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Proposed E-Commerce Platform for Unredeemed Pawned Items

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Abstract

Purpose: This work proposes a new e-commerce platform especially for trading unredeemed pawned items, so-called ePawnMart, by complying with the concept of Extended Technology Acceptance Model (ETAM), and then this work measures the user acceptance of the proposed platform. Research design, data and methodology: This study reviews current unredeemed pawned items selling methods and the extended technology acceptance model. This study presents work in two main parts. Firstly, it proposes ePawnMart, including use case diagram, activity flow, system requirements, system architecture, and product features, and analyses how the proposed platform complies with the concept of ETAM. Next, the research measures the user acceptance of the proposed platform by an online questionnaire survey in terms of the buyer side. Results: ePawnMart complies with the concept of ETAM in various features. The usage acceptance survey results suggest that the majority of both existing buyers and non-buyers would use ePawnMart to buy the unredeemed pawned items. This suggests that the proposed platform would help increasing the trading of unredeemed pawned items through online channels. Conclusions: ePawnMart would accelerate the growth of the pawn shop industry by improving pawn shops' working capital and promoting trustful online unredeemed pawned items trading transactions. Furthermore, it would help promoting the fair trade and Thailand's sustainable economic growth.

Keywords : E-Commerce, Pawn Shop, Online Platform, Extended Technology Acceptance Model (ETAM)

JEL Classification Code : L81, M15, G21

1. Introduction

The first e-commerce business was started in 1995 from advertising. Since then, it has grown very fast and has become an important means for advertising and sales (K. Laudon & J. Laudon, 2020). Especially during the Covid-19 pandemic, the e-commerce in Thailand had sharp and fast growth in 2020 and is expected to be one of the rising star industries in 2021. The government also has a policy to strengthen local online platforms to be able to compete over the international platforms (Thaiday Dot Com, 2021).

The influence of e-commerce affected various industries, including the pawn shops industry, but it seems that only big players successfully adapted into the online world, e.g., government owned pawn shop and meMoney (Nectar, 2018). According to Rocket Media Lab (2021), there are a total of 730 pawn shops in Thailand, including 277 government owned pawn shops and 453 private pawn shops. There is room for the online platform to provide an opportunity to all pawn shops, including small ones to get into the online world and also promote fair trade to the pawn shops industry.

In addition, to be able to survive in pawn shops industry, working capital is key. Without cash flow, the pawn shops will lack liquidity, not be able to run, lose trust from customers, and finally not be able to continue business (Siririn, 2018). Selling unredeemed pawned items in a short time duration is one of the main parts to maintain working capital. Based on data from one of the big pawn shops chain in Thailand, the average rate of unredeemed pawned items is 5% of total pawned items and will fluctuate according to the economic situation (Supattha, 2020). It is expected that the online platform will be able to help the pawn shops to reach more customers and sell the unredeemed pawned items quickly.

Therefore, the objectives of this study are [1] to propose a new e-commerce platform especially for trading unredeemed pawned items, so called ePawnMart, by complying the concept of Extended Technology Acceptance Model and [2] to measure the user acceptance of ePawnMart.

The rest of this paper presents Literature Review in Chapter 2, Research Methods in Chapter 3, Proposed

Platform in Chapter 4, User Acceptance Survey Results and Discussion in Chapter 5, and Conclusion in Chapter 6.

2. Literature Review

This study reviews the relevant literature on two main topics, which are unredeemed pawned items selling methods and the extended technology acceptance model. The explanation of each topic is explained below.

2.1. Unredeemed Pawned Items Selling Methods Review

Nowadays, there are several methods that are used by pawn shops to sell their unredeemed pawned items:

2.1.1. Showcase at shop

The most traditional way to sell unredeemed pawned items is to show them at the pawn shop itself. Customers who are interested in buying unredeemed items need to walk-in each pawn shop by themselves. However, most of the pawn shops show unredeemed items behind the traditional grilled store fronts as showcase, which seems to be intimidating to unfamiliar customers. Therefore, some new pawn shops tried to attract new customers by changing their store layouts by using the glasses instead of traditional grille and then show unredeemed items behind the modern showcase (Arty, 2020).

This seems to be more customer-friendly, but each pawn shop may have some struggles to expand the customer base due to distance and awareness limitations of physical shops. On the other hand, the customer needs to visit at each pawn shop and find if there are any interesting unredeemed items or not. Some visits may result in a waste of time and costs without getting any good items.

2.1.2. Seasonal Auction

To make it be more interesting, some pawn shops hold their own seasonal auction of the unredeemed items (Matichon, 2016). The news of the auction event could be promoted through word-of-mouth, public release, and the mass media.

This method allows the pawn shops to gather the unredeemed items from all of their branches to sell at one place. Interested customers can walk-in to participate in an auction. However, this method requires high cost of holding and promoting the auction events. Small players would not be able to afford and also not have enough unredeemed items to do such auction events.

2.1.3. Own Website and Social Media

As well as the traditional ways of selling unredeemed items, some pawnshops started posting unredeemed items on their own website and social media, e.g., Government Pawn Shop Website (Matichon, 2016), Kim Tai Pawnshop Facebook. This method of selling is more convenient for both pawn shops and customers than traditional ways as it allows local pawn shops to reach wider target customers with affordable costs and also allows customer to explore available unredeemed items and price without taking a real visit. However, some pawn shops may face a problem of gaining customer trust, and customers need to explore each site or social media one by one.

2.2. Extended Technology Acceptance Model

Technology Acceptance Model (TAM) was firstly introduced by Davis (1989) and has become one of the most influential models to study the factors influencing the user's intention to use new technologies. Since then, TAM has been adopted and extended with various acceptance factors to be better in the analysis of individual's behavior across different industries. (Venkatesh et al., 2012).

To increase the possibility that the prospective users will use ePawnMart, this study enhanced ePawnMart with the concept of the Extended Technology Acceptance Model (ETAM) introduced by Pantano and Di Pietro (2012) which consists of four main areas, i.e., perceived technology safety and cost, personal skills, social pressure and hedonic value.

2.2.1. Perceived Technology Safety and Cost

This area concerns the user's perception toward the particular technology in terms of security, cost, risk, and trust.

Perceived Cost: This concerns the user's perceived cost of the usage of the system. Higher perceived cost negatively impacts the usage intention of the particular technology.

Perceived Risk: This concerns the user's perceived uncertainty and possible negative outcome of using the

particular technology (Lee, 2009). Higher perceived risk negatively impacts the usage intention of the particular technology.

