

The Design of Thailand Fragrant Coconut's Traceability System for Exporting to China

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ABSTRACT

Thailand is an agriculture country which mainly produces the agriculture product as a main exporting product. Fragrant coconut is one of the most potential fruit for exporting of Thailand as it is the exotic fruit which is popular worldwide. But the main destination country for fragrant coconut is China. This research is aim to design the Thailand fragrant coconut's traceability system for exporting to China. The researcher did the in-depth interview with 4 experts and also did the design of information system database structure, use-case diagram and also the system architecture of the traceability system. The traceability system can be helped to maintain the exporting position of Thailand's fragrant coconut in China and will help the consumer to know the information of the origin of the product and also help the tracking back the product if the product was defected.

Keyword: Traceability System, Fragrant coconut, Export, China

1. Introduction

Fragrant coconut is the tropical fruit which is mostly grown in the tropical country such as Thailand, Taiwan, Vietnam and etc. In Thailand, mostly of fragrant coconut is grown in Ratchaburi province and Samut Sakorn province.

Fruit is the main export product of Thailand and fragrant coconut is the fruit that be wanted by the other countries because of its flavor and freshness after consuming. But the main obstacle for exporting the fragrant coconut is the physical of the fruit which is the weight of itself

and also the condition of the fruit (Alnusairat, Elnaklah, Ab Yajid, Johar, & Khatibi, 2021; Tomteberget & Larsson, 2020). As the fragrant coconut has a tough outside skin but in order to be easily consumed by the consumers, the outside skin must be peeled off or cut off by a skilled individual which means that the ordinary consumers will not be able to cut and open the fragrant coconut easily by themselves, so the fragrant coconut has to be cut at the distribution center in Thailand in order to reduce the weight of the outside skin and to be able to consume easily by the consumers. Another problem of exporting fragrant coconut is the pest which mainly the oriental fruit fly which can pierce through the soft skin of the fragrant coconut and damage the juice and meat of the fragrant coconut (Chen & Huang, 2013; Expósito, Gay-Fernández, & Cuiñas, 2013; Yan, Shi, & Huang, 2013).

China is the main export market for Thai's fragrant coconut as Chinese prefer Thai's fragrant coconut more than other's fragrant coconut so the exporting value and quantity of fragrant coconut is significantly increased. And nowadays several food importers of several countries such as Europe, Canada, Uruguay, Australia, New Zealand and etc. propose the idea which requires the origin proof of the food product and also the hygienic and the contaminated level of the food (Gomez-Piqueras, Ruiz-Barquín, & Olmedilla, 2020; Mazur & Kuć, 2020). In the near future, there is a possibility that all of the exported product (especially the food product) will have to prove the origin of the product before export. So the traceability system will be a tool which is able to reduce the risk and assist the stakeholder of the supply chain to track

back to the root of the problems more effectively and quickly which will reduce the product's return cost and also be able to retrieve the reputation of the company. This traceability system will be an assurance that the food will be cleaned and qualified as the consumer and all of the stakeholders want (Brookes, 2020; Justus Uchenna & Ohaeri, 2020; Karlsen, Dreyer, Olsen, & Elvevoll, 2013; Wang, Yang, & Gu, 2012).

So the existence of traceability system of fragrant coconut is very essential for exporting to China and Malaysia then the authors of this research came up with this research in order to design the prototype of the system of the traceability system to increase the capability of the exporting and also to gain the trust from the trading partner countries (Jonah & Kanyangale, 2021; Kose & Kiziltoprak, 2020; Noble & Jandjsek, 2020).

2. Research Objectives

There is only 1 objective of this research which is to design the information technology prototype of the traceability system for Thailand's fragrant coconut.

3. Literature Review

3.1 Related Research

There was a study which conducted on traceability systems, which are an integral element of international commerce and are critical for manufacturing and supply chain management systems (Aydin Ceran & Ates, 2020; Henry, 2020; Kasalak & Dagyar, 2020).

The benefits of the traceability system are more evident for exported and imported goods. Traceability is critical in food management and for items that have a short shelf life (Nishantha, Wanniarachchige, & Jehan). Numerous studies and articles have been conducted and published in recent years on traceability system requirements, particularly in the food sector in the United States, Europe, and Southeast Asia (Lavelli, 2013; Liao, Chang, & Chang, 2011).

