the project is entirely using Firebase's services such as its database service, authentication, and file storage. It is not only simple to use but also able to store a lot of data, which is why it is often used in a project that requires mass storing such as an e-commerce app. TypeScript

language is also supported by Firebase to communicate between Firebase and the Ionic. The mobile apps used Firebase's authentication function which is important for the security purpose of using the app. This allows for multiple users to use the application, each with its database and data. The authentication service also provides multiple sign-in options such as emails, Facebook, Twitter and even GitHub. This is especially useful for developers to expand their sign-in options.

The result of the first question is shown in figure 9. The results show that 90.4% or 66 respondents agreed that the apps help to market their product, while 9.6% or 7 respondents said otherwise. This shows that most of the testers in Pulau Tuba agreed that the apps can help them to market their rural area products. Meanwhile, the result of the second question is shown in figure 10. The results show that 65 respondents rate the apps as either easy or very easy to use, while only 8 respondents said otherwise. The results show that the application design and implementation are easy to use and suitable for non-technical individuals.
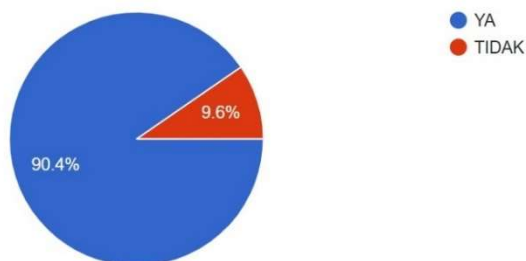


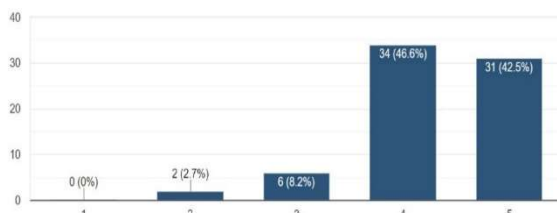*Figure 9:* Question One Feedback Result.



*Figure 10:* Question Two Feedback Result.

## 5. CONCLUSION

In Conclusion, this paper has successfully developed e-commerce mobile apps which design to help reduce the digital divide and poverty among the Pulau Tuba population by providing an easy-to-use platform to sell their rural product via the Internet. The mobile apps were designed from the ground ups to cater to the user with no ICTs skills by having a simple and easy-to-use interface. Having an easy-to-use interface is crucial in the effort to reduce the poverty as based on a survey conducted in a previous study, many of the Pulau Tuba population lack the ICT skills to operate an e-commerce application. The mobile apps were developed using the Ionic framework, an angular framework for front-end and firebase for back-end platforms. Moreover, as the development was based on Agile methodology, it is easier to revise the mobile application to cater for the needs of the Pulau Tuba Population in the later stage of deployment. For verifying and testing, several individuals on the island have been chosen to test the functionality of the app. Based on their feedback, the majority agree that the apps help them to market their product and the apps are easy to use even for individuals with no ICTs skills. For future work, the functionality of this mobile app can be expanded so that end-user can customize their store page in the mobile apps. Furthermore, the mobiles apps users can also be expanded to be used for other rural communities in Malaysia.

## REFERENCES:

[1] M. Y. Darus, M. Azizi, M. Ariffin, M. H. Jalil, M. Azahari, and M. Yusof, "A Case Study On Digital Divide And Access To Information Communication Technologies (Icts) In Pulau Tuba, Langkawi, Malaysia," Apr. 2021. doi: 10.17762/TURCOMAT.V12I5.2166.

[2] S. A. HALIM, I. KOMOO, H. SALLEH, and M. OMAR, "THE GEOPARK AS A POTENTIAL TOOL FOR ALLEVIATING COMMUNITY MARGINALITY SHARINA ABDUL HALIM IBRAHIM KOMOO MUSTAFFA OMAR," *Int. J. Res. into Isl. Cult.*, vol. 5, no. 1, pp. 2011–95, 2011.

[3] M. Omar and I. Yussof, "Transisi Demografi Dan Cabaran Pembangunan Lestari Di Pulau Tuba, Langkawi," *e-BANGI J. Sains Sos. dan Kemanus.*, vol. 1, no. 1, p. 22, 2006.

[4] U. Nations, "Sustainable Development Outlook 2020: Achieving SDGs in the wake

of COVID-19: Scenarios for policymakers."