Perceived Security and Trust: This concerns the user's perceived trust of how well the particular technology is secure. Higher perceived security positively impacts trust and intention of the particular technology (Shin, 2009).

2.2.2. Personal Skills

This area concerns the user's personal traits that the self-efficacy and the behavioral control influence the user's decision to use the particular technology.

Self-efficacy: This concerns the user's perceived ease or difficulty of performing a behavior. Higher self-efficacy positively impacts the usage intention of the particular technology.

Behavioral control: This concerns the user's perceived control over the performance of a behavior. Higher behavioral control positively impacts the usage intention of the particular technology. (Ajzen, 2002).

2.2.3. Social Pressure

This area concerns the influence of the third on the user's decision to use the particular technology.

Social Influence: This concerns the influence from family, friends, media, and influencers that increase the user's intention to perform a specific behavior. Higher social influence positively impacts the usage intention of the particular technology.

Subjective Norm: This concerns the user's perception of whether the third parties think that he/she should perform a specific behavior. Higher subjective norm positively impacts the usage intention of the particular technology (Pai & Tu, 2011).

2.2.4. Hedonic Value

This area concerns the user's perception toward the particular technology in terms of enjoyment and satisfaction.

Enjoyment: This concerns the user's perceived pleasure from the particular technology. Higher enjoyment positively impacts the usage intention of the particular technology. (Venkatesh, 2000).

Satisfaction: This concerns the user's feeling emerging from the experience with the particular technology (Udo et al., 2010). Higher satisfaction positively impacts the usage intention of the particular technology.

3. Research Methods

This paper presents the work into two parts. Firstly, it proposes the online platform especially for trading unredeemed pawned items (ePawnMart) by complying the concept of ETAM. This includes use case diagram, activity flow, system requirements, system architecture, product features, and the analysis how ePawnMart complied with ETAM (Chapter 4).

The second part, the research measures the user acceptance of ePawnMart by using the online questionnaire survey in terms of the buyer side (Chapter 5). The samples are people whose age is around 18-45 years old in Thailand, including both people who have ever bought unredeemed pawned items in the past and people who did not. The total sample size was 113, which consists of 52 females (46%) and 61 males (54%). There are 5 samples aged 18 to 24 years (5%), 85 samples aged 25 to 34 years (75%), and 23 samples aged 35 to 44 years (20%).

The samples were firstly asked to answer yes/no questions regarding the previous experience of buying unredeemed pawned items. Then, the samples were provided with the description of the proposed system, mainly about the key features which comply with ETAM and the design prototype and asked to answer yes/no questions regarding the intention to use the proposed system. Moreover, the study analyses the data to answer two questions. 1) Do the existing buyers intend to use the proposed platform? 2) Do the non-buyers intend to start buying by using the proposed platform?

4. Proposed Platform (ePawnMart)

4.1. Use Case Diagram

The use case diagram shows the actors and the use cases of the proposed platform (See Figure 1).

4.1.1. Actors

Buyer: This actor represents the customers who visit the platform to register an account to purchase unredeemed pawned items.

Pawn Shop (Seller): This actor represents the pawn shops who register to open its shop on the platform to sell unredeemed pawned items.

Identity Provider: This actor represents the identity provider of the social account used for social login who authenticates the account back to the platform.

Payment Gateway: This actor represents the payment gateway service provider who facilitate the buyer's online payment and verify the payment back to the platform.

Admin: This actor represents the person who manage the platform by managing users, managing items categories, updating pricing recommendation, and resolving the dispute cases sent by buyers or sellers.

4.1.2. Use Cases

[1]. Buyer Account Management System:

Register Account: This use case describes how the buyer registers a new local account on the platform.

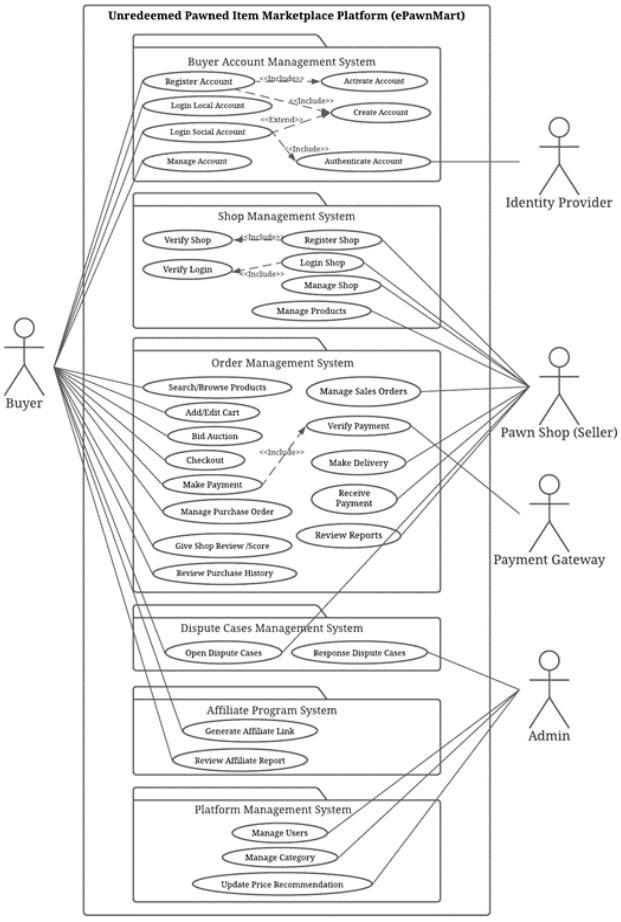

Figure 1: Use Case Diagram of the Proposed Platform

Activate Account: This use case is included in Register Account use case. It describes how the buyer activates an account by clicking the one-link sent to the registered email.

Create Account: This use case describes how a new buyer account is created either when the buyer registers a new local account or the buyer successfully logins through social account for the first time.

Login Local Account: This use case describes how the buyer logins into the platform with a registered account.

Login Social Account: This use case describes how the buyer logins into the platform with a social account.

Manage Account: This use case describes how the buyer manages the account settings on the platform.

Authenticate Account: This use case describes how the identity provider of buyer's social account authenticates the social account used to login into the platform.

[2]. Shop Management System:

Register Shop: This use case describes how the pawn shop (seller) registers a new shop on the platform.

Verify Shop: This use case is included in the Register Shop use case. It describes how the seller verifies registered shop on the platform.

Login Shop: This use case describes how the seller logins into the shop on the platform.

