

Analysis of information sharing model in the traditional market and its comparison with a proposed model of developing information and knowledge sharing in e-commerce in the agricultural sector of Iran

Mehrnoosh Mirzaei

Faculty Member & Assistant Professor of Economic, Social and Extension Research
Department of Qazvin Agricultural and Natural Resources Research and Education Center,
AREEO, Qazvin, Iran

E-mail address: mehr_mirza@yahoo.com

Maziar Amirhosseini

Faculty Member & Assistant Professor, Academic Relations and International Affairs,
Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran

E-mail address: Mazi_lib@yahoo.com



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Abstract:

Traditionally, rural products in Iran, including agricultural, livestock and handicraft commodities, are marketed by intermediaries. This flow of commodity supply reduces the profitability of production for rural people and increases its profitability for middlemen. Information and communication technology in the field of e-commerce has taken long steps to solve these challenges in recent years. The present study aimed to explore the traditional model of information sharing in the agricultural market of Iran in order to identify the obstacles, limitations, strengths, and weaknesses of the market system in Iran for the development of e-commerce. Following the analysis of the status quo, approaches are presented to transit from traditional to modern marketing system and to pave the way for the implementation of e-commerce within a conceptual model. To this end, a pilot field study was conducted in Qazvin province, Iran, and the data were collected with a questionnaire and it was administered to the animal farmers. Finally, an analytic, strategic model is presented to formulate an optimum mechanism of electronic sharing of market information in order to help developing e-commerce for agricultural commodities in general and animal products in particular.

Keywords: e-commerce, traditional market, conceptual model, information sharing, agricultural sector of Iran

Introduction

The Internet and e-commerce have opened up new, exciting opportunities for the supply and demand of the agricultural commodities in developing countries. The actors in different fields, especially in industrial and agricultural enterprises of these countries, have used the Internet and electronic platforms in various forms. In developing countries in which the farmers have the Internet access, they can sell their crops to customers directly with no need for middlemen, whereby cutting the extra costs and increasing their income considerably (Nozari et al., 2012). The interaction between modern information and communication technologies (ICTs) and business process is the key to understand the impacts of e-commerce on economic transactions and ultimately on the economy as a whole (Li & Fan, 2014). In e-commerce, information is shared through an electronic system in a networked platform or other electronic channels, rather than through direct or face-to-face contacts (Manoselis et al., 2009).

E-commerce, in the broad sense, emphasizes the adoption of modern technology for chain communications among producers, retailers, and suppliers. In general, commodity and service suppliers on the one hand and the buyers, consumers or customers on the other hand use electronic facilities and platforms to make communication with one another in order to make better decisions, optimize the commodities and services, reduce the costs, and open up new marketing channels. Thus, the application of e-commerce facilities in the Internet medium can make it possible to draw a foundation for dynamic, yet sustainable, economy within the scope of urban and rural development and to better share practical information and knowledge required by the villagers and crop markets (Rial, 2013).

Given the significance of adopting e-commerce trading platform, the present study explores the traditional information sharing model in the agricultural marketplace of Iran in order to identify the obstacles and limitations of the Iranian market system for the adoption of e-commerce. Based on the results, approaches are presented to facilitate the transition from traditional to modern commerce and marketing, and platform requirements are formulated for the implementation and development of e-commerce. To this end, a field study was first conducted as a pilot in Qazvin Province as a major agricultural center of Iran. It should be noted that this province has remarkable potentials for industrial animal farming in Iran. So, the research population was composed of industrial animal farmers and producers. Data were collected from the animal farmers of Qazvin province with a questionnaire based on the Likert scale. Finally, an analytical and strategic model is presented for the analysis of the electronic sharing platform of market information in order to identify the factors underpinning the development of e-commerce.

Background

An overview of e-commerce formation in the agricultural sector of Iran

Given the significance of e-commerce and the attention of the public and private sectors to create and run commercial trades on the electronic platforms, this section addresses the history of the formation and the objectives of e-commerce systems for agricultural commodities, especially for the trade of animal commodities on electronic platforms.

The Agricultural Commodity Exchange Brokers Organization (ACEBO) came into existence in September 2004. In October 2006, Iran Mercantile Exchange (IME) was formed to trade different industrial and mineral commodities and oil, petrochemical and agricultural products in the form of cash, credit, futures, standard futures, and derivative tools transactions including future contracts electronically. IME is independent of the Metals Exchange Brokers Organization and ACEBO. As far as the electronic trade of the agricultural commodities is concerned, IME is active in 18 categories of the agricultural commodities. In the same year (2004), ITPNews was established as the industrial livestock and poultry news channel to improve the speed, accuracy, and reliability of electronic sharing of information on animal and poultry inputs and products market. It should be noted that

ITPNews is the bridge linking Iran's poultry and livestock industries with all relevant players all around the world.

