

# Design and Implementation of an Internet-TV Based E-Commerce System

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## Abstract

*This paper introduces our design and implementation of an E-commerce system. One of the most distinguished features of this system is that an Internet TV system is integrated in the E-commerce system. In addition to the salient features for E-commerce such as price comparison, guarantee of the product quality, comments of other buyers, and so on, this system streams out a sequence of video contents just like home-shopping TV channels do. Our design and implementation details are discussed in this paper.*

**Keywords:** *Internet TV; E-commerce; Online Shopping; Recommender System.*

## 1. Introduction

With the rapid development of the network technology and applications, more and more companies choose to create their own web site to open up new business market and enhance their core competitiveness [1].

The continuous growth of Electronic Commerce and the big influence of Web sites have led to most organizations to make efforts to use Internet as a way to expand their business [2]. As a result, the most important international companies have moved their main activities to Web environment, making available an excessive amount of indexed Web sites to different users worldwide [2].

Jumping on the bandwagon, the city where the authors live determines to provide shopping service on its Internet TV web site for regional products and tourism resources. Among the salient features of online shopping, this paper emphasizes on visualizing product because most of online shopping systems only provide images of product. Our system provides high quality videos of products so that user can fully perceive the appearance, characteristics, and usages of products. This paper introduces our design and implementation of the online shopping system.

## 2. Related Works

Online shopping has been hot research topic for a quite long time. The authors of [3] identified the following points as the salient features of online shopping:

1. Perceived price (Save money)
  - Price comparison for the product is provided
2. Perceived Service (Guarantee of the product quality)
  - The evidence that it will be dependable when customers have problems was provided
3. Informational beliefs and motivation
  - Customers' rating of the product
  - The comments by the other buyers
  - The comments from product experts

- The sales ranking of the product
- 4. Perceived Self-Efficiency and its Power
- Ease of purchasing the product
- 5. Perceived resource facilitation and its power
- Enough product information (The amount of product information I had in making my purchase decision was enough.
- It could easily visualize what the product actually looks like.

The author of [4] pointed out the following aspects in the development of Web personalization: the approach of interaction with users, the information used to form the user model, user model renewal time, personalization system architecture, and personalization techniques.

The authors of [1] discussed what enterprises should analyze before building their web sites focusing on definition of site objectives, site user analysis, the analysis of technical level, the cost and profit of site.

The authors of [5] pointed out that organization system, navigation system, labeling system and search system are the core of a website information architecture. Among them organization system is the most important and it is the base of the other three. Navigation system is responsible for routing problems, while search system is supplementary to it. The labeling system is the expression of the other three.

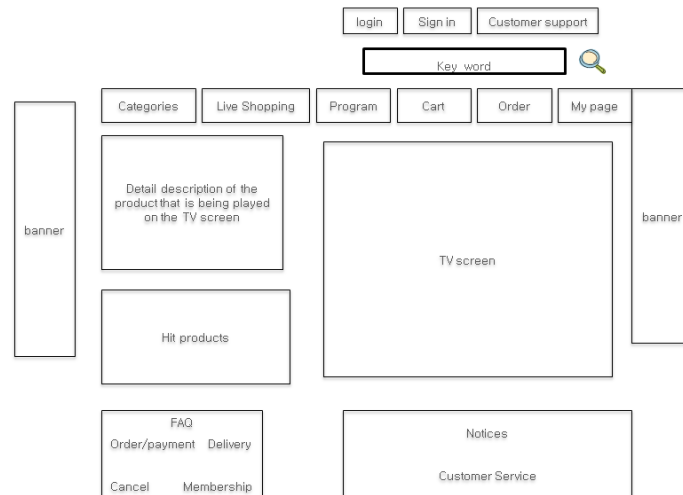
The evaluation criteria for organization system include: similarity of the same classification, the degree of overlap between the different classification, the degree of lower classification represent the sub-headings, the reasonableness of depth, the reasonableness of width, different ways of classification, different ways to find the same goods.

The evaluation criteria for navigation system include prompt user the information of recently browsed goods, prompt user the information of other users who browsing and buying the same goods, prompt user the information of goods sales and recommended goods, and so on [5].