Verify Login: This use case is included in Login Shop use case. It describes how the seller verifies the login.

Manage Shop: This use case describes how the seller manages the shop settings on the platform.

Manage Products: This use case describes how the seller manages the products in the shop on the platform.

[3]. Order Management System:

Search/Browse Products: This use case describes how the buyer searches or browses for products on the platform.

Add/Edit Cart: This use case describes how the buyer adds or edits the products in the cart on the platform.

Bid Auction: This use case describes how the buyer bids auction for the product on the platform.

Checkout: This use case describes how the buyer checkouts products when the buyer clicks to purchase or wins an auction.

Make Payment: This use case describes how the buyer makes a payment to the platform.

Verify Payment: This use case is included in Make Payment use case. It describes how the payment gateway verifies the buyer's payment back to the platform.

Give Shop Review/Score: This use case describes how the buyer gives a review or score to the shop on the platform.

Review Purchase History: This use case describes how the buyer reviews the account's purchase history on the platform.

Manage Sales Order: This use case describes how the seller manages the shop's sales order on the platform.

Make Delivery: This use case describes how the seller makes delivery of the sold products to the buyer.

Receive Payment: This use case describes how the seller receives payment from the platform.

Review Reports/Analytics: This use case describes how the seller review the shop's reports and analytics on the platform.

[4]. Dispute Cases Management System:

Open Dispute Cases: This use case describes how the buyer or the seller open a new dispute case on the platform.

Response Dispute Cases: This use case describes how the admin response to opened dispute cases.

[5]. Affiliate Program System:

Generate Affiliate Link: This use case describes how the buyer generate an affiliate link on the platform.

Review Affiliate Report: This use case describes how the buyer reviews the account's affiliate report on the platform.

[6]. Platform Management System:

Manage Users: This use case describes how the admin manage the users on the platform.

Manage Category: This use case describes how the admin manages the categories available on the platform.

Update Price Recommendation: This use case describes how the admin updates the price recommendation on the platform.

4.2. Activity Flow

The main business flow of the proposed platform is as follows (see Figure 2):

[1]. Pawn shop (seller) registers shop on the platform.

[2]. The system creates a new shop account.

[3]. Seller verifies shop by submitting all necessary documents to the platform.

[4]. If shop registration is rejected, the seller needs to reverify the shop. If shop verification is approved, the seller signs the contract and sends back.

[5]. Seller can manage the shop and manage products on the platform.

[6]. Buyer visits the platform.

[7]. Buyer searches/browses for the items and gets item listings.

[8]. Buyer sees the item page for description and details.

[9]. Buyer adds item(s) to his/her cart.

[10]. Buyer needs to log in to the valid account to be able to check out item(s).

[11]. If buyer logs in with a Social account for the first time, the system verifies the authentication before creating a new buyer account.

[12]. If the buyer does not have a valid account and does not log in with a Social account, he/she needs to register and verify a new buyer account created by the system.

[13]. Buyer can now check-out the item(s).

[14]. The system calculates discount, shipping fees, and displays the total amount to be paid.

[15]. Buyer chooses the payment method.

[16]. If the buyer chooses Cash on Delivery (COD) method, the process will be skipped to [18]. If not, he/she needs to complete the payment on the platform.

[17]. The system verifies the payment with Online Payment Gateway and secures funds in escrow.

[18]. Seller receives the order.

[19]. As seller needs to keep updating the availability of the products, the seller is assumed to accept all orders. For the normal route, the process will be skipped to [21]. In case of emergency, the seller can cancel the order.

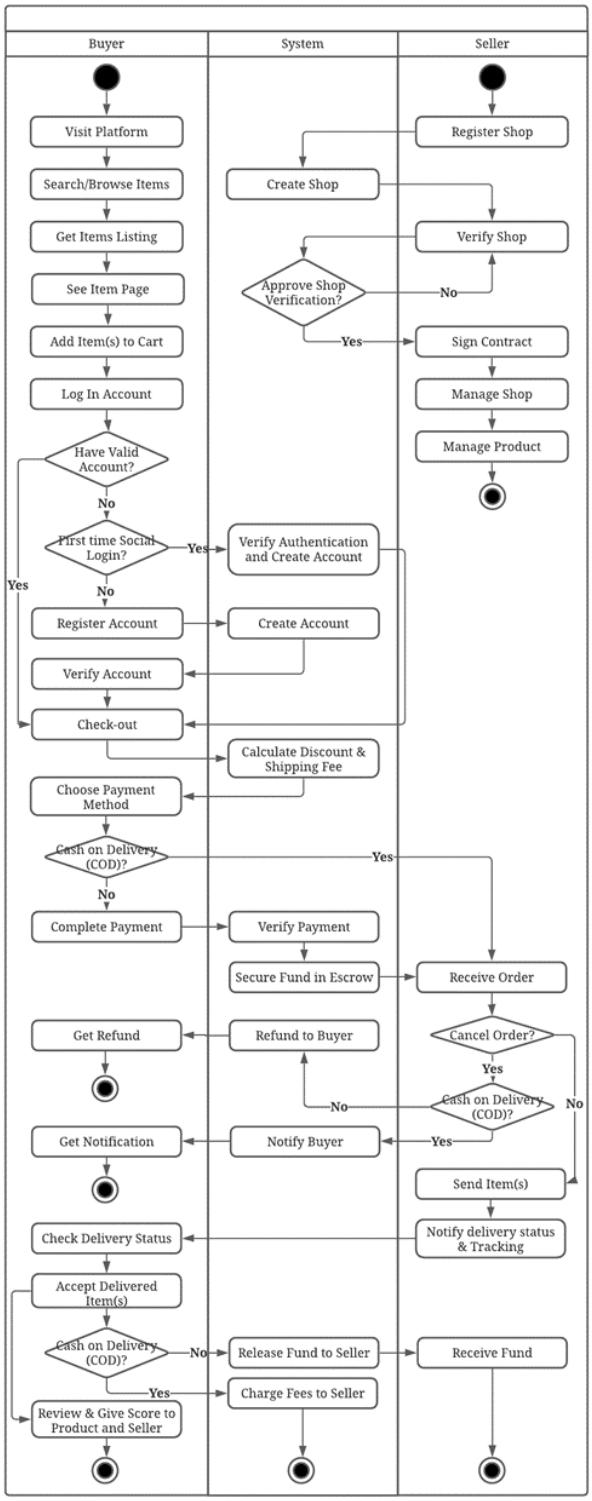

Figure 2: Activity Diagram

[20]. If the buyer chooses COD, the system notifies the cancellation to the buyer. If not, the system sends refund requests to Online Payment Gateway. The flow ends when the buyer gets a notification and/or refund.