And also there was a study about the traceability of data throughout the transformation phases of each unique food product, beginning with raw materials and ending with the final product, as well as the printing of critical data on the product package, increases customers' faith in the product's quality (Mahonge, Nsenga, Itani, & Kurosaki, 2021; Maryam Al Naimi, 2020; McGrath & Whitty, 2020). It is important to track data for each food product from the stage of raw material farming, through food processing, transportation, and warehousing, through retailing and reaching the ultimate customer. To provide users (primarily end consumers) with access to critical data, this article proposes that data be recorded on the product packaging in the form of a quick response two-dimensional barcode (QR code) at crucial moments during the product's life cycle. To guarantee the suggested system operates well, it is critical to provide rapid and reliable operation via correct positioning of the QR code on the packaging during manufacturing, as well as quick and easy data reading by the product customer. This article discusses the findings of a readability examination of QR codes with varied contents, size, and data error correction level

that are read by Android-based devices. Experiments were conducted using a variety of different types of substrate material onto which the code was written. Additionally, a readability examination of QR codes was done in the presence of geometric distortion. According to the comprehensive examination of the collected data, it can be determined that the readability of QR codes is not directly related to the amount of coded characters or the quality of error correction, but rather to the size of the code's modules. Additionally, the results indicate that while changing the base material does not affect the read time, it does affect the readability of the code. Additionally, the study illustrates the suggested traceability system, in which QR codes are utilized to track and trace data for fruit yogurts, based on readability analysis suggestions. This notion of traceability is ubiquitous and may be applied to a wide variety of products with little adjustments (Cesarec, Mikac, & Spevec, 2020; Piñeros, 2020; Qian et al., 2012; Saltini & Akkerman, 2012).

Additionally there was another research which found that traceability systems can assist production systems and supply networks in other ways. While these advantages are frequently mentioned in the literature, researches quantifying them are uncommon. In this article (Asha & Makalela, 2020; Dlalisa & Govender, 2020; Niyimbanira, Eggink, & Nishimwe-Niyimbanira, 2020), we suggest two hypothetical enhancements to the chocolate manufacturing system and supply chain's traceability system and demonstrate the ensuing advantages through the use of a case study. We create a simulation tool to assess the impact of these enhancements on production efficiency

and recall size in the event of a safety issue based on the case study. These findings are intended to demonstrate and quantify the extra advantages of traceability data, which may assist food businesses in determining whether and how to upgrade their traceability systems (Shakiba, Jit Singh, & Abdullah, 2015; Sutthachaidee, 2015).

4. Conceptual Framework and Methodology

4.1 Conceptual Framework

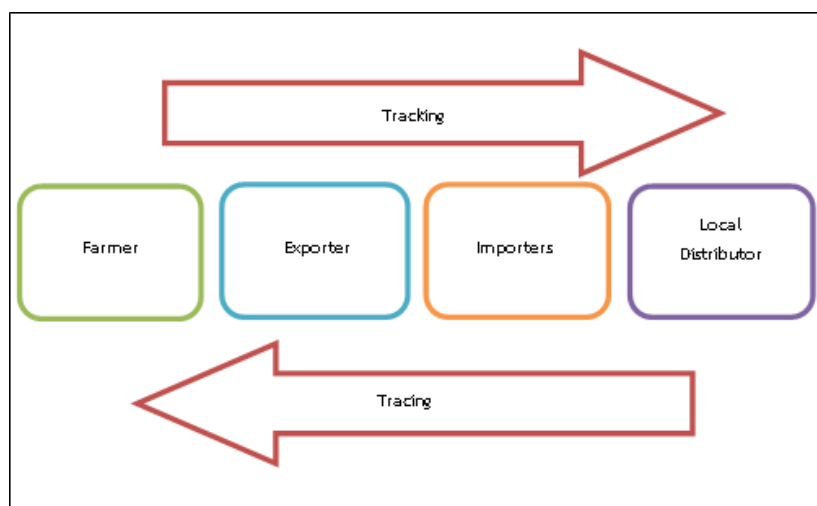


Figure 1: Research Conceptual Framework.

4.2 Methodology

4.2.1 Research Population and Sample for in-depth interview

The samples for the in-depth interview are 4 experts which each individual are expertise in the traceability system, information technology, networking and agriculture exporting.

4.2.2 Data Collection Tools

The data was collected by the in-depth interview with the experts and the researcher used the opened-answer question in order to retrieve the best answer from the samples who are the experts in their own profession.

After the in-depth interview, the researcher will

design the prototype of the traceability system for the fragrant coconut's exporting to China and will do the system evaluate as the next process of the research (Kairuz, Crump, & O'Brien, 2007).

5. Result

After the in-depth interview with the experts, the technology which most compatibility with the traceability system is the QR code. The traceability system should start from the farmer's farm to the consumer in the consuming country as the traceability system will enhance the quality level of the product and increase the value of its as well.

The process of using traceability system which was suggested by the expert can be divided into 4 processes.

1. Production Process

The farmers or producers have to record the data which are raw fragrant coconut data, date of planting, date of harvest, pesticide usage, watering data and etc. These data will be transformed into the information in the central database to identify the fragrant coconut and will be recorded in the QR code.

2. Selecting and Packing Process

The middlemen who gather the fragrant coconut from the producers and farmers will have to input the data such as the receiving date, humidity, amount of the fragrant coconut and etc. These data will be transformed into the information in the central database to identify the fragrant coconut and will be recorded in the QR code.

