The Integration of Seafood Traceability System for Shrimp Value Chain Systems

Echo Huang, Juh-Cheng Yang

***Abstract*—**The impact of information systems on productivity is wide ranging and potentially affects all other activities of a company. This trend extends beyond high-tech companies in Taiwan. The aquacultural industry is finding they can substantially increase productivity and reduce costs by moving process tracking, management and reverse tracking functions online. This paper presents a new radio frequency identification (RFID) and quick response code-based (QR codes) system for managing in-house seafood cultivation, inspection, distribution and retailing and its impact on productivity and costs. The value chain system was tested in a white shrimp cultivation factory which provides live-shrimp offerings, and demonstrated efficiency, effectiveness, and better customer services from the model. The traceability is mainly the standard that guarantees the food security of consumer, is a system that improves a risk management and promotes to produce effect and industry level. Integrate RFID and the technique of QR CODE, combine entity logistics and information process, record product all messages inside the life cycle in detail, increase information visibility, change traditional farming supply chain homework mode, will effectively raise the additional value of whole supply chain system.

***Keywords*—I**nformation Systems, Radio Frequency Identification (RFID), Quick Response code (QR codes), Seafood Cultivation, Value Chain, Traceability

I. Introduction

In recent years a successive occurrence bird's flu, foot-and-mouth disease, mad cow disease (the Bovine Spongiform Encephalopathy, BSE) waits for the plague, and parts of agricultural products are examine the agrochemical to remain the surfeit, and the gene reforms the food(the Genetically Modified Food), Inferior food flood etc. pile up one after another, causing the manufacturer and circulating operator and the discomfort and the dismay of the consumer. In order to work out the safe problem of the hygiene of agricultural product, the European retail trade group creates "the good agriculture standard (Euro-Retailer Produce Working group, EurepGAP) of the EU retail trade group" at 1997 proposal, and formally creates system in 2000.EU and the United States adds and Japan has already successively carried out a food and can trace back to system to ensure consumption security, other nation like Australia, India and Chinese etc., also in succession lawmaking establishment "food security" related standard, start programming a promotion.

In Taiwan, cultured shrimp output tumbled from the 1987 peak of 90,000 metric tons to 40,000 tons in 1988 and 25,000 tons in 1989. This was largely due to epidemic-level diseases caused by viruses, bacteria and protozoa. The indiscriminate use of toxic chemicals and antibiotics also decreased the resistance of shrimps to diseases. For future success in the shrimp industry, shrimp farmers and aquaculture scientists have discovered that a solution through knowledge of in-house multi-layer cultivation, information technology and seamless supply chain management is as important as an understanding of disease management or husbandry.

With the rapid spread of computers, the explosive growth of corporate intranets and the spread of high-bandwidth fiber optics and digital wireless technology, information systems functions are moving to the center stage in the quest for operating efficiencies and low cost structure [1]. The impact of information systems on productivity is wide ranging and potentially affects all other activities of a company. This trend extends beyond high-tech companies. The seafood industry is finding they can substantially reduce costs by moving process tracking and management functions online. Such a move reduces the need for large numbers of field workers and administrative staffs. While the potential benefits of implementing RFID technology in supply and distribution networks have been much studied, only now are engineers realizing that for the technology to be totally effective, it has to move upstream into manufacturing/production processes. In this paper, we treat RFID technology and QR codes as enabling technologies. Which defined an enabling technology as one that can profitably be adopted as a means of production by most chain-type organizations in the economy. An enabling technology creates possibilities for technological change in industries other than the one in which it originated [2].

This research compromises a Taiwanese fishing product supply chain establishment traceability system of the key factor carry on valuation and expect to create the fishing product that can go a traceability system and provide a domestic consumer security, have peace of mind of food fish environment, enhance the constitution of the fishery industry, make the traceability recognized identification system to be in line with nations soon,

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Echo Huang is an associate professor of IM at the National Kaohsiung First University of Science and Technology (phone: 886-6-601-1000 ext. 4119; e-mail: echoh@ccms.nkfust.edu.tw).

Juh-Cheng Yang is with PhD student, Doctoral Program in Management, National Kaohsiung First University of Science and Technology. (e-mail: u9428907@ccms.nkfust.edu.tw).

make the seafood cultivation product be able to meet an international market request.

This study examines the RFID suitability for shrimp cultivation and a new application that can perform the RFID-based management model in the shrimp value chain. Then, it examines the RFID system model with the new function and evaluation through experimental use of the implementation system. The discussion section presents the experimental results and implications for practitioners.

II. Literature review

A. RFID technology

RFID technology is being touted as a tool to revolutionize the way business gets done because of its broad impact on manufacturing, logistics, material handling, inventory tracking and management, safety and security, cashless payments, and customer services [3]. RFID was first applied to the railroad and trucking industries for commercial use in tracking and managing capital assets such as rail cars and cargo containers in the 1980s [4]. Accompanying cost reduction of RFID, the applications have expanded into a wide variety of businesses through the use of non-battery powered passive tags that can be used as a means of reading/writing information. More and more applications of RFID technology in the retail and manufacturing fields have been adopted; these are currently the major users of RFID technology. The representative leading companies include Wal-Mart, Marks & Spencer, Viper Motorcycle, and Cardinal Health Inc.[5].

