Chapter 20
The Empirical Study on the Evolutionary Game Based Agricultural Products Supply Chain

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ABSTRACT

This research paper is to use a method of Evolutionary Game to investigate the relationship between a large supplier and a franchised supermarket in China. The authors would like to go through their empirical study with their filtered answers from the survey using SPSS software on agricultural supply chain for their quality safety factors. Their research is using factor analysis with five target factors which are: the excess return, cost, the relative size of cooperative enterprises, hitchhiking, and overflows income. Applying these factors to the evolutionary game model, analyze the earning status from the both players under their own policies, then make suggestions or proposals for quality and safety issues of agricultural supply chain management.

1. INTRODUCTION

Regarding the application research of game theory on the food supply chain security, some scholars' studies are focusing on the issues of food supply chain and agricultural supply chain security from the perspective of game theory, while some other scholars are analyzing the relationship between the main body of food supply chain and food enterprises based on evolutionary game theory. Yet, there were no conclusions for the quality safety of agricultural products supply chain, no game analysis on the cooperation between the supplier and the seller. Nor resolved the problems for the quality and safety problems of agricultural supply chain in the presence of node enterprises.

This research intends to investigate the quality-safety problems of agricultural products supply chain from the perspective of evolutionary game theory. Also to establish an evolutionary game model between upstream and downstream stakeholders of agricultural products supply chains, propose possible solutions to the quality, safety of agricultural products supply chains from the perspective of empirical analysis.

2. PROBLEM DESCRIPTION

Given the consistency of the chain of agricultural supply chain, the paper aimed to study one typical agricultural supply chain. Based on the Lotus Town of Dalian Pulandian City which is located in the foothills of White Cloud Hill in the central Pulandian, is the conjunction center with strong radiating outward traffic of North-South Corridor Tang Hing highway and the Central City Eight Midline Line highway. This location is very conducive to guarantee the timely transport of agricultural products, fresh and shelves. Lotus Town has more than 400 vegetable greenhouses covered an area of 800 acres, 3000 acres of high oil soybean, 5,000 acres of peanuts under plastic mulch. There are several famous local products like "Flagpole bottom" cucumber, and mulberry, which are conducive to the development of the local characteristics of agricultural products, also conducive to brand building. It is more conducive to the development of agricultural supply chain in Lotus Town.

3. DATA COLLECTION

This investigation was conducted mainly in the form of issuing questionnaires and field random sampling survey. Our insurance of questionnaires went through with the main respondents. Based on Lianshan Town area, they were selected from the reginal farmers, suppliers, vendors, consumers and regulators as well (see Figure 1). Total 278 of 320 issued questionnaires were recovered, and 261 responses were confirmed the valid ones after effective screening. The recovery rate was 86.875% with the effective rate of 81.56%. There were 96 males and 165 females among the effective respondents. After issuing, recovering the questionnaires, and excluding invalid ones through initial screening, and analyzed by SPSS18.0 data analytics software. Subjects of the investigation are mainly farmers, suppliers, sellers, customers, regulators. The proportion and numbers of the respondents are listed in Table 1.

Table 1. The fieldwork investigation object of the quality-safety of agricultural products supply chain

Respondents	Proportion
Farmer	16.9%
Supplier	19.5%
Sellers	15.7%
Consumer	41.8%
Regulators	6.1%

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