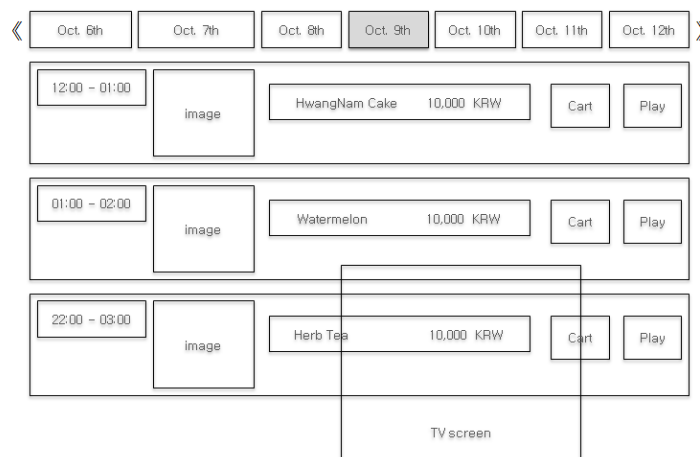
A recommender system based on Ant Colony and Ontology dependencies for E-commerce was introduced in [6]. The authors of [7] proposed a security countermeasure for network data processing based on cloud computing platform by examining the "business to customer" cloud data processing model. The authors of [8] proposed an identity-based anonymous agent privacy protection scheme to deal with the problems of privacy information disclosure. The authors of [9] proposed a new view synthesis technique for coding of multi-view color and depth data in arbitrary camera arrangements.

### **3. Design of the Transactional Web Site**

The distinguished feature of our design is that the products are described by high quality videos. We have the TV screen window in the layout of the online shopping main page as shown in Figure 1. When we click the Categories button, a list of all categories is displayed. If a category is selected from the list then the best products belong to this category are displayed in the top of the main window and a list of subcategories is displayed under the best products window.



**Figure 1. The Key Elements of the Online Shopping Main Page**

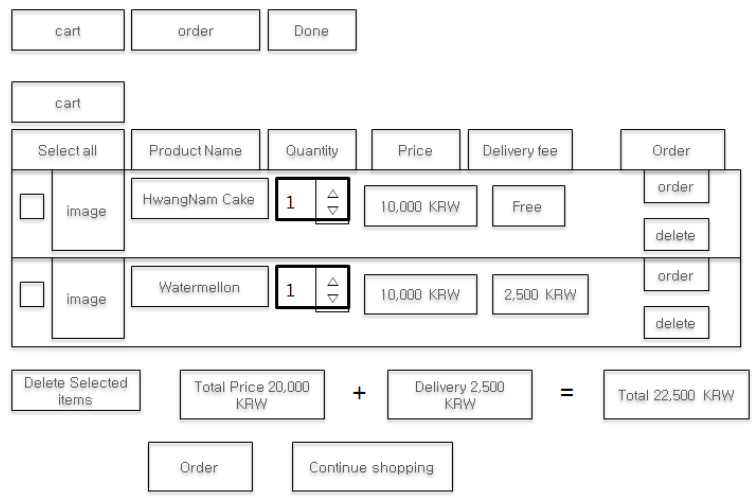


**Figure 2. The Layout of the Program Page**

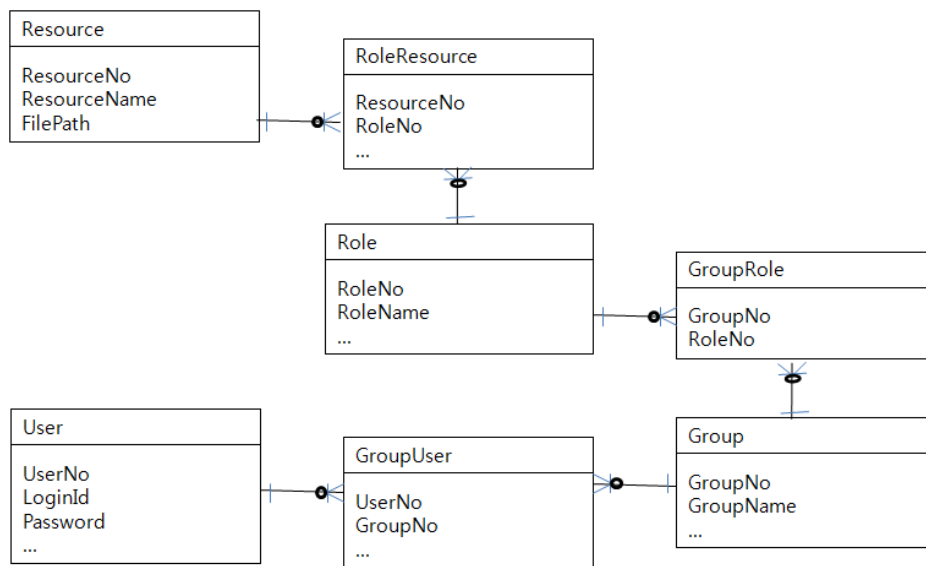
The local government is running several channels and one of them is this shopping channel. When users click the Live Shopping button, a big TV screen window covers almost whole monitor. A detail description of the product and menu buttons for purchase are shown under the TV screen. When the program button is clicked program schedules are listed as shown in Figure 2. When the cart button is clicked a list of products in the cart is shown. An example Cart page is shown in Figure 3 [10].