All RFID systems are comprised of three main components: the RFID tag, the RFID reader, and the back-end database. Tags can be chip-based or chip-less. Embedded chips are used to store data and a coiled antenna. There are three types of chip-based tags: read-only, write once/read many times, and read-write. Chip-less tags are used as anti-counterfeiting and anti-theft devices [6]. Tags can be active, passive, or semi-passive. Active tags contain a battery with up to 100 ft transmitting distance to a reader capability. Passive tags are detected when they pass through the electromagnetic field of a reader, and work well in these extreme circumstances and the technology can be trusted in a cold (-20°C) environment[7]. Semi-passive tags also contain an internal battery and the electromagnetic waves sent out by the reader [6]. Additionally, the development of more efficient multi-tag reading algorithms and studies concentrating on security and privacy issues expand the possible application environment [8]. This increasing use of RFID technology also expedites the requirements for tag antennas due to the various environments they confront during their progress along different types of supply chains.

The Pocket PC also continuously expands along with the PDAs market, WinCE is the operating system that particularly is designed by PDA and have absolutely on the data transfer with existing PC of compatibility. In recent years, the information technology and PDA hardware platform has already reached equal stabilization state, therefore PDA related integration's applying is accepted gradually and make use of an allocation on PDA of RFID reader device .PDA has already been made use to every different management style. Mobile users using PDA will communicate with a web server through an HTTP request via mobile browser .PDA with its capability like image and browser capability and the types of markup languages supported, will allow accessing to a mobile web application [9].

B. QR codes technology

Another enabling technology is called a two-dimensional Quick Response (QR) code which has become an ubiquitous and useful part of daily life in Japan. By using a mobile handset's camera to scan a two-dimensional bar code, the need to write long URL's using the keypad is eliminated; this being one of the major consumer barriers to accessing the Internet from mobile devices. Studies show that over 90 percent of Japanese consumers recognize QR codes as hyperlinks to more information about products and services carried in the black-and-white square codes, by providing an instant link to mobile websites on the Internet.

QR Code is in great quantities adopted of the main reason is that it is to open standard. Japan has been already gone of several years, is grow to make use of inside the cell phone after setting up a digital camera to take, through recognize software translate to various different information, or used to identify the two-dimensional bar code of the usage for the status. Before buying something, users may want to acquire information about introduction and biography of products through the 2D barcodes. Having the detailed information about products will make users feel relieved on the safety of the products. [10]

QR codes can be printed on any physical object including advertisements, brochures, billboards, packaging, financial instruments, garments, etc., where consumers or business users can scan them, providing an instant call to action, or immediate gratification- with all the multimedia capability of the Internet. Products and services are linked directly to relevant content on the mobile Internet, simply by scanning a QR code. In line with the move, Taiwan Mobile has introduced and promoted application services that use QR codes with the anticipation that use of QR codes in various scenarios (including ring-tone download and e-commerce) will accelerate in Taiwan with the coming of the 3G era in the island country.

C. Traceability of supple chain system

Organization of International for Standardization (ISO 8402) to the definition of production & sales resume, for to the habitat of product, process a manufacturing and it makes use of process' related information to all include a detailed record, and can be traced back to[11].At the product fraction, can link from the original habitat and make the information of process and conveyance dispatching process, the back ground data providing to be good enough to predict it to the need port to the quality to request; Also rely on information technology, and supply chain information system to link related information.

Involve a big religion product into global market biggest of

the challenge lie in the supply chain of the vertical integration manufacturer, how more close cooperative relation and acquire a greater benefit; then must promote the consumer's cognition degree with contented its request to the security of the food health and the quality to long-term market .The progress of information and knowledge management will promote the kinetic energy of production & sales resume and help a manufacturer to quickly respond the challenge from inner part and the market benefit of the exterior[11].

In the system of traceability, the most important two greatest functions are tracking and tracing [12].

(1) Product Tracking: Through production product the product created related information, can know the name of product and process the capability of process in time, belong to track from top to bottom of idea.

(2) Product Tracing: Through produce a product the product created related information, can carry from the consumption in time, the dealer returns to trace the source of the product upward of capability, belong to from bottom to top trace back to idea.

The traceability has costliness to be worth very much to the population food security, in addition to company reputation helpful outside, can also provide a certification and distinguish the basis of responsibility, have very big advantage to the step - down industry risk [13].