[21]. Seller sends item(s) to the buyer.

[22]. Seller notifies the delivery status and tracking code.

[23]. Buyer can check the delivery status.

[24]. Buyer receives and approves the item(s).

[25]. Buyer reviews and gives score to both seller and products.

[26]. If the payment method is COD, the system charges fees to the seller account. The flow ends.

[27]. If not, the system releases funds to the sellers. The flow ends when the seller receives funds.

Besides the normal flow as described above, if there are any problems or concerns, e.g., item has defects, both seller and buyer can open the dispute cases to be solved by the platform admin.

4.3. System Architecture

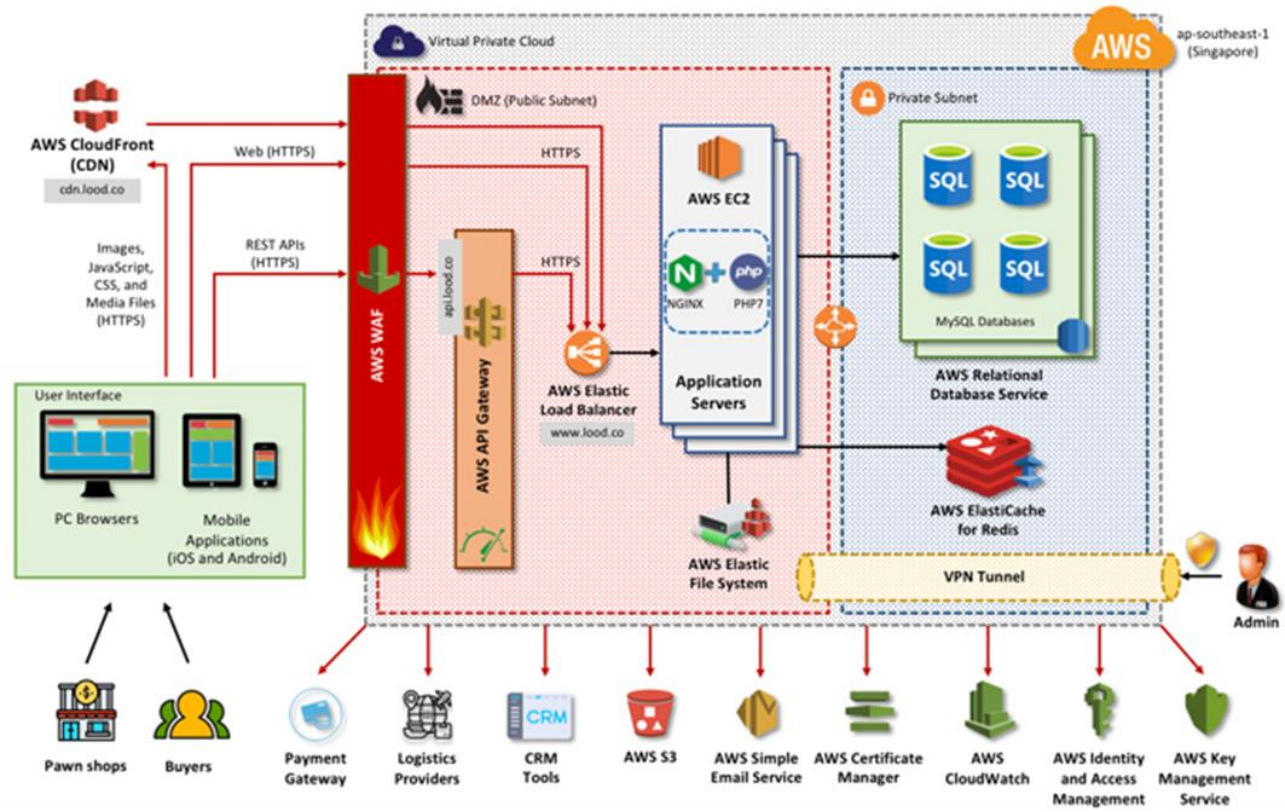

Figure 3: Architecture Diagram

Most parts of the system would be done through Amazon Web Service (AWS) because AWS is regarded as a leader in Cloud Infrastructure and Platform Services. The main strengths of AWS are the Engineering supply chain, large financial commitments, and Innovation leader (Bala et al., 2021). It has a leading wide range of services, SLA, security, and support. Although, it has no data center in Thailand, the closest one in Singapore provides excellent bandwidth, speed, and latency for Thais as 16Tbps Thailand International Internet Gateway is mostly connected to Singapore (Internet Information Research Network Technology Lab, 2021). The overview of the system architecture of the proposed platform is in Figure 3.

4.3.1. System Architecture Modules

The modules details are described as follows.

Web contents and web resources: The web content (HTML) will be loaded directly from the application server to ensure the data consistency while the web resources (images, JavaScript files, and CSS files) will be loaded from the nearest Content Delivery Network (CDN) edge server providing by AWS CloudFront service to the users to optimize the downloading speed.

API access: The web client and mobile client access the APIs on the application server to retrieve information or update data with authorization, access control, validation, and rate limit control which are done through AWS API Gateway.

AWS Web Application Firewall (WAF): The 7th layer (application layer) firewall will scan every content of the web request and response. Any suspicious attack,

including Distributed Denial-of-Service (DDoS), will be blocked.

AWS Elastic Load Balancer (ELB): To enable horizonal scalability and support failover, the application server will be deployed and serves users more than one server at a time. ELB will distribute all requests to all healthy backend application servers in Weighted Round Robin scheme; if any of application servers failed, it will be automatically removed from the pool and no request will be routed to it until it becomes healthy again.

AWS Elastic Compute Cloud (EC2): EC2 acts as a virtual machine. Red Hat Linux 8 operating system, NGINX Web Server, and the PHP code files will be deployed into it to serve as application server. EC2 also allow being scaled vertically by resizing to the larger server size. Both NGINX and PHP are free and open-source. They are the most popular web server and server-side programming language on the web, respectively (W3Techs, 2021).

AWS Elastic File System (EFS): As there will be multiple EC2 servers at a time, the platform PHP code and configuration files are kept in EFS shared drive. EFS enables one server to write a file then other servers will read a content of the same file. Therefore, with EFS, these multiple EC2 servers are working on the same file workspace.

