

# Improvement of the Approach of the Effective Responding to the Customer Using the EPC Technology

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## ABSTRACT

Future wireless networks are expected to provide quality of service (QoS). The effective capacity (EC) and powerful tool for the design of QoS provisioning mechanisms since the effective capacity approach provides a simple and accurate method for predicting link-layer QoS performance measures such as data rate, delay, and delay bound violation probability. Future wired-wireless multimedia networks require diverse quality-of-service (QoS) support. To this end, it is essential to rely on QoS metrics pertinent to wireless links. In this paper, we develop a cross-layer model for adaptive wireless links, which enables derivation of the desired QoS metrics analytically from the typical wireless parameters across the hardware-radio layer, the physical layer and the data link layer. The Quality of Service (QoS) provisioning for wireless and mobile Next Generation Networks is becoming increasingly important objective.

**KEY WORDS:** The efficient consumer response, electronic product code, recharging, the management of the supply chain, identification of the radio frequency.

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## INTRODUCTION

Since 1980, the manner of the business in the management of the supply chain has been subject to the changes and transformations whose result has been the reduction of the costs of the operations, facilitation of the business process and improvement of the service presentation to the customer.[1-3]. In keeping pace with these changes or transformations, the range of the supply chain has changed from the local business to the global business. [4]. Through increasing the competition among the businesses, the management of the supply chain tries to improve and develop the function of the business, specially through the concentration on the service giving to the customer and his attraction of the satisfaction. [1]

In the retail industry, meeting of the needs of the customer as soon as possible is a necessity in the working situation. [1-3]. Therefore, the foodstuff industry has been faced with the challenges in the approaches of decreasing the costs and improvement of service giving as well. [1-3].

As a result, the new concepts and approaches have been presented and introduced within years in order to convert and change the landscape of the retailing which JIT (Just in Time), Quick Response (QR) and efficient customer Response (ECR) are from amongst them and regarded as an example. [4,5]

Efficient Customer Response (ECR) is a customer based (customer –oriented) approach [6] which makes possible the efficiency of the supply chain through the introduction of the new processes and employment of the potentiations in each process. This approach put emphasis on the relationship and trust between the trading parties in particular. [7]. So that it facilitates and makes efficient the flow of the information and product in the supply chain [6-8]. Anyway, this approach has not been succeeding in the narrowing of the borders among the partners of a supply chain [9, 10]. In addition, because of the existence of the various obstacles in the implementation, including the obstacles of the unequal distribution of the cost, interest and the risk among the trading partners in the supply chain, it was not admitted as up to a limit as expected.

This research studies how the admission of ECR can be improved using the new technology based upon the Radio Frequency Identification (RFID). This technology has been identified under the name of “Electronic Product Code.” (EPC). This research intends at first to introduce the ECR approach and EPC technology and then, in an exploring research, to deal with the survey of the effects of the usage of the EPC technology on ECR approach and the potential changes of this new technology in the food stuff industry through the conceptual modeling.

Findings of this research reveal that EPC technology can improve the effectiveness of each four ECR processes. In addition, they show that this new technology has the capability of the facilitation of the subscription (sharing) of the information and increase of the trust among the partners of the supply chain and therefore, removes the obstacles of admitting the ECR.

At first, this paper introduces the ECR approach. In this section, in addition to description of four ECR processes, complexities and the requirements of its implementation are to be studied in detail as well. Then, it deals with the introduction of the new EPC technology and its components. In the conceptual modeling, the

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effects of the EPC technology on the ECR approach are dealt with and it is shown that how the requirements are to be responded and how the requirements are to be responded and the complexities removed by this technology. Finally, the potential capabilities of EPC technology in the improvement of the approach of the ECR's supply chain are summarized and concluded.