[5]     Maria Fernandez Vidal and Xavier Faz, "E-Commerce Is Taking Off in Rural China: 3 Lessons for Other Countries," *CGAP*, Jan. 2020. https://www.cgap.org/blog/e-commerce-taking-rural-china-3-lessons-other-countries (accessed Mar. 21, 2022).

[6]     Morten Mack Berger, "'Don't get sick at sea': An Ecological Study of the Fishermen of Pulau Tuba, Langkawi, Malaysia," *University of Oslo*, 2015. https://www.duo.uio.no/handle/10852/45223 ?locale-attribute=en (accessed Mar. 21, 2022).

[7]     M. Jaganathan, U. Utara Malaysia Shuhymee Ahmad, U. Utara Malaysia Khairol Anuar Ishak, and U. Utara Malaysia Siti Noratisah Mohd Nafi, "DETERMINANTS FOR ICT ADOPTION AND PROBLEMS: EVIDENCE FROM RURAL BASED SMALL AND MEDIUM ENTERPRISES IN MALAYSIA," *Int. J. Entrep.*, vol. 22, no. 4, pp. 1939–4675, 2018.

[8]     H. Osman Ali, M. Zaidi Abd Rozan, and A. Mohamud Sharif, "Change Requirement Management Issues for a Large Software Development Projects," Accessed: Apr. 12, 2022. [Online]. Available: http://seminar.utmspace.edu.my/jisri/.

[9]     N. M. Trendov, S. Varas, and M. Zeng, "DIGITAL TECHNOLOGIES IN AGRICULTURE AND RURAL AREAS."

[10]    Zubaidi Faiesal Bin Mohamad Rafaai, Amir Hamzah Bin Abdul Rasib, and Mohd Shafinaz Bin Muhamad Zuki, "Enhancing e-commerce to sustain economy in Malaysia: Short Review," *Int. J. Sci. Bus.*, vol. 2, no. 4, pp. 718–724, 2018, Accessed: Mar. 21, 2022. [Online]. Available: https://ideas.repec.org/a/aif/journl/v2y2018i4 p718-724.html.

[11]    S. Alsaqqa, S. Sawalha, and H. Abdel-Nabi, "Agile Software Development: Methodologies and Trends Sentiment Analysis View project Social Media Networks View project," *Artic. Int. J. Interact. Mob. Technol.*, 2020, doi: 10.3991/ijim.v14i11.13269.

[12]    L. Starkey, A. Sylvester, and D. Johnstone, "Negotiating Digital Divides: Perspectives From the New Zealand Schooling System," *http://dx.doi.org/10.1080/15391523.2017.12 92161*, vol. 49, no. 1–2, pp. 31–42, Apr. 2017, doi: 10.1080/15391523.2017.1292161.

[13]    N. A. Bt Mohd and Z. F. Zaaba, "A Review of Usability and Security Evaluation Model of Ecommerce Website," *Procedia Comput. Sci.*, vol. 161, pp. 1199–1205, Jan. 2019, doi: 10.1016/J.PROCS.2019.11.233.

[14]    A. Kaur and K. Kaur, "Systematic literature review of mobile application development and testing effort estimation," *J. King Saud Univ. - Comput. Inf. Sci.*, Nov. 2018, doi: 10.1016/J.JKSUCI.2018.11.002.

[15]    C. . A. Panigrahi, R. Upadhyaya, and P. P. Raichurkar, "E-Commerce Services in India: Prospects and Problems," *SSRN Electron. J.*, Jan. 2016, doi: 10.2139/SSRN.2736822.

[16]    S. P. Sharma and N. Tandon, "E-commerce: A Gateway to Prosperity of Rural Youth in India," *J. Bus. Thought*, vol. 11, no. 1, pp. 17–27, Nov. 2020, doi: 10.18311/JBT/2020/25861.

[17]    K. HAJI, "E-commerce development in rural and remote areas of BRICS countries," *J. Integr. Agric.*, vol. 20, no. 4, pp. 979–997, Apr. 2021, doi: 10.1016/S2095-3119(20)63451-7.

[18]    B. Neyole Misiko Jacob and N. Misiko Jacob, "A Review of Mobile Application Development in the Agile Software Development Environment," 2019.

[19]    N. Govil, M. Saurakhia, P. Agnihotri, S. Shukla, and S. Agarwal, "Analyzing the Behaviour of Applying Agile Methodologies DevOps Culture in e-Commerce Web Application," *Proc. 4th Int. Conf. Trends Electron. Informatics, ICOEI 2020*, pp. 899–902, Jun. 2020, doi: 10.1109/ICOEI48184.2020.9142895.