In 2010, Iran's Great Agricultural Market was formed to provide e-trade services for the agricultural commodities, especially animal products. The market supplies the commodities to the consumer market electronically on the basis of the commodity trade by producers and suppliers of the agricultural commodities. On the other hand, Livestock, Poultry, and Fish Industry Database came to be known as *Dastcheen* was formed in 2010 to act as a virtual ICT-based exhibition for the agricultural commodities. This e-market can display the titles, images, and prices of all commodities to the visitors. Two years later, the Online Agricultural Store was developed in 2012. It aimed to eliminate the intermediaries, provide high-quality commodities to customers, and create an electronic interaction between producers and consumers with low market margin and appropriate prices. This store is featured with its e-purchase platform and the rapid and low-cost delivery of the commodity to the consumers.

In 2013, the National System for Agricultural Commodities and Inputs Trade (NSACIT) was founded with the aim of updating producers' database, clarifying the prices, enhancing crop quality, improving production competitiveness, shortening the farm-to-fork length, and creating a proper distribution chain by Iran's Rural Cooperative Organization. NSACIT database allows the retailers of agricultural commodities and inputs including farmers, producers, unions, and cooperatives to offer their commodities on the supply e-board. Similarly, the purchasers and applicants can submit their requests for the crops and inputs on the demand e-board. In the same year, the Virtual Market for Iranian Villages was started to operate in order to provide pavilions for the sale of rural products, increase the production added-value, and bring the production sector closer to the sale market on an electronic basis.

The Iranian Livestock Network (Damina) is an e-commerce system that was established in 2015. The goals of this system included improving livestock producers' income, enhancing consumer satisfaction by the supply of high-quality products at appropriate prices, and reducing the margins of the marketing of livestock products. One year after the establishment of this network, the first smart livestock and poultry market was formed in Iran in 2016 to create an e-market for the trade of input requirements of animal farmers (including animal feed, supplementary feed, vaccines and medications, and equipment) and the sale of animal products. In the same year, animal e-market (Damalan) was formed in the pursuit of two main goals: the supply of safe and high-quality animal products to consumers and the supply of high-quality Iranian breeds in the international market. One year later in 2017, other e-markets come to be known as "Rural Commodity Site" were formed to provide commercial services of the trade of agricultural and livestock commodities in order to make these commodities available to consumers.

A glance at e-commerce systems for the agricultural and livestock products in Iran reveals the remarkable development of the electronic trade of these commodities. What is notable about the development of e-commerce of agricultural and livestock commodities is the formation of the systems in recent years. All in all, it can be said that these systems follow the principles and key goals of e-commerce in accordance with the international standards. However, it is necessary to conduct field studies on the willingness of the producers and consumers to adopt these e-markets.

Objectives

1. Analyzing traditional market of animal products in Iran
2. Prioritizing the requirements to create a local e-commerce model
3. Analyzing factors underpinning e-commerce adoption by animal producers
4. Presenting a proper analytical model for e-commerce in Iran.

Methodology

Data collection

Data were collected in a field study using a questionnaire as the research instrument. The questionnaire is composed of the following sections:

- i. Assessment of traditional market of Iran
- ii. Assessment of respondents' awareness of e-commerce
- iii. Prioritization of the requirements to implement e-commerce

Respondents assessed these items using the Likert scale. The reliability of the questionnaire was estimated to be 98.6 by Cronbach's alpha, reflecting the high reliability of the research instrument on the basis of the Likert scale. The statistical population was composed of all industrial animal farmers who had the official permit to work in Qazvin province, amounting to 94 farmers. The sample size was determined to be 72 farmers using the Cochran formula who were randomly selected to fill out the questionnaire.

Data analysis

To accomplish the first objective, the traditional market model of Iran was derived by exploring the status of the trade market of the animal products using factor analysis. The structural analysis model and path analysis were applied to evaluate the factors underpinning the adoption of e-commerce. The requirements for e-commerce establishment were assessed and scored by respondents on a Likert scale, and finally, a localized analytic model was presented for the implementation of e-commerce in Iran.