III. RFID-BASED CULTIVATION VALUE CHAIN SYSTEM MODEL

Over the past three decades, Radio-frequency identification (RFID) systems have evolved to become cornerstones of many complex applications [5], for instance, faster loading and receiving, reduced transit and storage times, or less spoilage and counterfeiting [14]. One important environmental challenge is low temperature. When RFID is used in item identification during the supply chain, the tag antennas may be required to function at low temperatures in various situations. When tracking frozen food, the tracked item has to be at temperatures below freezing throughout the supply chain from the manufacturer to the end user [15].

Along with the fast development of science and technology and the economy, the competition of traditional enterprise has already turned into the competition of supply chain and promotes supply chain information to integrate function to improve a logistics efficiency and reduce logistics cost, is also the important topic that competition ability promotes. RFID is introduced, will change the homework mode of traditional supply chain, make entity logistics and information flowed to combine, record product all messages inside the life cycle in detail, increment visibility, raise the value of whole supply chain system. The framework of RFID benefits used in Fig. 1 provides a good overview of the benefits that could be achieved by using RFID in supply chain management [16]. Fig. 1 presents these benefit types in two main groups:(i) the benefits that can be realized throughout the supply chain, and (ii) the benefits that can be realized by major supply chain participants.

□The original material is not merchandise□, the industry of the marine products farming only attained production fish, shrimp etc, and the high level of multinational type production & sales value chain, will by product security examination, packing, brand, logistics and marketing, until completion merchandise manufacturing process. The traditional mode of production changing early times to emphasize experience to spread to accept is paid attention to standard operation process, conduct and actions activates the carrying of business creativity.

Rebuild the image of the product market, break the difficulty of marketing, just can the farming industry is from the family type farm management way upgrade, with profession management the way head for international Jing to contend for, therefore the concept of the product resume of the clean food material however get, this research mainly through RFID the technique of the control core, duct in to automate management concept, effectively manage a control to keep the shrimp factory farming process, load in the related information into RFID, and build up the resume of the white shrimp farming, provide customer to get to the Internet to search the resume of the product production.

Mark for from the technique processes such as the farming clean and white shrimp, production by-product, farming technique and factory knowledge etc., turn it into commodity and quasi-commodity again, and combine virtual channel, carry on brand packing and the production & sales value chain of sale, the main business technique competition ability lies in:

1) The cleanness lives a shrimp farming control technique: Through the low artificial farming of the RFID control technique.
2) The detailed record produces a resume: Through RFID label, track the process information of the production processing.
3) The One-Stop shopping service is in collaborative commerce: Through a e-trading platform and reach diversified profit source and include to live shrimp sale, by-product sale, farming technique guidance, training, adviser, patent authorization, plant export and clean food material to consign a service etc. through complete product line.

In fact, RFID will be one of the most strategic technological value chain integrators embracing the life cycle of adoption; the infrastructure is as shown in Fig. 2. The management server of three-tier connection offers information-on-demand services for value chain partners and customers through multiple devices.

RFID offers the unique ability to provide benefits across the four stages of a seafood product’s life cycle: cultivation, inspection [17], logistics [18] and retailing [14, 19, 20]. Thus, four major applications contained in this system: cultivation process management, inspection tracking, distribution tracking, and reverse tracking for retailing, will be further explored in the following section.

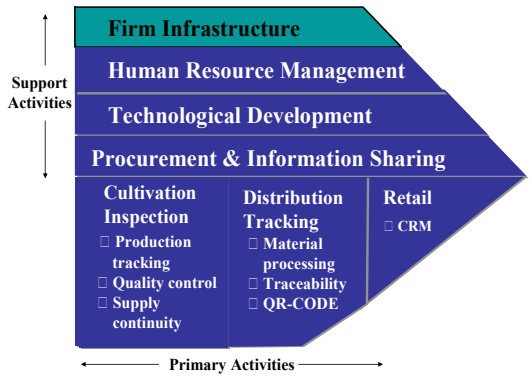

Fig.1 RFID benefits across the supply chain

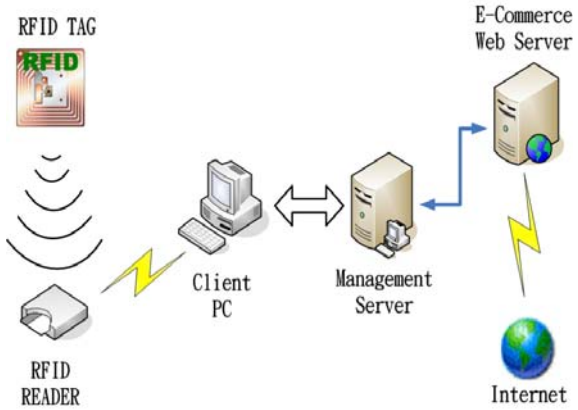

Fig.2 RFID-based infrastructure

A. *Cultivation Process Management*

First of all, the cultivating phase read/write high-frequency tags (Auto-ID) are placed in cultivating boxes to hold all the cultivating details. These include refill feeder, clean unfinished food, clean dead shrimp, replace water, and water warming details for each drawer, worker, and shelf. This data can be transferred-if required- via RF links to update shrimp feed order processing and trigger automatic re-ordering when stock levels are low. It also can be used to trigger baby shrimp re-order processing. In addition, the cultivation process from seawater desalination to change cultivating tank and virus inspection is tracked and logged in real time, using either hand-held PDAs, or, where conveyor systems are employed, automatically using RFID portals.

