INTEGRATION OF QUICK RESPONSE (QR) CODE FOR AGRICULTURAL PRODUCT TARIFF COLLECTION AND VIRTUAL PAYMENT TRANSACTIONS

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ABSTRACT

Covid-19 pandemic that affects the whole world today. Local governments support all possible solutions to limit the exposure of its people to the disease. It promotes cashless and contactless transactions even in purchasing necessary goods. And since the government's strength comes from the revenues, refining the existing process is essential to survive this pandemic.

The government imposes market tariffs to raise revenue, and many developing nations like the Philippines use taxes. In establishing trading hubs all over the country, the government also ensures income from market activities. Urdaneta City Bagsakan market is one of the biggest trading hubs of agricultural products in Northern Luzon.

This study is about developing an automated tariff payment collection system for agricultural products like fruits and vegetables and livestock. It primarily aims to provide cashless and contactless transactions in collecting tariffs at Urdaneta City. The system automates cash collection and produces reporting in real-time. It can also keep track of the list of traders that can facilitate the elimination of illegal trading. The system has two parts – (1) a mobile application to be used by traders, and (2) a cashiering system intended for market staff and administrators in the Baganakan market. The mobile application for traders provides a contactless procedure of product valuation and tariff computation. It also has an electronic wallet to deliver a cashless transaction in tariff payment. The cashiering system for the market administrators for the following objectives: (1) provide support in loading the trader's app electronic wallet, (2) offer assistance to new trader's transactions, and (3) ensure valid transactions of tariff payment in trading hubs.

KEYWORDS

Agricultural Product Tariff System, Quick-Response (QR) Code, Cashless and Contactless Transactions, Electronic Wallet, Mobile Application Technology

1. INTRODUCTION

The existence of trading hubs in different provinces in the Philippines is beneficial to both traders and buyers, aiding farmers to sell their crops and other products. The government imposed market tariffs primarily to raise revenue. Many developing nations like the Philippines use tariffs as a way of raising revenue. In establishing trading hubs all over the country, the government also ensures gain from market activities.

Currently, the collection of tariffs is in manual collection and process. Reporting is done afterward by encoding the daily reports on a spreadsheet and is not always on time. It also includes a large amount of workforce to facilitate collection. With the manual method of tariff collection, some anomalies always come up, leading to the inaccuracy of reports affecting revenue. At present, there is intense competition between bank wallets and third-party e-wallets for payment transactions (Teng, S., & Khong, K. W. (2021).

This study focuses on developing an electronic wallet-based tariff collection system using Quick-Response (QR) Code for a cashless and contactless system for agricultural products in Urdaneta City 'Bagsakan' Market. Its specific objectives are: (1) Offer a cashless and contactless transaction in product tariff assessment and...
payment; (2) Use Quick Response (QR) code in agricultural product tariff assessment; (3) Develop electronic wallet for tariff payment transactions; and (4) Deliver a solution in providing reliable government transactions through a mobile cashiering application.

2. BODY OF PAPER

Many of our daily transactions move to cashless systems. However, most of the implementations are seen only for essential goods and transportation. Other local government units also offer cashless systems but only for permits. The mobile tariff collection system, to be called marketIS is customized for the Urdaneta City Bagsakan Market.

2.1 Project Problem Definition and Objectives

This study focuses in finding solution to the following problems:

1. What is the present process in Urdaneta City Bagsakan Market in terms of: (a) product tariff assessment; and (b) tariff payment?
2. What technology-based solution can offer a cashless and contactless transaction of product tariff assessment and payment?
3. How is Quick Response (QR) code technology be applied in the present market process of Urdaneta City Bagsakan Market in terms of: (a) of product tariff assessment; and (b) tariff payment?
4. How mobile cashiering application can provide option to reliable government transactions?

This project is also open and prepared for future system expansion to cover central business district transactions to the Local Government Unit. As a mobile application, the marketIS will serve as a wallet-based tariff collection system. It has the following advantages and features: offer a cashless and contactless transaction in product tariff assessment and payment; use Quick-Response (QR) code in agricultural product tariff assessment; use Quick-Response (QR) code for transaction records; an electronic wallet for tariff payment transactions; provide real-time tariff assessment and payment transactions; and deliver a solution in providing reliable government transactions through a mobile cashiering application.

2.2 Market Tariff Payment Solution

This project is an offered solution for a cashless and contactless fulfillment of transactions. Due to the Covid-19 pandemic, traders in Urdaneta City Market are at risk. But to fulfill the needs of the government through revenues, market transactions must continue. The proposed solution in collecting market tariffs in Bagsakan Market of Urdaneta City is an information system through a mobile application that automates market transactions. Market transactions that for automation are as follows: (a) product valuation and assessment; (b) traders’ registration; (c) issuance of product tariff amount based from product valuation and assessment transaction; (d) tariff payment using the electronic wallet, and (e) mobile cashier application for market officials.

2.2.1 Trader’s Identification Information using Quick-Response (QR) Code

To be able to use the full feature of the system, the trader must download and install the mobile application of the system. It requires the trader to provide a valid identification cards, e.g Government issued ID to confirm the details inputted. If no valid ID is available, the trader can opt for certificates proving residency, e.g. Barangay Clearance, NBI Clearance and the like.