3. Distributor Process

The distributor will input the data about shipping date, quality of fragrant coconut, number of date during receiving and releasing fragrant coconut and other data which essential to the fragrant coconut quality (Nalaka & Diunugala, 2020; Ozer & Akbas, 2020; Yang et al., 2021). These data will be transformed into the information in the central database to identify the fragrant coconut and will be recorded in the QR code.

4. Exporting Process

The exporter will input the data such as shipping date, mode of transport data, condition of the product and etc. These data will be transformed into the information in the central database to identify the fragrant coconut and will be recorded in the QR code.

From the in-depth interview, the researcher had done the design of the traceability system for fragrant coconut as figure 2.

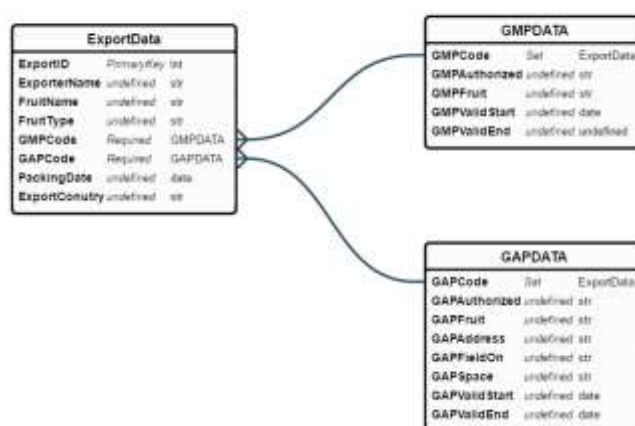


Figure 2: Information System Database Structure of the Traceability System

The design of the Use-Case diagram of the traceability system can be divided into 6

processes which are:

1. Tracking Product
2. Import the GMP Data
3. Import the GAP Data
4. Import the Export Data
5. Label Print
6. Log Out

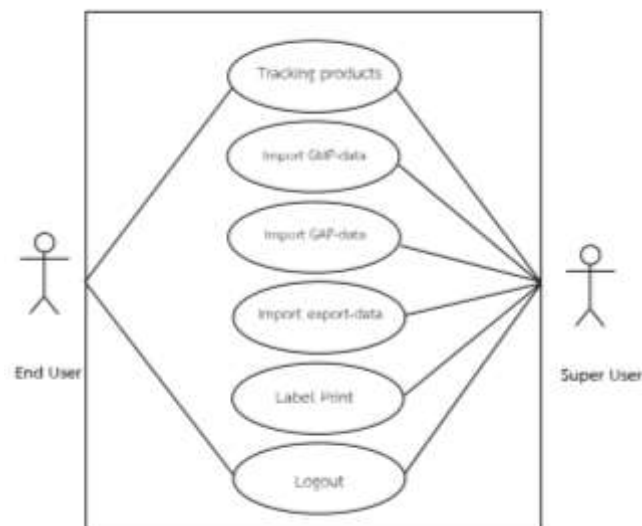


Figure 3: Use-Case Diagram

Researchers had done the information system architecture for the traceability system of the fragrant coconut which shown in figure 4.

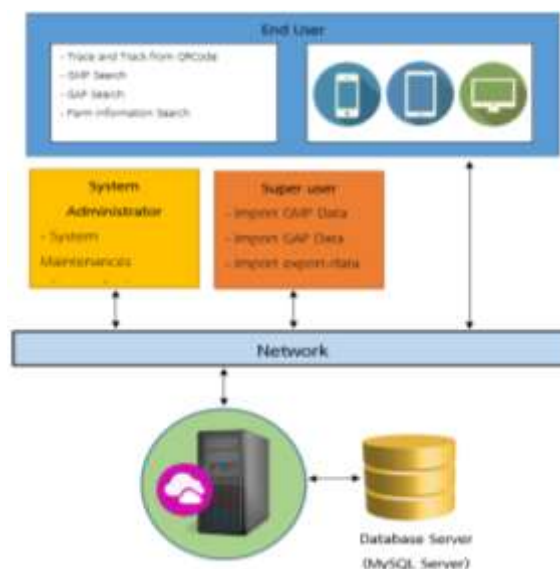


Figure 4: System Architecture

6. Recommendation

So as the recommendation, this traceability

system can help the consumers can track back the information of the fragrant coconut which they consume by the QR code which attached

with each individual fragrant coconut. As QR code can be so convenient and very user-friendly, every stakeholders can access to the information so whenever there is a problem with the fragrant coconut, the precise information can be pull out from the system and the product recall and tracking can be done very easy. There's also give the consumer the change to get the information of individual fragrant coconut which will tell the origin of the fragrant coconut so whenever the consumer want to have the same taste of fragrant coconut again, they can find the same fragrant coconut from the same farm in the future.

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