The workers hold a PDA reader (which has embedded Wi-Fi functions) within a certain distance to authenticate the cultivating boxes. Each PDA has a specific IP for security during data transmission via Internet. Data will be transmitted through GPRS service (General Packet Radio Service) from a PDA to its local access point. Data are fully protected because of being encrypted (including compressed and verified) by the router from VPN (virtual private network) before being transmitted [21]. This automatic identification technology based on the RFID technology has two values for the cultivating process. First, this technology helps to simply the cultivation processes allowing accurate daily instructions for field workers, such as refill feeder, replace water, and water warming. Second, the RFID technology helps to prevent or reduce operation errors and the reduction of training time of new workers.

This not only provides management with critical work-in-progress monitoring but also means that data can be maintained locally on the cultivating tanks, thus enabling management to query the product locally without having to rely on RF connectivity to the database. Furthermore, the availability of critical cultivation data and work-in-progress monitoring in near real time, depending on the RF coverage, gives management the flexibility to continually review and optimize their operations with up-to-date information at all times, The flow of cultivation process is shown in Fig. 3.

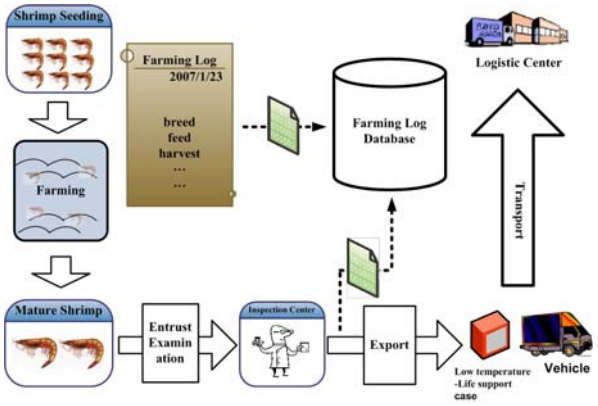

Fig. 3 Cultivation Process

B. *Inspection Tracking*

In recent years, healthcare in the food sector has demonstrated the need for increased safety and quality [17]. One way of achieving this goal is through improved traceability of the product; allowing the consumer full access to relevant information. In terms of the seafood industry, the full cultivation history is necessary to be recorded in detail. A wireless network and database system allows numerous field teams equipped with RF-enabled PDAs and laptops to carry out coordinated and detailed water quality monitoring, electrochemical analysis, and remote control of systems and access to information via Internet interfaces. The flow of inspection process is shown in Fig. 4.

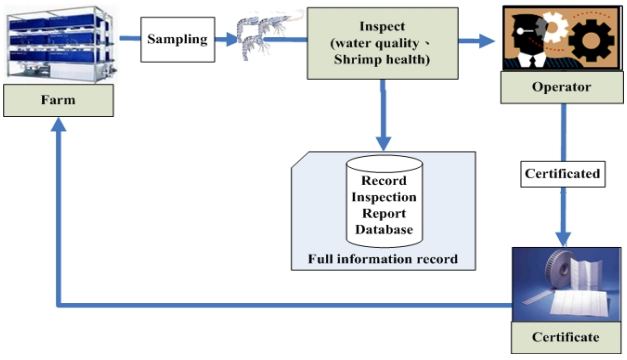

Fig.4 Inspection process

C. *Distribution Tracking*

The third phase benefits of RFID become evident when the product enters the supply chain for distribution. Referral to the realization of the system includes the integration of physical and chemical sensors with RFID communication capabilities for gas sensor integration onto flexible substrates [22]. Operation of similar sensors [22] mentioned at a fixed temperature [23] shows that the reader could work as an alarm level monitor able to assess the conservation stage of apples. Per previous studies, a sensor with RFID communication is useful while off-factory monitoring.

This phase can be divided into two parts: 1) Instant frozen process: before long-distance delivery, first of all, live white shrimps will ship, via specific logistics carts, to frozen factory for instant freezing. An RFID-enabled product provides a facility for updating the product tag with receipt/delivery details. The update is accomplished either manually, or by using an RFID-enabled PDA. 2) Packaging: the standard retailing package is about 600g per box; the Quick Response Code (QR code) will be printed on the label for product information tracking. At this moment, the RFID tags are collected and returned to the cultivation farms for recycling use.

The subsequent web-based tracking services will be replaced by QR codes. After the processes, the standard retailing package of frozen white shrimps will ship to distribution centers for sale. Since the whole factory products are sold to an exclusive retailer, the retailing ordering information and delivery arrangement will not be included in our systems. But, the picking, receiving and shipping operations can also be recorded in QR-codes; through the connectivity between QR-code and RFID tags the resulting data is also useful for retailing logistics companies that offer web-based tracking services for automatic product location. The flow of distribution process is shown in Fig. 5.