AWS Relational Database Service (RDS) for MySQL: All transactional data is stored in AWS managed MySQL database. It provides cost-efficient, scalable, high-availability, resizable storage, and security.

AWS ElasticCache for Redis: The in-memory cache is used for accelerating the overall web and API performance by temporary caching rendered web pages, API responses, and database query results. The Redis works seamlessly with PHP.

AWS Simple Storage Service (S3): S3 is a cost-efficient and unlimited storage. S3 is used for storing product videos, product pictures, review videos, review pictures, and upload documentations, i.e., product manuals, seller registration documents.

AWS Simple Email Service: The Email Service acts as email sender, which will be used in many scenarios, e.g., confirm email address, password reset, purchase/delivery confirmation, and digital tax invoice delivery.

AWS Certificate Manager: The Certificate Manager provides free-of-charge SSL certificates which are bound to ELB and CloudFront. So, with SSL certificates, both web and mobile clients always exchange data with the backend in HTTPS protocol to ensure confidentiality and privacy.

AWS CloudWatch: Application logs, usage logs, performance metrics, incident events, and audit information are reported to CloudWatch. Administrators can query CloudWatch for investigating an issue or monitoring service workloads and performance.

AWS Identity and Access Management (IAM): IAM manages and controls access keys and credentials to access each AWS service.

AWS Key Management Service (KMS): KMS generates and stores rotatable full-disk encryption keys for EC2 disk, EFS, RDS storage, and backup snapshots.

4.4. System Requirements

4.4.1. System Requirements for implementation

Web Application Server Hardware: AWS Elastic Compute Cloud (EC2) – The platform chooses the general-purpose instance type m5dn.2xlarge that comes with 8 vCPUs and 32 GB RAM x 3 servers as web application server. The servers are guaranteed at least 99.99% SLA and deployed in different AP Southeast-1 (Singapore) availability zones to maximize fault tolerance.

Web Application Server Software: Each EC2 is run with Red Hat Enterprise Linux Server 8 as the operating system and PHP 7.4 as the source code interpreter and web application executer. The most recent version 1.21 of NGINX is served as a web server to run the web application.

Database Hardware: AWS MySQL Relational Data Services (RDS) – The general-purpose instance type db.m5d.4xlarge which has 16 vCPUs, 64 GB RAM and 99.95% SLA with multi-availability zone (multi-az) deployment to support failover will be used to support huge user transactions.

Database Software: The most recent version of MySQL 8.0 is used.

AWS ElasticCache for Redis: The 99.9% SLA general-purpose instance type cache.m5.large with 2 vCPUs and 6.38 GB RAM x 2 replicas will be provisioned. The Redis will play the important role to in-memory cache to speed up the web application performance.

For other AWS services, the platform will use as pay-as-you-go with standard AWS specifications.

By having these specifications, the platform is estimated to support approximately 100,000 users per day

and/or 5,000 transactions per day with efficient cost. Once the number of users has changed, the specifications can be both vertically and horizontally adjusted with minimum downtime thanks to the public Cloud concept. Referring to AWS Service Level Agreement (SLAs) document, the platform should have at least 99.9% service uptime – total downtime must be less than 8h 45m 56s per annual (Amazon Web Services, Inc., 2021).

In terms of the response time, the proposed platform utilizes Cloud Server and Database which are scalable up to the request volume, together with the help of Database caching and Content Delivery Network. Therefore, the response time is expected to be on average two seconds in case of no user device internet connection issues, making the proposed system acceptable by the users.

4.4.2. System Requirements for Client

Web Client: Buyers and pawn shops use standard web browsers to access the platform. Below is the list of supported web browsers:

- Google Chrome version 80 or newer
- Mozilla Firefox version 78 or newer
- Microsoft EDGE browser
- Apple Safari version 14 or newer

Mobile Client: Buyers can also use the application on their smartphones to access the platform. The application can be used on two major smartphone platforms:

- For iPhone and iPad, it supports iOS version 12 or newer.
- For Android phones and Android tablets, it requires Android OS version 6 (Marshmallow) or newer.

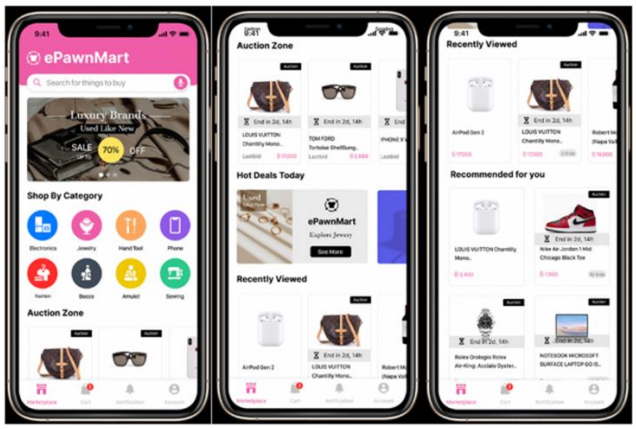

Figure 4: Application's Landing Page of Proposed Platform

4.5. Product Features

4.5.1. Product Features - Buyer

There are both website and application platforms available for the buyer to use.

4.5.1.1. Landing Page

The first screen that will be seen by all buyers when entering the platform (See Figure 4). Both website and application's landing pages start from the search on the top, following by Carousel Banner, Shop By Category, Auction Zone, Hot Deals Today, Recently Viewed, and Recommended for you, respectively.

The differences of landing pages between two platforms are Menu and FAQs, T&Cs, and General Information sections.

Personalization: ePawnMart will utilize the personalization based on user data under the privacy policy.

This applies to all items and banners displaying in each section and the notifications sent by CRM Tools. The recommended items are the items that have the most chance of the buyer purchasing by using user data, i.e., gender, age, items in a wish list, search history, item viewing history, purchase history, and third party's data.

4.5.1.2. Account Registration

Buyers are required to register an account by providing personal information. The buyers need to accept terms and conditions and a privacy policy in order to use the platform.

Because the e-mail address will be used as the account username and main communication contact, it must not be used by the other account.

Once the account registration is completed, the platform will send an e-mail to the provided e-mail address with one-time link for verifying the ownership of the e-mail. Failure to do so will result in account login being prohibited unless the e-mail address gets verified.

The account information will be used as a contact information if delivery failure or dispute support and an anonymous data to group an interest of items for

personalization service which conforms to a platform privacy policy.

4.5.1.3. Buyer Account Login

Buyers are required to provide the correct e-mail address and password to login into a registered local account.