We made use of the exploratory factor analysis to discover and prioritize the effective factors in different sections of the questionnaire. In this analysis, the factors whose eigenvalue was greater than 1 were derived and prioritized using Varimax rotation.

The model was prepared by SEM, and the impact of various variables was evaluated on the adoption of e-commerce. SEM is a multivariate statistical technique that is used to validate the relationship between the constructs and the hidden variables. In SEM, the extent to which the research data and the conceptual model are matched is examined on the one hand (goodness of fit) and the significance of the relationship is tested in the fitted model on the other hand. Overall, there are several indicators to measure the model fit.

Results

The results show that 34.3 percent of respondents were in the age group of 31-40 years. On the other hand, 34.3 percent had B.Sc. degrees. Among the respondents, 57.1 percent had less than 18 years of experience in agricultural activities. Most respondents in industrial animal farms were in the age range of >30 years. About 62 percent of the owners of industrial animal farms had diploma or B.Sc. degrees. about 43 percent of animal farmers learn about the price of inputs in the marketplace through unions, about 33 percent of animal farmers learn about the prices of the products through unions, 17 percent through other animal farmers, and 15 percent through dairy factories.

We applied exploratory factor analysis to reduce the number of the research variables. The major variables were specified by eigenvalues and cumulative variance percentage. The results of the exploratory factor analysis are summarized in Table 1. Cronbach's alpha in this table is greater than 0.6, meaning that the results of factor analysis are statistically reliable.

Table 1. Results of factor analysis

Index	Number of Items	Cronbach's alpha	Description
i) Assessment of traditional market of Iran	27	0.645	Acceptable
ii) Assessment of respondents' awareness of e-commerce	14	0.837	Acceptable
iii) Requirements to implement e-commerce	19	0.885	Acceptable

Source: Research findings.

At this stage, eigenvalues and cumulative variance percentage were applied by Varimax method to discover the effective variables or the factors affecting each objective. Using the rotated component matrix, the factors influencing the hidden variables were derived as presented in Tables 4-6. The hidden variables included (i) the assessment of the market status in Iran, (ii) the assessment of the respondents' awareness of e-commerce, and (iii) the requirements to deploy e-commerce.

The analysis of the traditional animal products markets in Iran

It can be observed in Table 2 that among 27 factors of the hidden variable "assessment of market status", seven variables had effective factor load and accounted for 72.25 percent of the variance of the traditional market of Iran.

Table 2. Total variance accounted for by the factors underpinning the hidden variable of the assessment of Iran's market status

Overt effective factors	Load factor	Rotation of sum of factors squares		
		Eigenvalue	Variance %	Cumulative variance %
Is your animal farm profitable under the present conditions of animal products supply to the market?	0.714	3.649	13.515	13.515
Do you agree with the activity of middlemen in the marketplace?	0.831	3.456	13.800	26.315
Do you know the quality of your or other producers' products?	0.861	2.805	10.390	36.705
Do you agree with the supply and sale of your products through Internet-based electronic platforms?	0.856	2.716	10.057	46.762
Are you informed of your product price in other markets or other countries?	0.829	2.698	9.991	56.754
Are you satisfied with the government's intervention in product pricing and market?	0.794	2.513	9.308	66.061
Are you informed of consumers' taste about the product quality?	0.658	1.671	6.189	72.251

Source: Research findings.

It was found that in the traditional market, most farmers are informed about the marketplace through the unions and/or dairy factories because they supply their products exclusively to either unions or the dairy factories. In the traditional market, the animal farmers are less informed about the quality of the products of other producers and rarely consider consumers' taste. Similarly, consumers play no role in the marketing of animal farms so that they only purchase the products supplied to the marketplace with any quality and are usually dissatisfied with the status of traditional producer/consumer market. The government greatly interferes in milk pricing, causing discontent among the producers. On the other hand, this has diminished the profitability of milk production due to the rising costs of the production in recent years and the lack of reasonability and transparency in prices.