### **A background of the Efficient Consumer Response (ECR)**

In 1990 decade, the foodstuffs industry was encountered with severe critical problems because of the economical crises and competition of other forms of the foodstuffs stores in the United States of America. In 1922, a group of the pioneers of the food stuff selling industry of the U.S.A formed a studying group in order to improve the industry. As a result of the studies of this group “the Efficient Consumer Response “(ECR) was created. ECR is an approach of the supply chain which attempts to reform the food stuffs industry through the introduction of the new processes among the trading parties of the supply chain; that is, factory owner, distributor and the retailer. ECR takes into consideration both aspects of the demand and supply chain [2] and improves the relationships among the trading parties. Through the new processes and plans, ECR tries to make possible both the flow of the efficient and fluent information from the direction of the customer to factory owner (direction of the customer) and the flow of the efficient and fluent product from the direction of the factory owner to customer. (Direction of the supply) [6,7].

### **Innovations of the ECR**

Implementation of ECR in each one of its Innovations requires the diversified technologies techniques which are reminded as it's potentiating. These technologies and techniques lead to the production of the required information and facilitation of the operations of the food stuff industry. Activity Based Costing (ABC), Category Management technique (CM), Computer Aided Ordering (CAO), CPFR, electronic exchange of the datum, unified product coding and barcode are the examples of these techniques and technologies. (Are from amongst these techniques and technologies). Each of these potentiating has its own particular complexities and their implementation requires to spent much time and cost. In the below, it has been shown by more study that which this subject, by itself, is one of the obstacles of the complete admission and implementation of the ECR.

### **Admission of ECR**

In spite of this fact that ECR facilitates the progress of the business processes in the food stuffs industry, there is not a complete implemented sample of it. In addition to this, it has not been admitted very much as expected [9-11].

There are different viewpoints regarding the slow admission of ECR. Some individuals believe that the expectations are not real. In some cases, the companies which even have implemented the ECR completely have shown the higher degrees of the efficiency compared to the companies which have not implemented ECR. Another group believes that the implementation of the ECR is complicated and the profits resulted from it must be studied when it is implemented completely. Also, a group believes that it's implementation, in addition to the complexity and requirement to spend much time and cost, is dependent on the human force which doesn't desist from its own traditional behaviors even in the new behaviors, including ECR . As an example, the human force insists on the advance purchase through the implementation of the ECR which doesn't reduce the interests resulting from ECR.

In addition, some researchers believe that there are obstacles in the implementation of ECR and its employment. Osonson has studied the potential profits and obstacles of the ECR'S implementation with in the audit of the Swedish companies in 2001 and presented a comprehensive list of these profits and advantages. The most important problems can be summarized as follows:

### **Technological needs of the technology**

Implementation of each one of the innovations of the ECR requires the launching of a few technologies and techniques [11]. Implementation and development of each one of these technologies and techniques have their own particular problems and require spending much time and costing by turn. Moreover, the required substructure in some of them is not equal for all trading parties; that is, some ones must spend more cost to launch the substructure [9] .While considering the inequality of sharing the interests, they may have a less share of the interests. As an example, Courina and Johnson showed, through studying a few Australian companies, that, in the cross – docking techniques a required potentiate in the efficient recharging innovation, it is necessary that the factory owners invest much cost to implement the required bed for the electronic exchange of the datum, while their share from the resulting profit is less than the distributors and retailers [11]. This unequal distribution of the cost and profit and risk is one of the basic problems in the admission of ECR.

### **Informational needs**

There are multiple problems in the responding to the informational needs. Firstly, there is the shortage of the information. Some trading parties who don't benefit from the informational systems cannot produce the required information. Secondly, correctness, accuracy and timeliness of the data are another obstacle which

originates from the lack of implementation of the unified informational systems. Thirdly, the lack of the standardization of the datum's mould requires the model in order to subscribe the datum which, by its own turn, is costly and time – consuming process and can be led to a problem of the second type as well. Fourthly, a lot of companies resist against the sharing of the information [8-10]. And, totally, there isn't an inclination towards the sharing or dividing of the information in the supply chain.

**Human factors**

The human factors, by themselves, are led to a few intra organizational and inter organizational obstacles to implement the ECR. Firstly, in many companies, there is a resistance towards the organizational level, which prevents from the admission of each innovation and ECR. Secondly, senior management levels, through the lack of supporting the activities and lack of beginning the relationships with other trading parties, cause the obstacles in the admission of the changes. Therefore, while the relationships between the business parties are important factors in the implementation of ECR, there aren't enough relationships among the factory owner, distributor and retailer; specially, the lack of the trust among the partners of the supply chain is a basic obstacle to develop the relationships.