[20]    P Sahithi and M Pradeep Kumar, "Implementing Scrum and Kanban Approaches for E-Commerce Web Application: An Agile Framework," *Int. J. Sci. Res. Dev. Vo*, vol. 9, no. 2, pp. 385–391, 2021, doi: 10.2/JQUERY.MIN.JS.

[21]    K. Summers, V. Salazar, D. Olszyk, L. Harwell, and A. Brookes, "The Development of DISC (Decision Integration for Strong Communities): An Agile Software Application of Sustainability Indicators for Small and Rural Communities," pp. 89–113, 2020, doi: 10.1007/978-3-030-48182-7_6.

[22]    A.-M. Gheorghe, I. D. Gheorghe, and I. L. Iatan, "Agile Software Development," doi: 10.24818/issn14531305/24.2.2020.08.
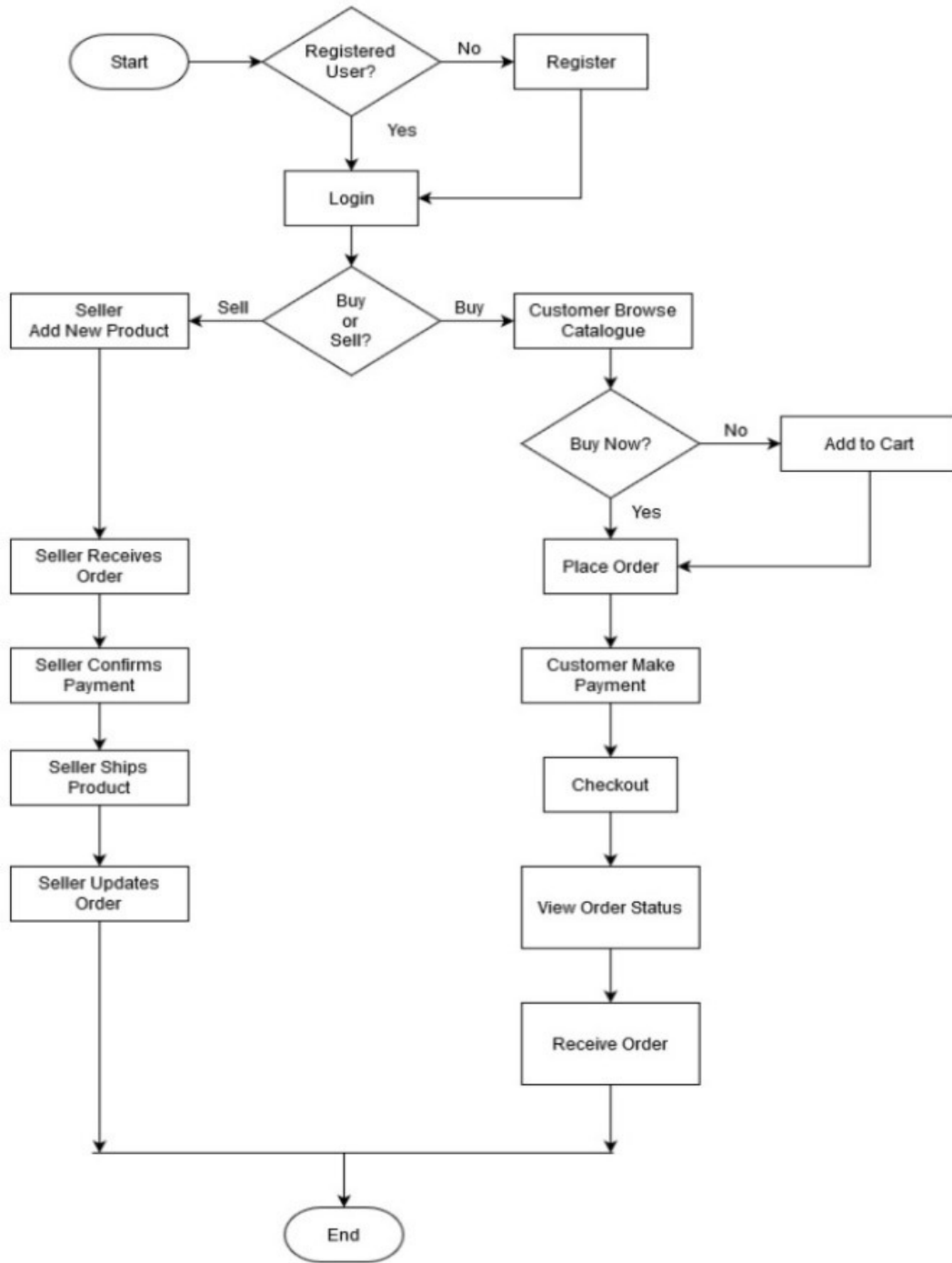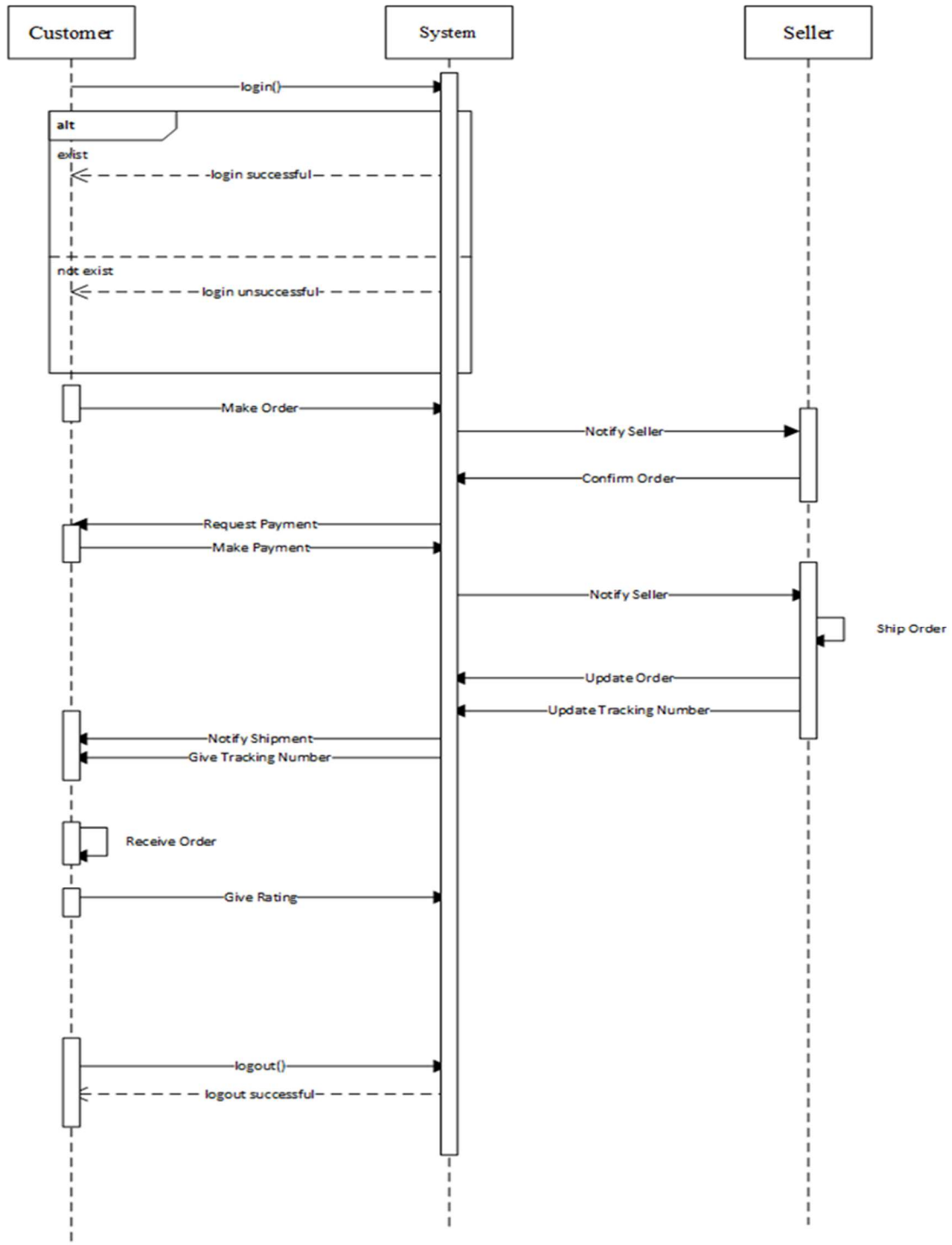
**APPENDIX:**



*Figure 3:* System Flowchart Diagram.

*Figure 4:* System Sequence Diagram.