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Knowing about your food from the farm to the table: Using information systems that reduce information asymmetry and health risks in retail contexts

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ABSTRACT

We combined the most relevant variables from the principal agent theory and the technology acceptance model to develop a parsimonious model of technology acceptance for food traceability systems, which are voluntary, direct consumer-use decision support systems that reduce health risks for consumers by reducing information asymmetry between consumers and sellers in retail settings. Results from a survey about a beef traceability system show novel findings about the important roles played by consumers' perceived regulatory effectiveness as an exogenous antecedent, and by their trust in seller and willingness to pay a price premium as mediators, that shape their intentions to use a BTS and conduct a purchase transaction.

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1. Introduction

Conventionally, retailers in the packaged food and grocery industry provide only limited information to consumers in terms of nutrition and content information on product labels to comply with various regulatory requirements. Although nutrition information remains important for consumers, food-safety concerns resulting from the increasing potential for the contamination of food products with harmful chemicals and microorganisms within the increasingly complex food supply chain has created a need for consumer information about when, where, and how their food was produced and shipped for retail sale. This development is not surprising; consumers want to ensure the quality of the products before buying them because poor-quality food products can pose significant health risks to them and their family. Moreover, we live in an

information age that has made consumers hungry for information about the products they want to buy. However, information about the when, where, and how of food production and distribution, i.e., the food supply chain, has hitherto been available mostly to the producers, distributors, suppliers, and retailers of food and grocery products, and consumers are mostly out of the loop with respect to such food supply chain information. This vast difference in the amount of food supply chain information known to the sellers vis-à-vis their customers creates a high degree of information asymmetry between these two parties in the retail context.

However, the recent increase in consumers' desire for food-safety related information resulting from their food-safety concerns has forced retailers[1] to share more information with consumers to reduce information asymmetry between the two parties and thereby alleviate consumers' food-safety concerns. Prior research has shown that some types of information systems

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[1] We use the terms retailer and vendor interchangeably and synonymously in this paper.

(ISs) can play an important role in reducing information asymmetry between vendors and consumers [136]. In the retail context, ISs provided by the retailers to consumers can play an important role in resolving this information asymmetry by providing consumers with more information regarding the food products they want to buy. These systems not only support customers' decision making; they also motivate sellers to charge fair prices for their products, thereby resulting in customer purchases with high satisfaction [26]. For this reason, the packaged food and grocery industry is adopting a variety of ISs for use by consumers in the retail context [50]. Examples of such ISs include Product Search Systems, which provide customers with information about grocery products' location and stock, and food traceability systems (FTSs), which provide customers with information about the production region, producer, timing, and other details of the production and distribution process. Ultimately, retailers' objective is to be successful in selling their food products, and hence, they are adopting and providing such systems for consumer use in the retail context to give consumers information that can help them in their purchasing decisions.

There are several attributes specific to these ISs – particularly the FTSs – that have not been addressed in the literature in a comprehensive way. Moreover, FTSs have started making their foray in the retail packaged food industry only recently, as a result of which there is a paucity of studies about the acceptance and use of these types of systems. The unique combination of attributes FTSs possess and the nascent state of knowledge about their acceptance and usage in the retail packaged food industry provide us with the motivation for this study. We discuss FTSs and the state of knowledge about their acceptance in more detail later. Briefly stated, however, these systems belong to a specific class of systems – voluntary, direct consumer-use, decision support systems – that not only reduce information asymmetry between the seller and the consumer in the retail packaged food products industry but also have the potential to reduce consumer health risk. First, the consumers' usage of FTSs is *voluntary*. A consumer is free to buy a product without using the information benefits provided by these systems. Second, as opposed to transaction processing systems such as retail checkout systems, FTSs are *decision support systems* that are *directly* used by the consumer in a retail context. The consumers themselves directly use these systems to help them support their purchase decision. Third, these systems aim to reduce information asymmetry between the seller and the buyer about the food supply chain by providing consumers with detailed information about when, where, and how the various food products were produced. Fourth, these systems also have the potential to mitigate consumers' health risks from poor-quality or contaminated food products that can sometimes have serious, life-threatening consequences, as opposed to other types of ISs that aim to mitigate strategic, operational, or information assurance risks.

The goal of this study is to shed light on consumers' acceptance and usage of FTSs in a retail packaged food purchasing context and their purchasing behavior in that context with or without the use of FTSs. A key goal of retailers in providing these systems for consumers is to empower them by reducing information asymmetry between the retailer and the consumer; therefore, we use the principal agent (PA) theory and the technology acceptance model [83] as the underlying theories for this study. Furthermore, because collecting and providing detailed food supply chain information to consumers would require additional investments on the part of the various supply chain actors, food products supported by FTSs are likely to be more expensive than food products about which detailed supply chain information is not collected and not provided to consumers. Therefore, we ask: What factors drive consumers' purchase of a food product that may pose health risks in conjunction with their use of an FTS to reduce information asymmetry in the context of this purchase decision? We develop a research model to address this research question and test it using data collected from a survey administered to users of a beef traceability system (BTS), which is a type of FTS that provides consumers with information about the production, processing, and delivery of the beef that consumers are considering purchasing from a retail store.

This study makes two main contributions. First, to our knowledge, this is the first study to investigate the acceptance and use of FTSs in retail settings. As a voluntary, direct consumer-use decision support systems that reduce information asymmetry between buyers and sellers in a retail context, FTSs unique types of information systems whose acceptance and usage have not been studied in previous IT acceptance literature. This paper developed and tested a parsimonious theoretical model that combined the most relevant variables from the two underlying theories – perceived regulatory effectiveness, perceived purchase risk, trust in the seller, and the willingness to pay a price premium, from the principal agent theory, and the perceived usefulness and ease of use, from the technology acceptance literature – providing evidence of the importance of these variables in the context of FTS acceptance and usage in retail settings. Second, this paper advances the theory of technology acceptance by adding the notion of consumers' willingness to pay a price premium as a mediator of the relationship between trust in the seller and intention to use an FTS and between trust in the seller and purchase intention. This is an important construct in the context of ISs that reduce information asymmetry between consumers and sellers in retail contexts because food products that are produced and sold with more supply chain information to consumers cost more to produce. As discussed before, resolving information asymmetry in a retail packaged food industry context is important to mitigate consumers' food safety concerns, which have increased due to an increasing number of occurrences of tainted food products, which can causes diseases, such as mad cow disease [159]. Together, the above two contributions allow us to advance the theory of technology acceptance in the context of the acceptance and use of voluntary, direct consumer-use decision support FTSs in retail contexts.

The rest of the paper is organized as follows: First, we discuss the theoretical foundations of this study, starting our discussion with food traceability systems (FTSs) and beef traceability systems (BTSs), which are a specific type of FTS, and their importance in the context of consumer concerns about food safety. This is followed by a review of the two umbrella theories – technology acceptance and principal agent theories – because they provide the underpinnings for the research model developed in this study. Next, we develop and discuss the research model and hypotheses to address the research questions posed in this study. We then discuss the methods used in this study, including the measurement instrument, data collection, and analysis methods. Next, we report the structural equation model results and conclude with a discussion of our results, theoretical contributions, practical implications, limitations, and future research directions.

2. Theory

2.1. Theoretical foundations

2.1.1. Food traceability and beef traceability systems

The goal of this study is to understand consumers' usage of a beef traceability system (BTS), a specific type of FTS that is a voluntary, direct use decision support system, for food purchase transactions in a retail context where food-safety concerns are prevalent. Consumers started paying more attention to food safety