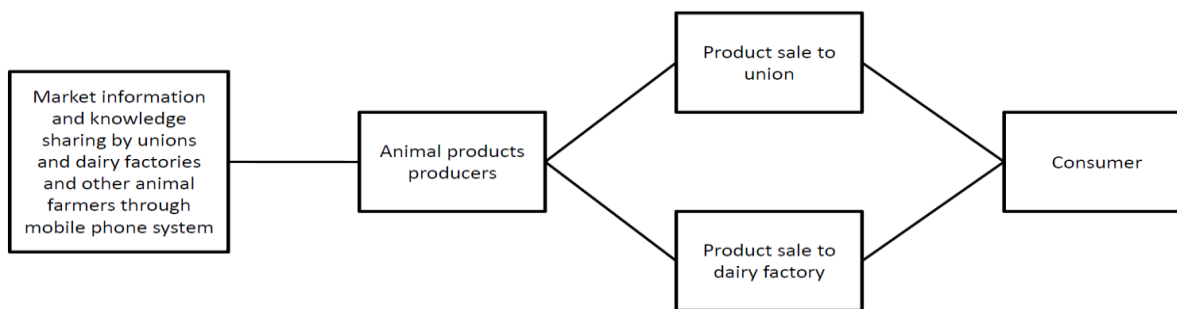


Figure 1. Status of knowledge sharing in traditional market of Iran

Analysis of respondents' awareness of e-commerce

Table 3 shows that among 14 factors of the hidden variable “assessment of respondents’ awareness of e-commerce”, two factors had effective loads and captured 71.458 percent of the variance of this variable.

Table 3. Total variance accounted for by the factors underpinning the hidden variable of the assessment of respondents’ awareness of e-commerce

Overt effective factors	Load factor	Rotation of sum of factors squares		
		Eigenvalue	Variance %	Cumulative variance %
Are you trained about the use of virtual marketing networks?	0.891	5.502	39.303	39.303
Are you willing to change your sale method by the use of electronic platforms?	0.924	4.502	32.155	71.458

Source: Research findings.

Prioritization of the requirements to establish e-commerce

As is evident in Table 4, three factors had effective loads among 19 factors underpinning the hidden variable “requirements for e-commerce implementation” and could explain 78.743 percent of the variance.

Table 4. Total variance accounted for by the factors underpinning the hidden variable of requirements for the implementation of e-commerce

Overt effective factors	Load factor	Rotation of sum of factors squares		
		Eigenvalue	Variance %	Cumulative variance %
Support of public and cooperative sectors of e-marketing	0.859	8.554	45.021	45.021
Brand-making and implementation of commercial brands	0.845	3.802	20.011	65.032
The presence of telecommunication and Internet structures and information technology	0.916	2.605	13.712	78.743

Source: Research findings.

Estimation of structural equations model (path analysis) to find factors underpinning e-commerce adoption

This section employs the fitting indicators of SEM to confirm or reject the variables or factors considered for the adoption of e-commerce. SEM is a multivariate statistical method, also referred to as the analysis of covariance structure and modeling. The technique is mainly applied to multivariate

subject matters. Multivariate analysis requires a series of methods that are characterized by the simultaneous analysis of some independent variables with some dependent variables. SEM is a rigorous multivariate analysis technique from multivariate regression family. Precisely talking, it is the expansion of general linear model that allows the researcher to test a set of regression equations simultaneously. The structural model does not merely mean the causal relationship between the hidden variables. In other words, SEM aims to discover both direct and indirect impacts of exogenous hidden variables on endogenous hidden variables.

Fitting of e-commerce model in structural equations

The hidden variable of e-commerce in the present study forms the dependent variable composed of two overt variables of “satisfaction with governmental intervention in product pricing” and “willingness to change selling method by electronic platforms”. Other variables discovered by exploratory factor analysis were included as the independent variable. We denote the general demographic and economic specifications with *General* and the other variables with *Commerce*.

Table 5 presents the meaning of the relationships depicted in Figure 2. As is evident in this figure, the respondents considered the government’s intervention in commodity pricing and the market to be ineffective on e-commerce (confirmed also by the regression weights in Table 5). In other words, e-commerce is inconsistent with the presence of the government so that the government should play the least role in e-market. In Table 5, the regression weights and P-values show the presence or absence of regression equations from SEM perspective. It indicates that the variables of age, the extent of awareness of the quality of own and other producers’ products, the extent of awareness of consumers’ taste, the trust of animal farmers to the presence of small animal farmers in the marketplace, the trust of animal farmers to lower geographical limitation of e-commerce, the trust of animal farmers to the good control and regulation of the market, the trust to better traceability in transportation and insurance contracts, and trust to enhancing bargaining power in e-commerce have a regression correlation with the adoption of e-commerce, so that e-commerce was more adopted as they were increased.

