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On the Supply Chain Management Supported by E-Commerce Service Platform for Agreement based Circulation of Fruits and Vegetables

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Abstract

According to analysis of the supply chain process of agricultural products, the IT application requirements of the market entities participating in the agreement based circulation of fruits and vegetables have been discussed. The strategy of supply chain management basing on E-commerce service platform for fruits and vegetables has been proposed in this paper. The architecture and function composing of the service platform have been designed and implemented. The platform is constructed on a set of application service modules User can choose some of the application service modules and define them according to the business process. The application service modules chosen and defined by user are integrated as an application service package and applied as management information system of business process. With the E-commerce service platform, the supply chain management for agreement based circulation of agricultural products of vegetables and fruits can be implemented.

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Keywords: supply chain management; E-commerce service platform; agreement based circulation; fruits; vegetables

1. Introduction

The concept of supply chain has been developed from expanded reproduction in the field of industrial products. Obvious benefits were introduced by implementing supply chain management which can efficiently improve on-timedelivery rate, value-added productivity and asset turns performance, curtail order fulfillment lead time, inventory, cash-to-cash cycle time and total cost of the supply chain [1].

But in agricultural products field, there exist very great difference between the process of production and circulation of agricultural products and industrial products, especially the fruits and vegetables. The agricultural production has apparently seasonal characteristic. The expected income of agricultural planting is not only

influenced by weather, but is affected by the condition of market supply and demand, the situation of circulation channels also, during the picking period. The agricultural products of fruits and vegetables are very easy to rot and difficult to store. These properties of the fruits and vegetables require that to make the bargain rapidly, and to dispatch the products into the consumption areas as soon as possible to reduce loss. The process of supply chain of agricultural products consists of a chain of transactions and logistics activities. In traditional pattern of supply chain of agricultural products, the flow-of-exchange which often followed by many unnecessary logistics activities took fruits and vegetables into consumption areas overtime. This means that it is more important and necessary to build supply chain management for agricultural products of fruits and vegetables. As all known that the supply chain management emphasizes the collaboration of the enterprises in the supply chain by information sharing and resources optimization allocation [2-4]. A lot of research works had been done to propose the solutions schemes of supply chain management for agricultural products basing on E-commerce [5-8], and the E-commerce applying schemes had been discussed in many papers, such as in [9-12]. However, these schemes hardly took the business processes of the circulation of agricultural products of fruits and vegetables, IT application abilities of the market entities of the supply chain into consideration, only assumed that if the supply chain management would be applied in the field of circulation of agricultural products, considerable benefit would be obtained.

In this paper, the pattern of circulation of agricultural products named “agreement based circulation” of fruits and vegetables is analyzed to further disclose the intrinsic characteristics of requirement of the supply chain management applied to agricultural products of fruits and vegetables. With the requirement analysis of the business processes of the agreement based circulation of fruits and vegetables, an E-commerce service platform has been designed and implemented for the supply chain management of agricultural products of fruits and vegetables.

2. Supply Chain Process Of Agricultural Products Of Fruits And Vegetables

The collaboration of production and circulation which emphasized by supply chain management have hardly realized in almost all the field of vegetables and fruits in China owing to the complicated historical causes. The processes of supply chain of fruits and vegetables are rather complex. The market entities participating in the processes mostly include: (1)home gardeners; (2)rural cooperatives, the cooperative patterns can be pattern of cooperatively planting and cooperatively sale or pattern of individually planting and cooperatively sale; (3)agricultural production enterprises; (4)individual brokers; (5)partnership brokers; (6)broker companies; (7)agricultural products acquisition processing enterprises; (8)agricultural products wholesale markets; (9)supermarket chains; (10)large retail enterprises and smaller retailers; (11)logistics service providers, include transportation service providers and storage service providers; (12)other relevant service providers; (13)entities in consumption field include household consumers, organizational purchasers such as refectories, food and beverage industries, etc. Among the above market entities, the home gardeners, rural cooperatives including two cooperative patterns and agricultural production enterprises can be classified as cropper planters. Their target customers could be individual brokers, partnership brokers, broker companies, agricultural products acquisition processing enterprises or supermarket chains, sometimes could be large retail enterprises and smaller retailers or entities in consumption field. As a link of the supply chain, the individual brokers, partnership brokers, broker companies can be sorted as agricultural products brokers. Brokers are the results of socialization specialization division of labour from agricultural planting or retail of agricultural products as intermediaries or agents. They are familiar with the situation of planting and picking of agricultural products in some areas, or they are acquainted with the consumption needs in some regional markets. They connect rural areas with cities, and connect production with wholesale or retail of farm produce. Agricultural products wholesale markets are the marketplace organizer, site and environment service providers for block trades of agricultural products. In general, supermarket chains, large retail enterprises and smaller retailers contact the consumption field directly, and they organize the supply source of agricultural products from home gardeners, rural cooperatives, agricultural production enterprises, individual brokers, partnership brokers, broker companies, agricultural products acquisition processing enterprises, agricultural products wholesale markets and/or some combinations of these channels. The logistics service providers which include