Account Locking: Five times failed account login attempts will result in account locking; therefore, the user has to wait one minute before he/she is able to retry. This security measure prevents password brute forcing attack.

Forgot Password: The buyers are able to reset their account password if they forgot by providing an e-mail address. Once provided, the platform will match the e-mail address to the associated account information and send one-time password reset link. If the e-mail address is inaccessible, they are required to create a new account.

Social Login (OAuth 2.0): To help buyers with their login, the platform allows buyers to login by using the following popular OpenID providers: Google Account, Facebook Account, or Microsoft Account (Hotmail.com, Outlook.com). If the account has not been registered in the platform before, the required account registration information will be pre-fetched from the account provider and the buyers are required to complete the account registration process before being able to login.

4.5.1.4. Account

Buyer Account Page is a page on application, which contains basic profile information and navigations to Your Orders, Account Settings, Payments, Affiliate Program, Help & Support, and Privacy Policy.

4.5.1.5. Your Order

This section allows buyers to get a full list of purchased orders. When each order is clicked, the full details of the order will be shown.

In each order, buyers also have the following action links and buttons: Cancel the order (if the item has not been shipped), Give a review, and Open a dispute case.

4.5.1.6. Account Settings

The account settings section allows buyers to update their profile, security information, delivery addresses, and platform preferences. The buyers can do the following: Update Profile, Update E-mail Address, Update Account Password, Add/Edit/Remove Delivery Addresses, Set Default Delivery Address, Set Website/App Language, and Update Contact Preferences.

4.5.1.7. Payment

The payment section allows buyers to add, update, or delete their payment details, i.e., Credit Card / Debit Card details and bank account details.

4.5.1.8. Affiliate Program

This section allows buyers to generate affiliate links to share to their social media networks or pages. When there are any other buyers who clicked the link and completed the purchase, the link owner will get a commission in a certain percentage as the credit called My Credit to his/her account. My Credit can be used as a discount or cash to buy items on the proposed platform. The signed-up buyer can also review their performance report in this section.

4.5.1.9. Item Listing

This page is responsible for listing items in the table with limited details based on filtering criteria and sorting preference. This applies to both Search and Category page.

Item Sorting: Item Sorting can be selected to arrange the displaying items in the following orders: By Keyword Relevant, By Popularity, By Discount (High-Low), By Price Ascending (Low-High), By Price Descending (High-Low).

Item Filtering: Item Filtering can be selected to display only related items by using the following criteria: By Brands, By Categories, By Product Properties, By Price Range, and By Delivering Options.

4.5.1.10. Keyword Search

The platform is designed for placing millions of items, so the search is necessary for buyers to find the desired items. Rather than using traditional SQL query search in DBMS, the platform uses the modern search architecture, Elastic Search or Lucene Search, which has the following advantages:

[1]. Able to index by tokenizing word by languages

[2]. Support complex search query by using AND, OR, quotation marks for finding exact phases, and a minus sign for keyword exclusion

[3]. Able to handle spelling error for common typing errors

[4]. Have an ability to cache search result for frequently used keywords

4.5.1.11. Item Page

An item page displays the photos of selected item, followed by item name, price details, auction details, place bid button, buy now button, add to wishlist button, item description, item detail, seller information, Q&A section, and people also view section respectively. For auction items, buyers can choose whether to place bid to compete against the others or buy now to secure the items.

4.5.1.12. Add to Wishlist

Buyers may add their interested items into a wish list like a bookmark. The platform will periodically track the price of items in the wish list and send a notification whenever the item price is dropped. Buyers also easily add items from the wish list into the shopping cart and vice versa.

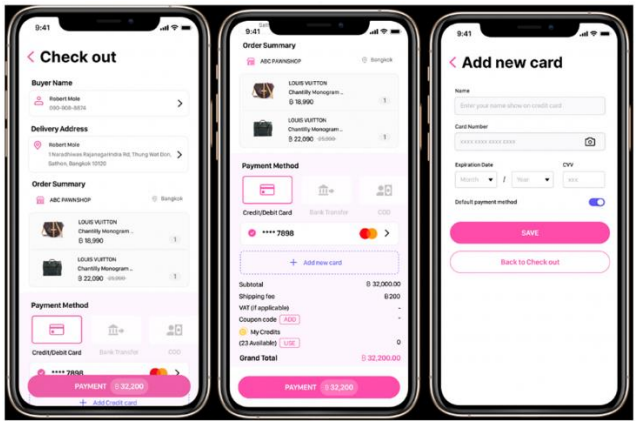

Figure 5: Application's Check Out Page of Proposed Platform

4.5.1.13. Shopping Cart

When buyers are satisfied with each item, they will add items into the shopping cart as the common behavior for e-commerce. In case that buyer won an auction, that item will be added to the shopping cart automatically, and the buyer needs to complete the check-out process within a specified period of time.

Buyers can tick checkbox for item(s) and then the system will calculate the real-time price. The platform supports standard shopping cart features: Quantity Amendment, Item Removal, Coupon Code, Shipping Method Selection, Shipping Fee Calculation.

4.5.1.14. Check out

When buyers click check-out button from the Cart page, the system will lead buyers to Check-out page (See Figure 5). The system will show the price calculation, and the buyers can alter their coupon code and My Credit usage on this page too. Then, they can choose the preferred payment methods as follows: Credit Card / Debit Card, Bank Transfer, Collect-On-Delivery (COD), Internet Banking, Mobile Wallet (True Money Wallet, Airpay, KPlus, etc.), QR Code (Promptpay), and Credit Card Installments.

Although the platform will utilize an external payment processor suitable for the Thailand market, i.e. 2C2P, Omise, or Adyen, the platform will store credit card / debit card and bank account information so that the platform will comply PCI DSS standard. While the transaction fee for each payment method is different, the platform will collect the fee from sellers at a flat rate, which will include a platform management fee also.

4.5.1.15. Delivery Tracking

Once buyers have successfully ordered the items and the items have been shipped by the sellers, the platform will periodically track the shipping status from the parcel delivery service. If the status changes, it will immediately notify the buyers when the Item has been shipped, Item is out for a delivery, and Item has been delivered.

When the status shows that item has been delivered, there will be a button for buyers to accept the item. After buyers click the accept item button, the platform would start proceeding the fund release to the seller.

4.5.1.16. Seller Review and Satisfaction Scoring

The buyers are convinced to give the 1-5 stars rating to represent their purchasing satisfaction by considering the following key areas: Item Quality, Value of Money, Correctness of Item Description, and Delivery Speed.