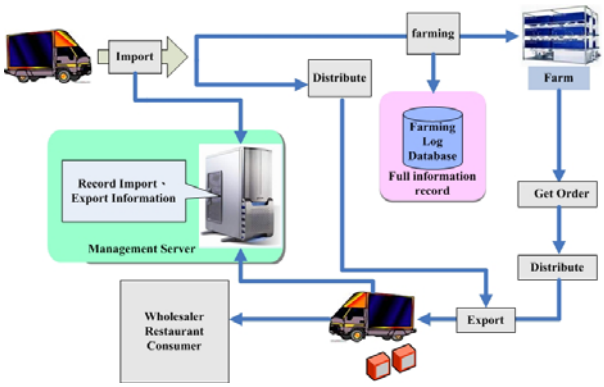

Fig.5 Distribution process

D. *Reverse Tracking for Retailing*

While QR codes have been a successful initiative for the retail industry, there is a growing need for a new technology to sustain and revive its vitality in order to deal with increasing market pressure and customer demand [24], therefore the introduction of RFID technology is timely, and is precisely the best solution.

Barcode solution has dominated retailing for decades, and accompanied with the emergence of RFID technology, hybrid solutions are introduced. RFID provides benefits including [24]: (a) improved accuracy in managing inventory; (b) improved visibility of orders and inventory; (c) reduced costs for logistical operation; (d) improved efficiency of store operation; (e) shorter retail cycle of designing, manufacturing and stocking the latest products; (f) improved sales floor planning for desired styles, sizes, and colors; (g) improved customer service; and (h) improved security. The flow of the retailing process is shown in Fig. 6. Home and restaurant customers are allowed to access virus-related information through the communication of RFID Tag.

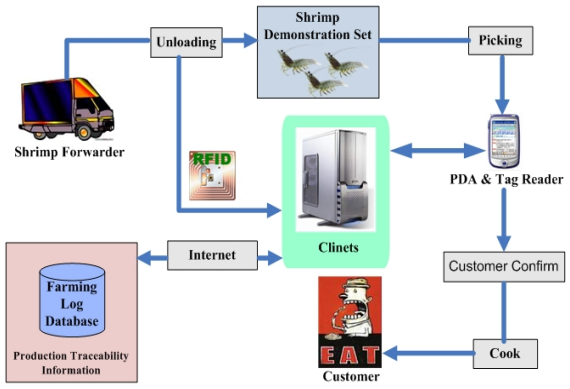

Fig.6 Retailing process

IV. Experiments

A. *Subject*

The most important purpose in the traceability is the risk

management, while carrying out to first lead the pilot test project, in order to reduce the risk and exaltation to control the degree, have to help the operator to build up a homework basis, examine the related risk control to order and the management content of the necessity, do the systematic management; also first try to do with the implement application ducting that close the type, can quickly control the need and current conditions, to various resources of control the degree also higher. Radio frequency identification is appropriate for various cultivation applications, and provides cost savings through increased speed and accuracy of data entry. The pilot system used in this experiment was applied to a selected case study involving a shrimp-framing factory building in Taiwan to verify the proposed methodology and demonstrate the effectiveness of information sharing of project control in the whole life cycle phase

In order to reach the maintenance of the convenience of the system usage and height flexibility, adopt a free software development platform XDNA(Extended Distributed Nerve Architecture), the dispersion type network operation and component module constructing by Trustix Linux share a server and match SOA(Service Oriented Architecture) definition, and is take XML(eXtensible Markup Language) as communication foundation[25], XDNA client, can let the customer return environment in the different application, choose the fittest client equipments, include the applied program of built-in system, for example equipments such as PDA, Browser, Windows and Linux etc. XDNA separate relationship with client of service module, the infrastructure is as shown in Fig. 7. The network computing platform, Java is for the basement, use of resources and the use of Open Source MVC Framework and the support of many peripheral devices, such as , To provide full technical support from the main type of distributed systems to e-market development platform. This system usage Microsoft-SQL regard as data base management system, database and application communicate with an interface by the ODBC function (Open Database Connectivity), reads the database data conveniently. This system usage label of ACG RFID according to the specification of the ISO05693(13.56 MHzs), can access of memory capacity is 1-2 Kbitses.

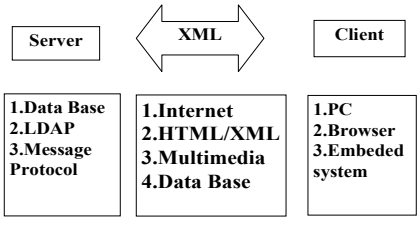

Fig.7 Distribution process

This system was implemented in a white shrimp factory of YouCFood Marine BioTech Company from 2006. In the beginning, senior managers were inspired by high-tech companies' effectiveness and efficiency of RFID-based production. Therefore, a pilot study was conducted to implement a tailor-made cultivation system with RFID technologies. As shown in Fig. 8, the factory is a multi-layer structure. Each layer has many boxes. Therefore, box-level tagging was chosen to accelerate the adoption rate due to ease-of-use and cost effectiveness. The major goals of box-level RFID tag use are: 1) negligence control; 2) remote monitoring; and 3) bio-security enhancement.