4. E-Commerce Service Platform For Agreement Based Circulation Of Vegetables And Fruits

A lot of research works show that information sharing of supply chain is the foundation of supply chain management [1-12]. The harmonious operation of the supply chain is established on the information transportation and exchanging among the link entities of the supply chain. However, because of high cost of the information system building and maintenance and/or insufficiency in IT application ability, almost all of the cropper planters have not built their management information systems of business process, and few of the brokers and logistics service providers use information system to manage their business processes similarly, although ERP systems have been applied by many of the supermarket chains, large retail enterprises and agricultural products acquisition processing enterprises to manage their business processes. From point of the supply chain management of fruits and vegetables, not only would they need to dovetail their internal business processes management with agreement based circulation management to reduce the circulation time, but they would like to obtain the information of planting plots and field management in planting processes for the aim of traceability and food quality safety control also. Thus these ERP systems become “information isolated islands” in the whole chain. For this reason, the usual methods of supply chain management in industrial products field could be hardly successfully applied to the agreement based circulation of fruits and vegetables. It is necessary to develop an E-commerce service platform with the functions of information management of business processes of circulation of fruits and vegetables, data exchange among business partners, system interface between the service platform and the MIS systems of business processes or ERP systems of the market entities if they have built them, to help the most market entities who have not built their information systems apply the application services supplied by the service platform to construct their business management systems with very cheap cost.

To the different class of market entities, their information system application requirements are diverse. For instance, to cropper planters, the business information they need to manage includes: (1) information of agricultural means of production, such as seed, pesticides, fertilizer, mulching film, etc; (2) information of suppliers of agricultural means of production; (3) information of planting plots; (4) information of field management in planting process; (5) sale information of agricultural products; (6) information of acquirers of vegetables and fruits; (7) information of cost; (8) information of agreements with agricultural products acquirers and suppliers of agricultural means of production. To the brokers, the business information they need to manage includes: (1) purchase information of agricultural products; (2) information of cropper planters; (3) information of transportation and storage; (4) information of cost; (5) information of agreements with agricultural products acquirers and suppliers.

By summarizing the IT application requirements of the market entities of the supply chain of agricultural products, the E-commerce service platform for agreement based circulation of fruits and vegetables can be designed as a Web based application service system with the architecture consists of four parts: (1) application services for business processes management of agreement based circulation described as applications service hall; (2) P2P data interchange service for business management of agreement based circulation; (3) service platform management consists of users management, system maintenance, additional service items management and user complaint management etc.; (4) information services for the circulation described as information service hall; which shown in Fig.2.

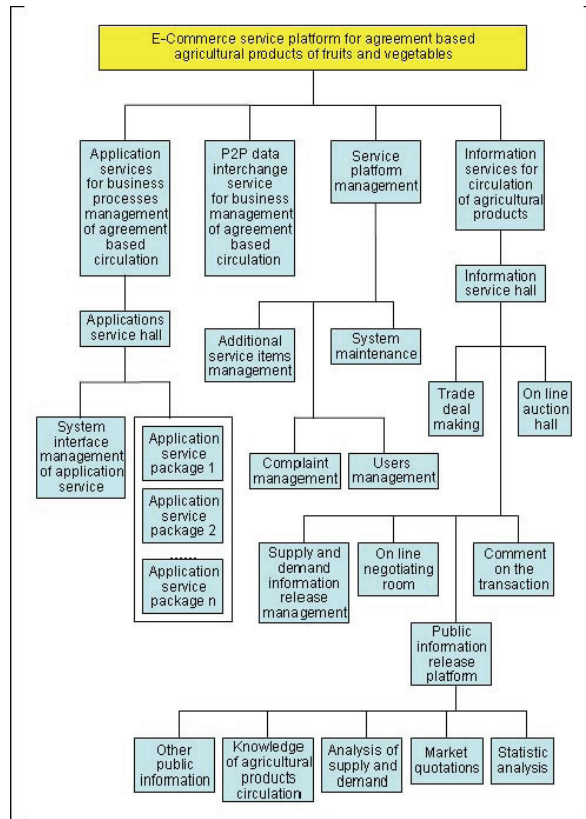


Figure 2. Schematic diagram of the architecture of E-commerce service platform for agreement based circulation of fruits and vegetables.

