IoT Business Model Development for Food Safety Monitoring System in the Poultry Slaughterhouse

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Abstract. Internet of Things (IoT) has changed the industrial direction and open a new opportunity for the food business. The food safety business took this technological leap to increase food safety in the industry. The technological leap focuses on the improvement of traceability system in order to guarantee the appropriate level of protection for biological and chemical hazards in the poultry slaughtering. Consumers' concerns about food safety are the key to new technological businesses by using the internet platform and reengineer the computer system. The different business model for IoT provides a system building for new ventures. This paper aims to describe a new business based on a new internet technology development. An internet-based business on food safety notification for the slaughterhouse with regards to food safety hazards is the main business backbone. The system development will be based on a sensor and link with the android system that integrated conveyor system to detect the possible biological and chemical hazards. The future new business model of IoT system is integrated with HACCP sensors.

1. Introduction
The food business opportunity and direction were changed by the Internet of Things (IoT) [1]. The food safety business took this technological leap to increase food safety in the industry [2]. The technological leap is giving a new opportunity for the future development of the industry. One of the opportunities is an improvement of the traceability system in order to guarantee the appropriate level of protection for biological and chemical hazards in the poultry slaughtering. Since many consumers concern with their food safety and food sources, which previous study prove the consumer switch their buying habit due to food unsafety incident [3]. Consumers’ concerns about food safety are the key to new technological businesses by using the internet platform and reengineer computer systems [2]. The different business model for IoT provides a system building for new ventures. The Internet of Things (IoT) in poultry slaughterhouse is the network of physical devices of slaughter plant appliances that work via electronic equipment. The network uses software to connect, collect, and connect data using sensors, actuators, and connectivity [4]. Each stage with food safety hazards is identified and embedded in the computing system within the Internet infrastructure. The conceptual idea of using IoT as a strategic business needs to be evaluated. Therefore, this study focuses on the use of IoT to
safeguarding food safety and control the appropriate level of protection in the poultry slaughterhouse. This paper aims to describe a new business internet based on new internet technology development.

2. Materials and methods
The paper proposed an initial concept of IoT in food safety monitoring as a business model. The proposed model was developed by the basics of 3D scanning, image analysis, comparison, and classification. The model developed by two approached. First, this paper used a qualitative approach to identify business strategy. We identified the food safety monitoring system as a strategy to develop business model types by Porter's generic strategies [5, 6]. Second, adapted business model canvas to develop the value proposition for business model [7, 8]. The nine elements of the business model canvas analyzed the food safety monitoring system for a new business. These nine elements are business model canvas (BMC) are customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. BMC was mapped to describe food safety notification for the slaughterhouse with regards to food safety hazards.

3. Results and Discussion
A food safety notification for the slaughterhouse is the main business idea. The backbone of this idea with regards to food safety hazards is to notify the food unsafety event during slaughtering to the company. The concept of system development will be based on a sensor and link with the android system that integrated conveyor system to detect the possible biological and chemical hazards. The scanning process will give an input for image comparison analysis. A classification of microbial pathogens will process the data from the comparison stage. The sensor improvement focuses on the detection of nanomaterials by electrochemical or optical sensors.

![Figure 1. Business canvas model for Food safety monitoring system in the Poultry Slaughterhouse](image)

The study found that the business model should develop a focus strategy from Porter as a strategy to be competitive. A narrow focus supports the company on a segmentation strategy or even a more niche strategy. Since a competitive advantage will be gaining from this market by product innovation and/or brand marketing. We found that the competitive advantage provided by the focus strategy is differentiation focus to develop a food safety monitoring system. The main value proposed is chemical and biological detection tools based on food safety notification for the slaughterhouse. The food monitoring system by utilizing IoT in supporting to improve food safety and traceability. BMC proposed companies as the customer segment. It will be easier to maintain companies compare to the retail market. However, the end-consumers could be developed as the customers as well, since many small-medium enterprises working in the slaughtering business. This market development needs customer relationship programs to keep and increase consumer loyalty. Such loyalty program that
could be offered by BMC were partnership contract and after-sales program. It can be followed by using other marketing channels, namely direct selling, website utilization, and social media optimization. The IoT business model for food safety monitoring was proposed to be more focused on the core competencies of research, design, development sensor, and nanomaterial detection technology [1]. This business model optimized innovative technology by collaborating with key partners to enter the new market. By focusing on the specific segment, IoT development for food safety monitoring could be reduced, and limited capital investment. Another benefit of the focus strategy by Porter was the ability to drive the demand. The strategy classifies as product-driven that will be able to pull the consumers and adapt to the economic situation.

The BMC featured key activities in research development to support the innovation on production, marketing channels via a partnership with many websites and social media [7]. The BMC proposed the value of a better way to integrate sensor technology with nanomaterials and pathogen into food safety grids and technically based on more effective hazard prediction [4]. It will be improving the diagnosis and treatment of poultry slaughtering with connected devices for better assessment in slaughterhouse. The application will be given to real-time dashboards in smart devices that will ultimately deliver real-time insight to the company and safeguarding millions of customers’ health. The developed feature could give more trust toward poultry consumption in their choice of market channels and guarantee their food safety [3]. In the end, technology can protect the traditional and modern poultry market channels, and it will reduce the possibility of an unhealthy poultry market to supply the market with sick poultry [9].

4. Conclusion
The paper presented an initial study for IoT in the food monitoring business by using BMC. The study found that the offered value from the BMC was a sensor to detect the possible biological and chemical hazards. The focus strategy will give a competitive advantage in the IoT business that drives technology improvement and product innovation. The future new business model of IoT system in the poultry slaughterhouse is integrated with HACCP sensors

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