B. RFID-based Value Chain System

After three months communication with YouCFood, inspection and distribution partners and customers, the research team proposed a twelve-process system which would integrate RFID technologies, as depicted in Fig. 9. We then detailed the processes as per the following.

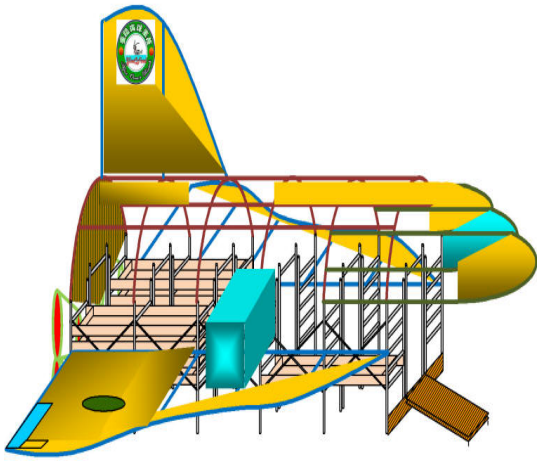

Fig.8 The multi-layer box cultivation factory

1) Farming side

The white shrimp is cultivated in the multi-layer cultivation box (as depicted in Fig. 8) with the RFID Tag which carries on daily standard operation procedures (S.O.P.). The operators scan the RFID tag with handheld reader which triggers the job dispatches and assignments. As shown in Fig. 10, with RFID tag help, the daily routine SOP of operators can be preceded with reminders shown on their PDAs, and also through the tags, managers can monitor and detect fraud and errors.

The shrimp seeds were purchased from providers, delivered into the farm; the RFID tags were embedded on the cultivation box which was used to record the seeding journal for 5 weeks. This stage is very critical for keeping seed shrimp alive. The operators were reassigned to a short-term intensive job rotation task force (8 hours a shift, 3 shifts a day). Seamless observation of water temperature, quality, and special treatment are critical for seed shrimp alive. With RFID tags, the remote monitoring can be controlled and automatically recorded.

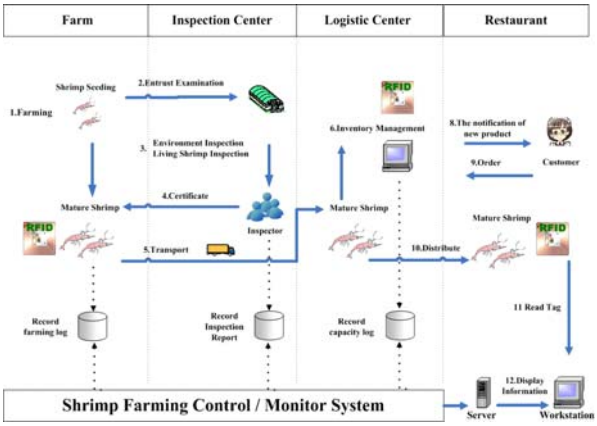

Fig.9 White Shrimp Value Chain Systems

After 35 days, baby shrimp have matured, and the limited space in the existing box may threaten mortality. Baby shrimp will accordingly be reallocated into new boxes. One baby shrimp box will be dispatched into three new boxes accompanied with new RFID tags. The baby shrimp will be cultivated for seven weeks until the next reallocation. The link information of old and new tags can be traced from the back office systems. Again, after a period of time, the second and third movement will be preceded and the old tags will be replaced for the new boxes in the third farming stage.

Fig.10 Cultivation Work-in-Progress Data

2) Entrust examination and environmental security

As we mentioned in the introduction section, the inspection for viruses are a kind of high quality seafood guarantee. YouCFood has several routine external examiners and in-house inspections are needed to be carried out daily or monthly such as water quality, carbon monoxide, Dioxin, medication residual quantity and so on. The system provides a sampling approach to effectively examine virus, water, and pollution levels. The inspection information is recorded in box-level RFID tag. As shown in Fig. 11, the operator reads the tag to verify the needed inspection.

For external inspection boxes, the random chosen sample was packed and sent to the public inspection center with QR-Code sticker. After the qualified inspection report is returned, the original report will be scanned and stored in the systems for customer access. Inspection boxes failing inspection will be isolated and precede bio-security examination immediately.