The buyers are also able to provide a comment as well as photos to the purchased item and/or provide a comment to the seller. And sellers have a right to reply to buyers' comments.

4.5.1.17. Open Dispute Case

Buyers could open a dispute case in case of any unsatisfaction. Once the case is opened, an admin will review the case and get back to the case owner within 3 working days with instructions to resolve the case.

4.5.2. Product Features - Seller

A legitimate pawn shop can join the platform as a seller. Registered sellers are allowed to sell items in the platform while the platform also provides essential tools for sellers. The seller center is available only on the website.

4.5.2.1. Shop Registration

Pawn shop needs to provide the following information to open seller account on the platform: Shop Full Name, Shop Short Name (in English – unique among all sellers), Shop Profile Pictures, Shop Description with Photos and Videos, Full Address, Shop Latitude and Longitude Coordination, Business Registration Number, VAT Registration ID, Contact number, E-mail address, and Account Password. The shop short name will be used as seller account name.

4.5.2.2. Seller Verification and Contract Signing

Newly registered sellers are required to submit the digital version of the legal documents for a seller verification process. Once the seller information and documentation are reviewed, the two hard copies of seller contract will be sent by post. The seller is required to sign and send back one copy to start selling on the platform.

4.5.2.3. Seller Account Login

Sellers are required to provide the correct e-mail address and password to login into a registered local account.

Account Locking: Same as buyer.

Forgot Password: Same as buyer.

Two-factors Authentication (2FA): To preserve account security and verify the up-to-date e-mail address, a two-factors authentication (2FA) will send one-time pin code to the e-mail address provided in account information for each account login. To enhance the login convenience, the platform will store login data in permanent browser cookie or application storage so buyers can re-login by only providing an account password without typing e-mail address and bypassing 2FA.

4.5.2.4. Dashboard

Dashboard is the first screen that will be seen by all sellers when logging in to the platform (See Figure 6).

Its main purpose is to provide a comprehensive snapshot to the sellers. Seller dashboard starts from shop name, to do list section, business insights section, and performance section. There is menu list on the left of the screen, which sellers can navigate to other pages of the website.

4.5.2.5. Shop Settings

Sellers can view or edit their profile, business information, and operating days & hours in this menu. The seller can do the following things: Update Profile, Shop Decoration, Update E-mail Address, and Update Account Password.

4.5.2.6. Product Management

My Products: This is the menu for managing all products in the seller's shop. Sellers manage, i.e., add/list/unlist/suspend/delete, products by using this function. They can also filter or search products they are interested in.

Promotions: Sellers can set promotional campaigns, discount codes and free shipping into either shop-wide or specific products with start time and end time.

Reviews: All the reviews which are posted by successfully purchased sellers will be listed here and ordered by the most recent reviews. Sellers can review and reply to the reviews.

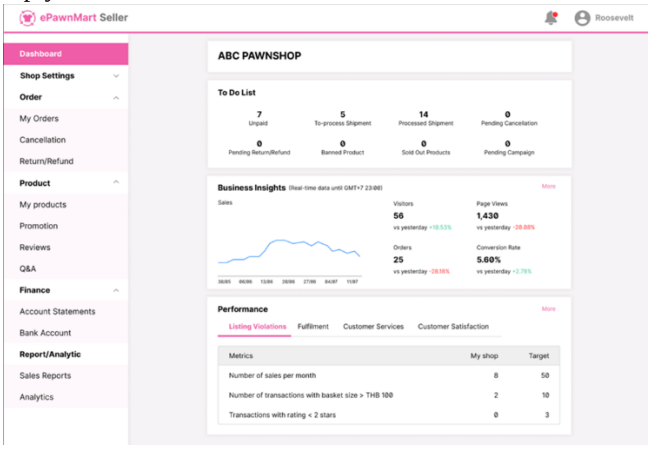

Figure 6: Seller Dashboard Page of Proposed Platform

Q&A: Unanswered questions that are asked by buyers for each product will be shown here. Sellers must reply to the questions within SLA to keep the shop at a good response rating.

4.5.2.7. Order Management

My Orders: All the orders that have been placed by buyers will be listed here including: Unpaid, Waiting for Seller To ship, Items Shipped, Items Delivered, Order Cancelled, Items Returned, Refunded, and Failed Delivery.

Sellers can see details of each order such as order datetime, order items, full price, discounted price, shipping fee, promotion discount, customer details, recipient details, shipping method, order status (See Figure 7).

Sellers can also filter the list of orders or make an action on the order, e.g., cancel order, print parcel label, confirm shipment, etc.

Cancellations: The cancelled orders will be listed here. Sellers must respond to buyer's cancellation request within SLA; otherwise, it will automatically refund the buyer.

Buyers can raise a case to administrations to review if they find that the cancellation is suspicious or unfair.

Returns / Refunds: As same as the cancellations, all the returned and refunded orders will be list in this menu. Seller must check and record the returned goods within SLA to avoid automatic refund to the buyer if exceeded.

4.5.2.8. Finance

Account Statements: This menu shows the current balance, payout in progress, and recent paid balance. All balance movements will be listed here.

Bank Accounts: Sellers can add/remove bank accounts from this menu.

4.5.2.9. Report / Analytics

Sales Reports: Seller can see shop's sales reports, e.g., monthly sales amount, monthly transaction fees.

Analytics: Sellers can see shop's analytics key metrics, e.g., impressions, reaches, new visitors, existing visitors, visitor conversion rate, buyers, buyer conversion rate, sales,

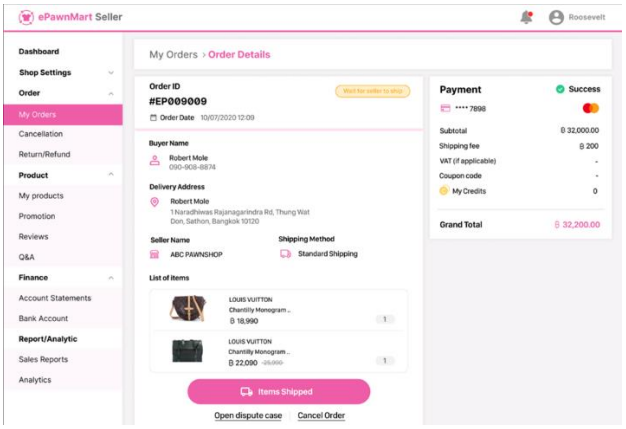

Figure 7: Seller Order Details Page of Proposed Platform

and orders statistics filtering by date and/or devices (PC browser, mobile browser, mobile app) in this menu. It can also rank the most viewed, most sales and high time spent in all listed products. Moreover, it will show promotional campaign performance statistics here.