The E-commerce service platform is virtually a multi-tenant service system. The module of users-management actually is that of tenants-management. Every user can include several user members, and various user members can be given various operation rights by the user or the tenant.

A registered user can enter the application service hall to select some of the service modules and define them according to the business management requirement as an application service package. An application service package actually is a management information system of business process in the agreement based circulation. If a user has built its ERP system, the service platform should supply the service of data exchange between the application service package and the ERP system through the module of system interface management of application service. The platform supplies users with the service of business data interchange to their partners through the service module of P2P data interchange service for business management of agreement based circulation. Under the architecture of the E-commerce service platform, the set of the service modules which supplied in the application service hall had been summarized as 14 function modules shown in Fig.3.

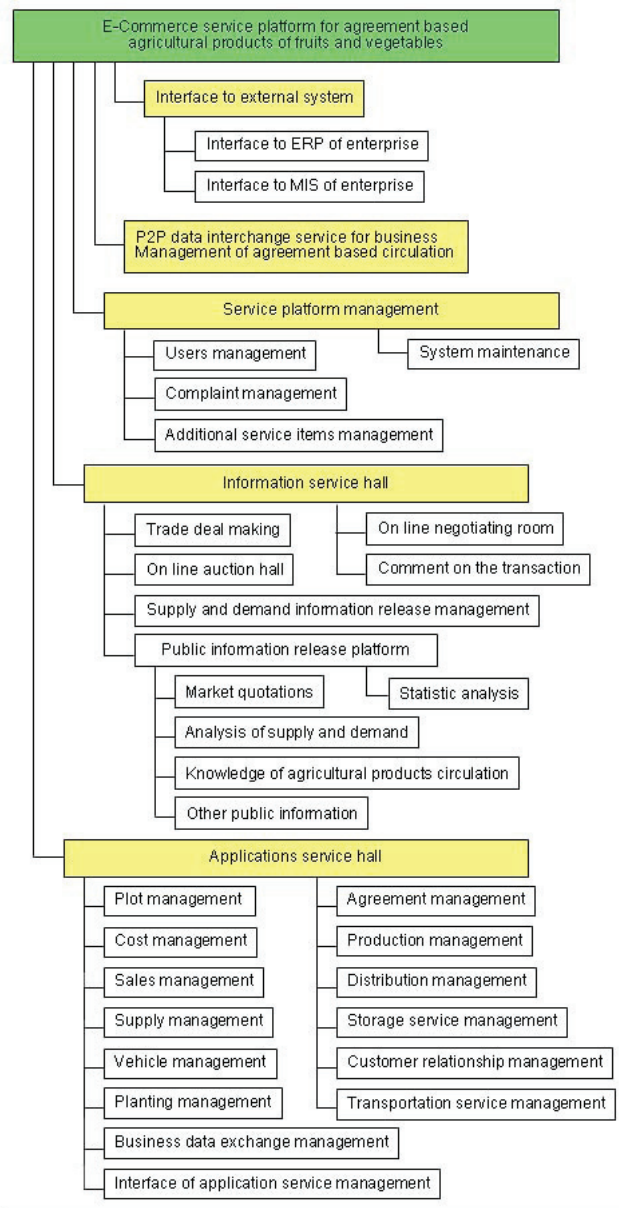


Figure 3. Schematic diagram of the service modules of E-commerce service platform for agreement based circulation of fruits and vegetables.

5. Conclusion

Through the E-commerce service platform, no matter whether the market entities of the supply chain participating in the agreement based circulation have built their information systems, they can manage their business processes and interchange the business data with their partners. The management of the circulation of agricultural products would be extended from the internal business process of the market entities to the whole

process of the supply chain of fruits and vegetables. The supply chain management can be realized basing on the E-commerce service platform to harmonize the production and circulation of fruits and vegetables, shorten the circulation time and more benefit can be obtained.

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