Despite the all problems and lack of admission based upon the ECR'S expectation, it cannot be denied that it is a comprehensive approach which could be led to much efficiency and profits in the supply chain. There fore, the researchers have tried to recognize the problems and obstacles of this approach within these years [7.9 ]. In this problem, the writers intend to present too the EPC technology as the potentiating which both removes many problems and obstacles of ECR and increases its efficiency and accurate of the inventions as a solution to overcome the complexities of the ECR's implementation. Before that, it has been dealt with the introduction of the EPC technology in the next section.

**EPC Technology**

EPC technology has been the results of the project carried out 5 universities of the world since 1999 to 3003 and its development continues the Auto ID lab in such a manner. At present, EPCG Global INC is the guardian of launching this technology around the world [14-16],[1214]. This technology is based up on the automatic identification through the radio waves. This technology consists of five main components, including " Electronic Product Coding ", Tags and Tag Readers based on RFID ", Object Name Server, (ONS)", Product Mark-up Language(PML)" and so soft ware component of savant. EPC is a unique numbering standard which, contrary to the UPC, allocates a unique number to each product, instead of allocating the number to a product group. [17-19],[15-17]. EPC'S tag is attributed to a collection of the microchip, antenna and tag Reader [16-20][14-18] which makes possible the transfer of the datum wirelessly through radio waves. [13,18,19]. Object Name Sever (ONS) is based on the " Domain Name Server " (DNS). AS DNS records the addresses of IP in the name of the domain, ONS also records the code of a product in the address of the informational file of that product .

Product Mark – up Language (PML) is a new program – writing standard based on the XML [20-21] which includes the information regarding the characteristics and features of the product. The PML's server and through the address which ONS refers to it are to be extracted [23]. Savants are as the nervous system of the EPC network . In fact, they are the soft ware solution for the management and exchange of the information in the general net work of EPC . Savants are the hierarchical multi functional soft ware components which undertake the various affairs, including the prevention from the entrance of the repetitive information in to the datum base. This technology uses also the bed of the Internet to exchange the datum. The relationships among the components of the EPC technology has been shown in figure 1. The electronic product coding is installed in the EPC tag. When, a tag reader reads the code of the inside of the tag, gives it to ONS so that it gains the address of the specifications, file from the PML server to correct the specifications from file.

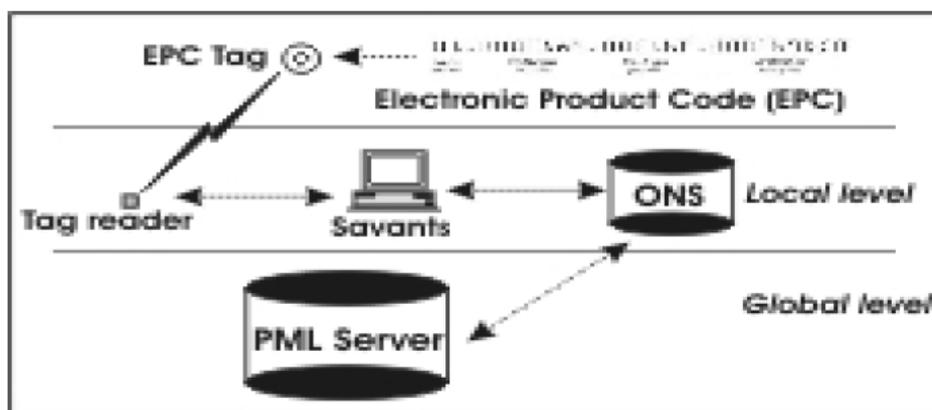


Fig.1. relationships among the components of the EPC technology

### **The effects of EPC'S technology on the ECR approach**

As it was said, landscape of ECR is to unify the partners of the supply chain product current from the factory owner to consumer and, therefore, the fluent information current from the consumer to the factory owner. Without gaining access to the important needs, including the technologies and standards of the datum's exchange and cooperation and trust among the trading parties, this landscape is not become possible. Potential EPC technology can remove these needs through a few ways. Firstly, it provides the required substructure in the exchange of the datum. Specially, its basis on the Internet makes available the least cost. By having the standard components such as ONS, PML, Savant, and the unique code of EPC, technology of EPC guarantees the compatibility of the required processes and interactions in the supply chain thirdly, it exchanges the correct and timely information for each trading parties of the production and among them. Fourthly, the automatic process of the datum's exchange guarantees that the business parties in the supply chain cooperate with each other to exchange the datum. This feature together with the correctness and accuracy of the information, finally, lead to increase of the trust among the partners and more re cooperation.