3) Transportation

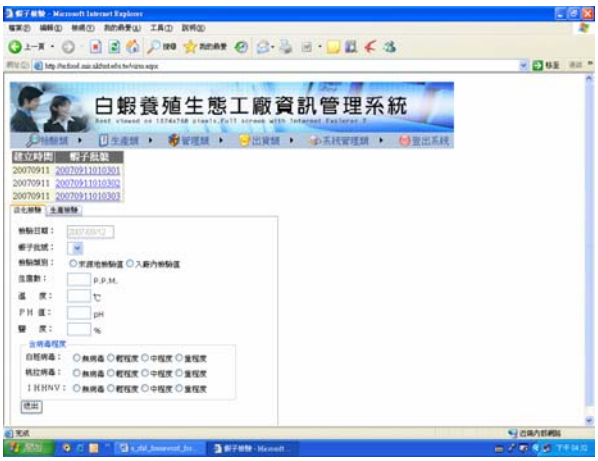

Fig.11 Virus and Water Quality Inspection Data

Live shrimp distribution management attempts to effectively obtain real-time information and enhance dynamic control and management via information sharing and analysis from involved participants of the value chain to reduce channel conflicts and shipping delay. However, extending the distribution control system to customer sites is considered inefficient, since customer sites are unconventional practice. Integrating RFID technology, mobile devices-PDA and web portals help improve the effectiveness and convenience of information flow in shrimp value chain systems.

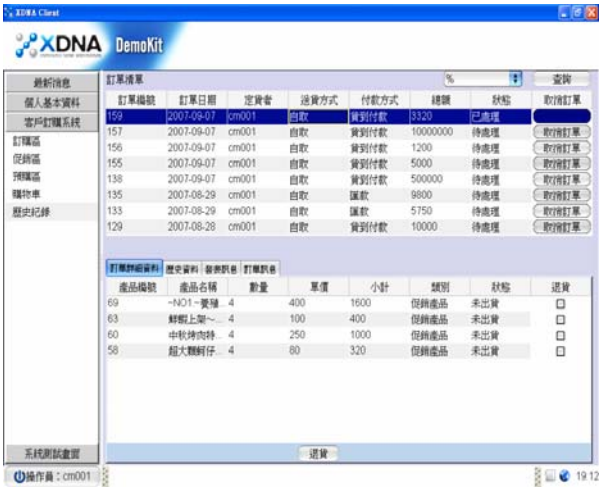

Fig.12 Real-time distribution Data

There are two major distribution methods offered in this system, as depicted in Fig.12. For home customer order fulfillment, the RFID tag will be replaced by QR code sticker which eliminates the inadequacy of readers. We suggest customers use their cell phones with CCD to scan the QR code on the product pack which generates instant hyperlinks to the white shrimp database recording information regarding producer, non-virus certification, ordering, and shipping information.

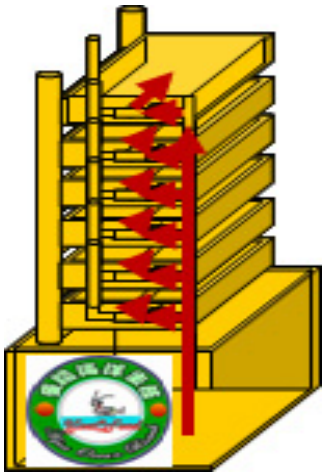

Fig.13 The mobile multi-drawer cart

For restaurant customers, the RFID tag was used in the multi-drawer mobile cart (Fig. 13) for further reverse tracking. The multi-drawer is embedded with basic cultivation systems including water circulation, refreshing, and refilling. The RFID tag used to record the actual distribution information includes distributor, delivery time, arrival time, quantity, and shipping location. Detailed distribution information can be tracked on the website, as shown in Fig. 14. Restaurant customers are allowed to access the status and exceptions.

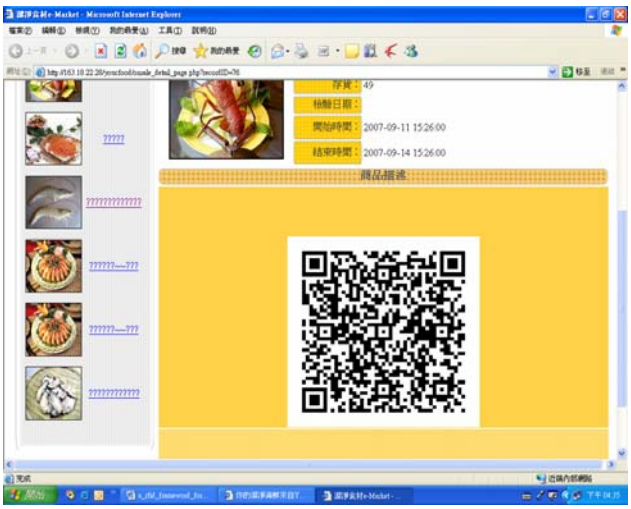

Fig.14 The website product information

4) Reverse tracking for customers

As shown in Fig. 15, corresponding QR codes can be found in online shops. The function of QR Code is the most important part in our system and is used to complete many functions such as recording data, querying information, etc. When the user-end cell phones or PDAs taking a picture for QR Code, the system can make some basic decisions and send the result to the server-end. The potential buyers click the code to verify the inspection profile of the live shrimp before they make a purchase decision. For offline customers, they use a cell phone with CCD and Wi-Fi/3G to scan the printed QR code on the retailing packs which provide instant hyperlinks to the white shrimp information regarding producer, inspection, distribution, and retailing information, as depicted in Fig. 15. This QR code sticker offers customers an easy-to-use, playful, and scientific way for instant communication of reverse tracking information which helps customers have a better understanding of the detailed cultivation of white shrimp.