Once, account has been created, the system will provide a Trader Identification ID card with assigned QR code. This code contains the information about the trader. Also, this Trader Identification card shall be used in all transactions related to the system. Figure 1 presents the Trader’s Identification Card with assigned QR code generated by the system.
2.2.2 Automated Product Valuation

The mobile application automates the valuation and assessment of agricultural products delivered in Urdaneta City Bagsakan Market. This mobile application shall be made available to every trader who wants to sell Urdaneta City Bagsakan Market. Using this application, any seller must register their names and contact information first. When the system confirms the trader's information, registration of kinds of products to sell follows. This registration will continue to product assessment by determining the type of agricultural product.

2.2.3 Automatic Tariff Computation

The mobile application automatically performs the tariff computation, and the application will then compute the total tariff to pay. Tariff payment has two (2) options: (1) payment using electronic wallet load, and (2) by using an account card for first-time users without prior registration as a market trader.

This option shall result in the generation of QR codes for successful transactions as a receipt. The second option is by using a physical account card by paying directly to the City Market Office, and (2) mobile payment using the mobile application as an electronic wallet.

2.2.4 Tariff Payment Using the Electronic Wallet

Another essential feature of the mobile application is the electronic wallet function. The traders' account with an electronic wallet holds a digital amount for paying product tariffs. Payment transactions are only possible if the electronic wallet has enough amount equivalent to the computed tax. Figure 2 presents the mobile application features for the trader.

Figure 2. Mobile application features for the trader

2.2.5 Mobile Cashier Application

Market administrators will use the mobile cashier application. Market administrators are previously issuing stubs with the equivalent amount for product tariff. It is also the task of the market administrator to accept the payment and record every transaction.
Market officials shall use a separate mobile application that caters to the following tasks: (1) Loading station of electronic wallet for mobile tariff payment system, (2) Trader registration of arriving traders without mobile application, and (3) accepting payments of sellers without access to trader's mobile application.

2.3 System Design and Discussions

The tariff mobile collection system integrates Quick Response (QR) Code for Tariff Collection and Virtual Payment Transactions of agricultural products delivered by traders in Urdaneta City Bagsakan Market. Automated transactions are as follows: (a) traders' registration, (b) product valuation and assessment, (c) issuance of product tariff, (d) the electronic wallet, and (e) the Cashiering system.

2.3.1 Trader's Registration

A registration intent will be made for initial users to collect information about the trader's profile such as name, address, place of origin of products, products, and vehicle information used to deliver goods. Upon registration, each trader will have an assigned unique identifier to be used in transactions inside the Bagsakan Market. When a user is already registered, the app will default to a login intent.

Since its application for a government transaction, the researchers included the issuance of a trader's card. The trader must present the card in every transaction in the Urdaneta City Bagsakan market, and this is to ensure security. Figure 3 presents the use-case diagram of the system for the two main actors, the trader and the market cashier.

![Figure 3. Use Case Diagram of the System](image)

2.3.2 Product Valuation and Assessment

The mobile application will include a preset assessment of goods based on the usual procedure done. Product assessment determines the type of agricultural product. The trader can also view the current prices of goods in the application.

2.3.3 Issuance of Product Tariff

The system shall generate a Quick Response (QR) code reader for payment transactions. Each transaction will also be having corresponding timestamps, and these transaction details are reflected in QR code for verification later upon the trader's arrival in Bagsakan market.

2.3.4 Using the Electronic Wallet

The electronic wallet is one of the notable features of the project. Its primary purpose is to provide an automatic cashless and contactless payment after tariff assignment. Digital cash is used for tariff payment for cashless and contactless transactions. The mobile application also reflects all the transactions in real-time.

Loading an amount to the electronic wallet was done through the cashiering system. This cashiering system accompanied the mobile tariff transaction system intended for market administrators assigned in tariff collection.
2.3.5 The Cashiering System

The researchers included an accompanying automated system to support the project goal of providing a cashless and contactless transaction in Urdaneta City Bagsakan Market. This cashiering system is intended only for market administrators assigned to tariff collection. Mobile Cashiering system has the following features: (1) Loading for trader's electronic wallet; (2) Generation of transaction details in QR code; (3) Registration of new traders; (4) Product valuation; (5) Auto-Tariff generation for valuated products; (6) Checking of transactions history through QR; and (7) Transaction history viewing page.

The cashiering system can also keep track of the list of traders. This feature aids in the elimination of illegal trading. Then, a more secure collection of tariffs is assured, resulting in high revenue for the local government. Figure 4 presents the process flow of the system.

2.4 Implementation

This system is a product tariff collection system and virtual payment transaction from registered traders with QR coded Identification Card. The use of QR code helps in proper documentation of transactions. It also promotes transparency by providing real-time reports from the acquired transactions of the system. Figure 5 presents the system architecture.
3. CONCLUSION

The researchers recommends the implementation of the automated tariff collection system for agricultural products. The system can benefit different agricultural trading hubs in the Philippines, where manual apportionment of tariffs is still in practice. Subsequently, this system also promotes cashless and contactless transactions and new standard practices amid Covid-19 pandemic.

With the manual collection, anomalies always come up, leading to the inaccuracy of tariff collection, significantly affecting revenue. The system also offers a secure system collection of tariffs for assured government gain. Transactions log aids in providing reliable transactions. Also, collecting payment is directed towards the Government's Treasury electronically for a more secure revenue collection.

The electronic wallet can also expand applications in paying other transactions in local government. It can be extended to cover the whole central business district transactions to the Local Government Unit.

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