4.6. Compliance Between ePawnMart and ETAM

This section explains how the proposed system complies with ETAM in the features and attributes level.

4.6.1. Perceived Technology Safety and Cost

ePawnMart will build perceived security and trust from users by promoting the following features to the users.

Unauthorized Access Prevention: ePawnMart has account locks feature for buyer and seller and Two-factors Authentication (2FA) verification feature for seller. This helps to prevent password brute forcing attack.

Data Leak & Data Breach Prevention: It would be secured by utilizing AWS, which is monitored by world-class security experts (Amazon Web Services, Inc., 2021).

Laws & Regulations Compliance: ePawnMart would keep credit card information in the system to allow the buyers to make payment as easy as possible, so it will comply PCI DSS standard. Beside this, it will keep log data of both usage and login for at least 90 days from the date on which the data was input into the system as required by Thailand's Computer Crime Act B.E. 2550 (2007).

It will also keep historical transaction records of buyers and sellers and archived product information for a

certain amount of period. This data could be used for auditing and judicial process, if any.

Fake Shops & Scammers Prevention: Buyers can ensure that all shops on the platform is legitimate and reliable as all registered shops on the platform need to go through the process of Legitimate Pawn Shop Verification and sign contract with the platform. This procedure is to prevent fake shops and other scammers from opening a shop on the platform.

Online Payment Gateway: During the payment process, the platform sends payment information to Online Payment Gateway, which allows the buyer to entrust with global standardized secure network firewall, e.g., Verified by Visa, MasterCard SecureCode. With the use of one-time password (OTP), it helps to secure both sellers and buyers.

Escrow & COD: To promote trustful transactions, the platform shall act like an Escrow to secure funds from the buyer before shipment, and release funds to the seller after the buyers properly receive the items. Besides this, there is also Cash on Delivery (COD) option, which allows seller and buyer to meet to verify the real items before making a payment.

4.6.2. Personal Skills

Although this area is more concerned with the personal traits of each individual himself/herself, ePawnMart will indirectly boost up user's self-efficacy and the behavioral control by promoting the platform regarding its ease of use.

4.6.3. Social Pressure

ePawnMart will increase the third parties' influence on the user's intention to use by using the following tactics.

Search Engine Optimization (SEO): SEO refers to the methods and techniques which help boost up web traffic to the website. According to Lee et al. (2016), well-established SEO techniques could help increasing traffic from the search engines, a greater number of web pages indexed by the search engines, and better keyword ratings. The example of SEO techniques that will be used by the platform to promote the web traffic are URL structure optimization, XML sitemap, Meta tag, and Title tag.

Affiliate Program: The key to successfully implement affiliate marketing is to promote a win-win relationship between the advertiser and the affiliate (Duffy, 2005). The proposed platform would allow the buyers to generate affiliate links and share to their social media networks or pages. When there are any other buyers who click the link and complete the purchase, the link owner will get a commission as a certain percentage as the credit to his/her account. The credit can be used as a discount or cash to buy items on the proposed platform. This affiliate program would help the platform to grow at a faster pace.

Social Media Marketing: Nowadays, social media plays an important role in people's daily life, so many brands and companies are currently utilizing social media to create brand awareness. Firstly, an official Facebook page will be created to promote the brand existence to the public and get in touch with the target users. After the Facebook page could gain a follower base, more official pages will be opened on the other social media platforms. Furthermore, there will be campaigns done through micro-influencers. These campaigns will help to increase the content library about the platform, as well as reach and build trust from the niche target audience (Forbes Communications Council, 2020).

4.6.4. Hedonic Value

ePawnMart will increase enjoyment and satisfaction by using the following elements.

Social Login (OAuth 2.0): OAuth 2.0 allows users to login to the platform with the popular Open ID without registration without the need to login again in the future. This promotes ease of use to the users.

Personalization: With personalization, the users would enjoy the recommended items which are analyzed by the system to be interesting for them. This feature would differentiate the platform from the other unredeemed items selling channels.

Elastic Search: The users would enjoy exploring items on the platform with elastic search. This feature would help the platform to be smarter in guessing what the users are searching for. This improves the user experience with the platform.

Short Response Time: Response time factor could affect the user experience with the platform. ePawnMart is designed with the system architecture which would support performing tasks at an average of two seconds to make the user satisfied using the platform.

5. User Acceptance Results and Discussion

5.1. User Acceptance Results

The samples are broken down into 2 groups, which are 53 samples who have ever bought unredeemed pawned items (existing buyers) and 60 samples who have never bought unredeemed pawned items (non-buyers).

For the usage-intention results, 89% of existing buyers would use ePawnMart to buy the unredeemed pawned items, while 73% of non-buyers would start buying the unredeemed pawned items by using ePawnMart.

5.2. Discussion and Recommendation

The proposed platform complies with Extended Technology Acceptance Model, which would increase the user intention to use. The usage acceptance results suggest that the majority of both existing buyers and non-buyers of unredeemed pawned items intend to use ePawnMart to buy unredeemed pawned items.

The user intention of the buyer side could be regarded as demand of buying the unredeemed pawned items on ePawnMart. When there is demand, there will be supply. It is expected that the pawn shops will be willing to get into the ePawnMart to sell the unredeemed pawned items. This suggests that the proposed platform would help increasing the trading of unredeemed pawned items through online channels.

For recommendations for future work, the user-intention survey could be expanded to pawn shops (seller side) to prove whether they are actually interested in using ePawnMart. In addition, beyond the main purpose of trading unredeemed pawned items, the proposed platform can be developed further in two ways: [1] expands to serve the pawning process of the pawnshop and/or [2] expands to serve the trading in the second-hand goods industry as well.

6. Conclusions

The pawn shop industry is a niche market that has been developing to be able to survive through the eras. The proposed e-commerce platform so called ePawnMart is designed especially for trading unredeemed pawned items and would act as a portal for pawn shops to open shops and sell the unredeemed pawned items while centralizing the unredeemed pawned items available from various pawn shops for buyers to explore and buy conveniently. From the results, the proposed e-commerce platform would accelerate the growth of the pawn shop industry by improving pawn shops' working capital and promoting trustful online unredeemed pawned items trading transactions. Furthermore, it would help promoting the fair trade and Thailand's sustainable economic growth.

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