Through defend false marking and the database of the production resume RFID built, concrete following advantage:

1) Defend a false processing
Combine the method of the database identification, reach to defend false function, there is no farming batch number product, the product can not get into a market and defend false ability to in multiple layers protect by password at the food material database.

2) The information container: According to prevent a falsification batch number, the computer information records the following content.
- Product and service model number: From the production, strategy and to market, provide brand model number and responsibility ownership of item service.
- Product and service content explain: Concretely explain an item product model number and identify standard and special feature.
- Product and service examine a result: Complete examination reports a result, can win consumer's confidence.

3) The information presents: Present product information to the consumer.

Fig.15 QR-Code sticker with instant communication of reverse tracking information

V. Discussion and Conclusion

Current manual and labor-intensive methods are inefficient; as a result, information is frequently incomplete, inaccurate or unavailable during the life cycle of a product. This pilot system provides a vision of intelligent boxes, which know their identities, locations and history, and communicates this information to their environments. It proposes streamlining information flow through supply chains by utilizing radio frequency identification (RFID) technology. To explore the technical feasibility of intelligent boxes, shrimp-related information flow patterns in value chains were identified and analyzed. Requirement analysis and corresponding technology deployment and testing were performed for three types of shrimp through different life cycle phases. These experiments demonstrated that it is technically feasible to have intelligent boxes in value chains by using RFID technology; that status information can be collected automatically; and that cultivating information can be stored and retrieved during the cultivation life of a shrimp.

Build up the complete shrimp product traceability information system, the consumer can provide through the network, cellular phone or the retail price store of information, clearly search or understand from produce the related information of the sale process. When the shrimp product occurrence health safe accident, can quickly trace back to a processing, will have an off-the-shelf the product of problem, recall and destroy processing, manufacturer and consumers can have a guarantee, the traceability information system in addition to having to consider the supply chain operator's production line to record, must also pay attention to consumer's will, shorten an operator to relate to with customer, and improve industry constitution

For this organization, measures of the RFID system effectiveness three months after implementation revealed several major improvements. Based on a comparison of performance before and after implementation of the new system, the company found: an increase in shrimp survival rate of 10 percent, a reduction in the number of workers by 30 percent, higher management and customer satisfaction, and less training time required for new hires and for transfers among departments. This comparison reveals a strong improvement in effectiveness after the implementation of the new system for the case company.

Have already reached highly mature today in information science and technology development, the information of the traceability, don't trace back to the restriction on the technique; It the one who causes bottleneck is usually the original data or data of the production line and bargain of don't easily obtain, with the result that "information asymmetric" happen, in order to overcome this problem, initial work is promote a product of the specification turn, and create to soundly recognize identification system to guard a pass, particularly is a consumer to concern "process a stage" most and have to strengthen and bring into the identification of the traceability to solve a consumer to the worry in uncertainty on the security of the food health[26].

The advantage of the pilot system lies not only in improving work efficiency for on-site operators, but also in providing dynamic operation control and management to enable value chain participants to control the whole process. The shrimp farming needs through a series of workflows, and be divided into much more stages, each record unit also needs with the change of the homework process, don't easily attain the product can trace back to of object, this study main purpose lies in creating a shrimp farming and can trace back to data logging and collections mechanism, through the paper of design originally menu and vision turn bar code label, is the process of the front end workflows to make use of bar code to recognize tool for the product, link from habitat to the shrimp of each step of consumer can trace back to information, behind carry consumer port to match the mobile device of RFID-PDA to present the data to the consumer, this the shrimp production & sales can trace back to data processing process, can be in the days to come every trade create the product traceable system of reference.

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Echo Huang is an associate professor of IM at the National Kaohsiung First University of Science and Technology, Taiwan. Her research areas are E-commerce and Information Technology Marketing. Her articles have appeared in Journal of Management & System, Journal of Information Management, Internet Research, WSEAS Trans on Information Science and Applications, Computers and Human Behaviors, Electronic Commerce Research on Applications, and Sun Yen-Sen Management Review.(e-mail: echoh@ccms.nkfust.edu.tw).

Juh-Cheng Yang is with PhD student, Doctoral Program in Management, National Kaohsiung First University of Science and Technology 2, Jhuoyue Rd., Nanzih, Kaohsiung City 811, Taiwan, R.O.C.
(e-mail: u9428907@ccms.nkfust.edu.tw).