Potential EPC technology improves the efficiency of the ECR innovations as well. Each progresses and reformations resulted from the field of vision, automatic processes and the flow of the information will lead to the higher levels of efficiency in the classification of the product, introduction of the product, propagation of the production and recharging the product. In the classification of the product, Increasing of the vision field of the product place has a noticeable effect of the product's place has a noticeable effect on increasing the efficiency. For example, as EPC has explained in the retailing operations using the EPC technology, the shelves, through equipping with the tag reader and the related savant, can declare the retailer if a product has not been placed in its own position or the customer has taken a product from a shelf and replaced it in another position. In addition, using the EPC technology, the retailer can gain access to the accurate information of the place of the product's purchase in the store by the customer and through which he can have a more accurate planning from the classification of the production.

In the introduction of the product, the accurate flow of the information among the trading parties of the supply chain also leads to increase of the efficiency. In fact, EPC technology can give the factory owner the capability of the production of the new products on the basis of the accurate information of flowed demand on the behalf of the customer. Therefore, introduction of the new products will have the less failure rate and more efficiency.

In the propagation of the product, in addition to the accurate and timely information flow, in crease of the field if vision is effective on the improvement of the effectiveness. As an example, factory owner and retailer can know exactly from what store and from where place in that store each product has been purchased. This information which results from the cooperation between the retailer and factory owner can present the consumption model of the different regions and the correct products are selected to propagate based upon it and the best place of each store is considered in order to promote them. In such a way, the factory owners can improve the approaches of promoting their own product on the basis of the accurate information of the demand. Also, the increased field of vision, automatic processes and the accurate flow of information for each trading party in the supply chain cause that the product, in keeping pace with information, to be made flow and guarantees the recharging of the product in the appropriate time and with the desired product in the enough number and reaches the risk of unavailability of the productions in the store's shelves to minimum. In such a way, efficiency of the recharging of the product improves as well.

### **Conclusion**

This article showed the potential EPC technology, through presenting more fields of vision, automatic processes and the accurate current of the information in the supply chain, leads to improve the efficiency, advancement in the inventions of ECR and in its whole approach. Therefore, each one of the trading parties can benefit from the much profits of the reduction of the jobs dependent on the human force and their related costs, decrease of the failure's rate in the production, distribution and sale of the product, decrease of the error in the information and thus it's analogous product, reduction of the product's deficiency for each reasons of the theft, losing or it's unavailability, improvement of keeping the quality of product, improvement of the planning related to the flow of product in the supply chain and improvement of function.

Of course, customers will have more satisfaction with the supply chain equipped with the EPC technology as well. Because, firstly, they can benefit from the advantages of the less price too through the reduction of the costs and the intensification of the arena of competition among the supply chains. Also, they receive the productions with better quality through the reduction of the time of storing the production, while they are sure that they can always get access to their desired products on the shelves of the store. Finally, they receive their own purchase list with a less waiting and delay. Particularly, the stores, by equipping the constant customers with the tag cards, can present them more services. As a result, the supply chain will attain its final goal which is the customer's satisfaction in order to protect it and reach to more profit.

The discussions performed regarding the ECR inventions can be generalized to each one of it's potentiating too. The writers of the current article have done this same subject regarding the cross – docking of one of the effective potentiating of ECR in the recharging of the product and presented a model of cross – docking using the EPC technology. More researches in this scope cause that this new technology, in keeping pace with other countries all over the world, is to be introduced to the country's various industries so that the possibility of the exploitation from it's advantages is feasible in Iran as well.

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