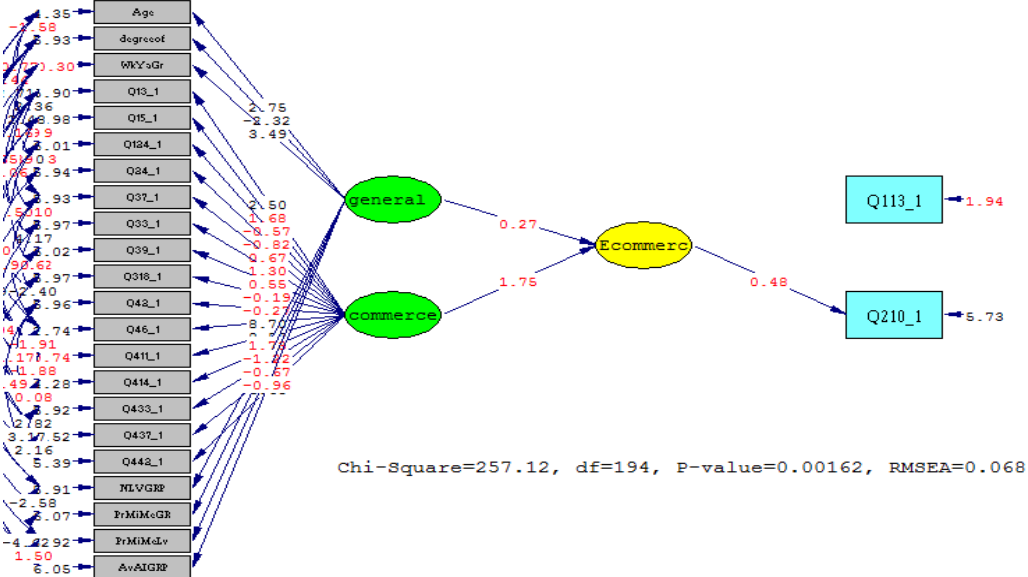


Figure 2. Estimations of the structural model

Table 5. Regression results for the factors underpinning the adoption of e-commerce in Iran

Variable	Regression coefficient	P-value
Age	0.219	0.037
The extent of awareness of product quality	0.215	0.004
The extent of awareness of consumers' taste	0.292	0.004
Belief in the presence of small animal farmers	0.295	0.005
Belief in geographical limitation in e-commerce	0.225	0.024
Belief in the control and regulation of the marketplace in e-commerce	0.347	***
Belief in traceability of transportation and insurance contracts	0.378	***
Belief in the increased bargaining power of producers	0.507	***

Source: Research findings.

Note: *** in P-value column represents the refutation of the null hypothesis of the regression coefficients at 95 and 99 percent significance level.

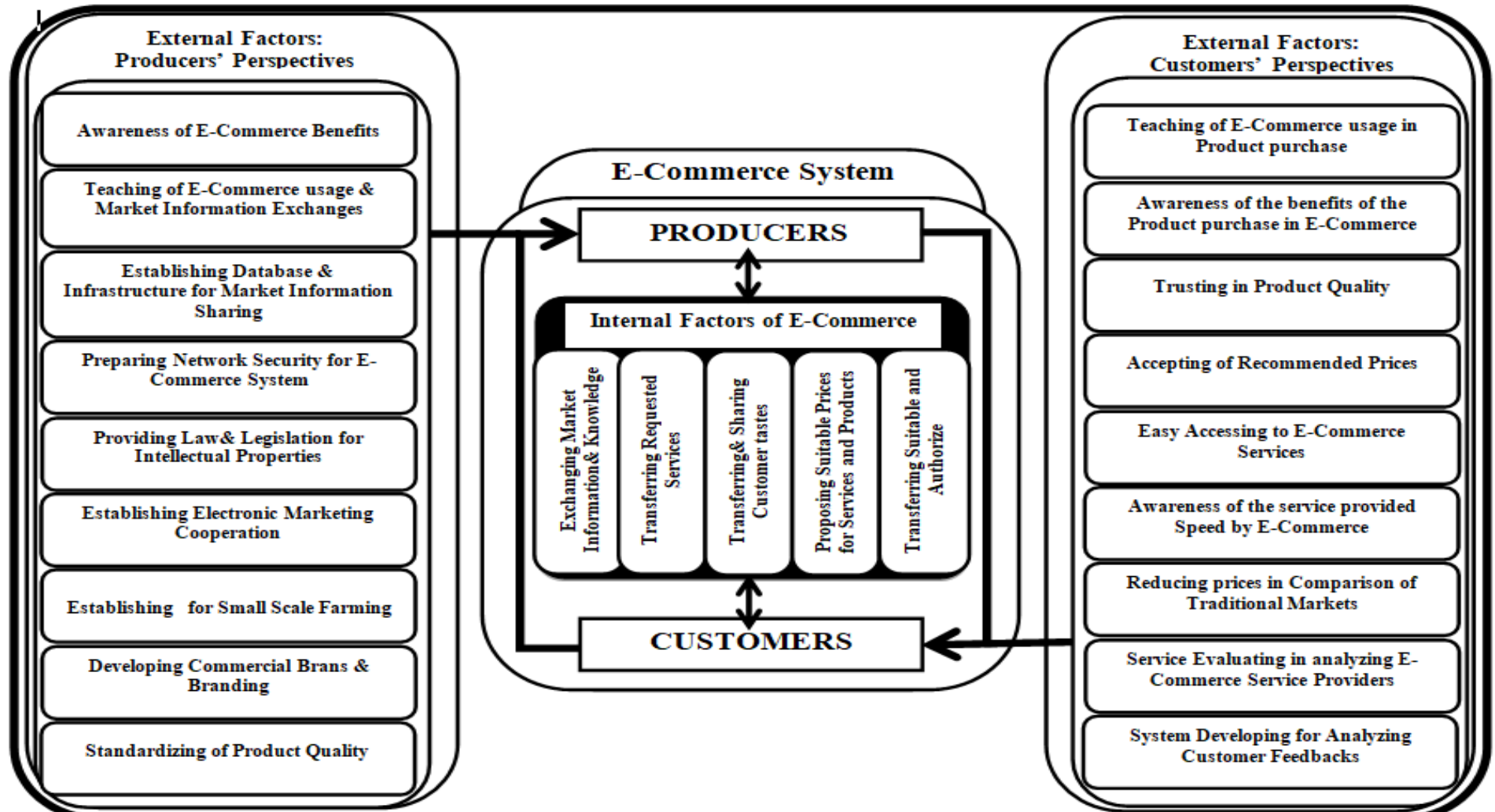
Discussion and Conclusion

1. In the traditional agricultural market (the case of industrial animal farmers), farmers learn about the price of the inputs and commodity sale through the unions and cooperatives. Most farmers are dissatisfied with the presence of middlemen and the intervention of the government in pricing and attribute the non-transparency of the prices to the presence of the government in the marketplace.
2. Most animal farmers perceive the final price of the product to be high and argue that the prices are not profitable in the production market.
3. Most animal farmers are ignorant about the consumers' taste and the quality of their own and other farmers' products, and they mostly acquire information about the market from the unions.
4. The information is shared slowly in the traditional market of Iran, and animal farmers are less informed about the market status.
5. The major limitations of electronic sharing of information in the traditional market in Iran include the lack of security in the Internet networks of Iran and the lack of trust to them. Also, there are a lot of small and traditional animal farms that produce low-quality products and have inadequate knowledge about the knowledge. The lack of the Internet database for the sharing of market information in the vicinity of the production centers and the lack of appropriate regulations about the use of e-commerce are some other limitations. Therefore, solving these challenges will allow accomplishing sale markets and the marketing of the products through practical e-commerce systems.
6. Most users do not have a proper vision about the implementation of e-commerce and believe that it is possible to clarify market data, enhance producers' bargaining power, and enforce control on the market via electronic systems. On the other hand, they believe that the extensiveness of e-market, rapid exchange of products, and accomplishment to the production and distribution centers in a timely manner are factors contributing to their profitability. Rapid traceability of sale contracts, transportation and marketing services, improvement of the systemic relationship between production and consumption sections, and rapid sharing of market data are among the advantages of e-commerce over the traditional markets in Iran as perceived by users.
7. Most animal farmers regarded the presence of small farmers as an important factor contributing to their accumulation in the form of cooperation and the creation of e-commerce. So, the establishment of marketing cooperatives can be an effective step towards implementing electronic sharing of knowledge and information.

8. To implement and model e-commerce in Iran, the planners and policymakers should prioritize consumers and their tastes, brand-making and standardization of the quality of products, and the creation of electronic structures and the related regulations so that trust can be fostered between producers and customers for the electronic trade of animal products.

Finally, according to the results, a localized model is suggested for the implementation of e-commerce in Iran. In this model, the factors influencing e-commerce adoption by producers as derived from the questionnaire are depicted on the left side and the factors influencing its adoption by customers are depicted on the right side. It is noteworthy that the consumers have been placed along with the producers in order to create the e-commerce so that their mutual relations are necessary.

Conceptual Model of Agricultural E-Commerce in Iran (CMAE-CI)



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