The "sign in" button brings a user interface that allows the user to subscribe to this site. The sign in procedure verifies if the person represented by the input name is identical to the social security number. This procedure also checks if the ID is unique and password is complex enough.

The login procedure provides the ID forgot, Password forgot, and sign in buttons. After clicking the ID forgot button, the user can type in his name, and his smartphone number. If the owner of the smartphone is identical to the person represented by the name, then the system allows the user reestablish his/her ID and password.



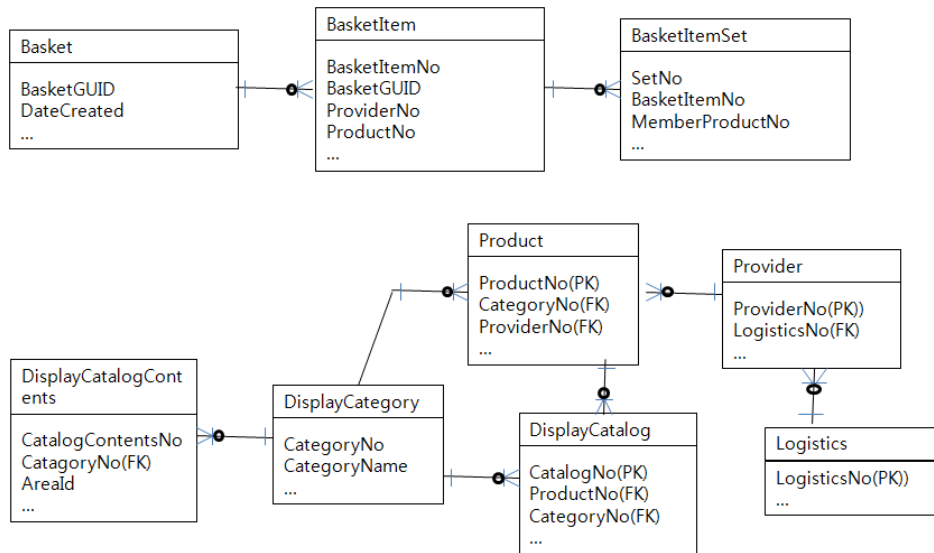
**Figure 3. An Example Cart Page**



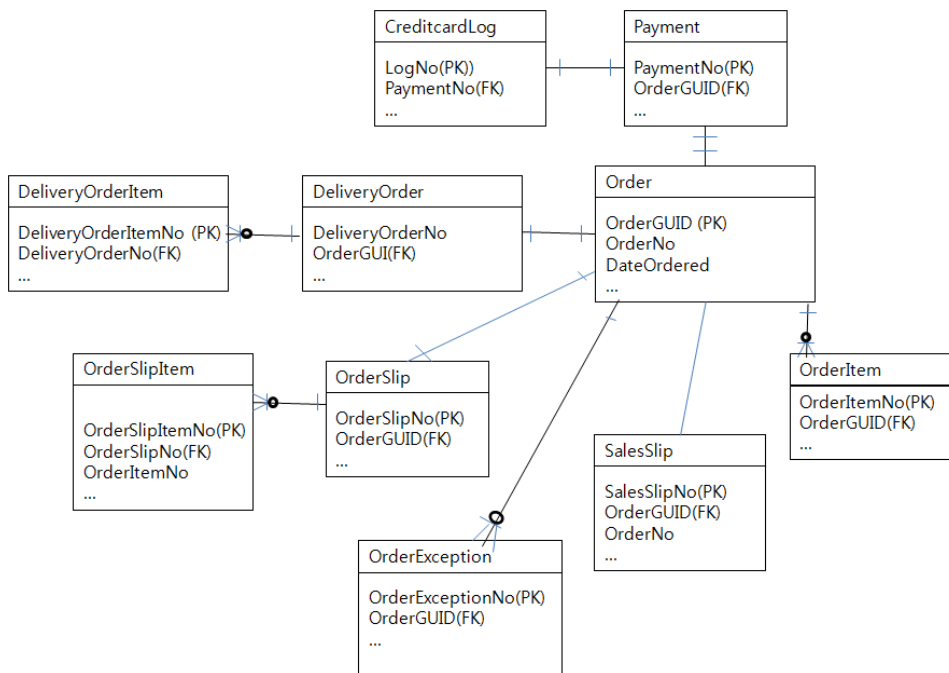
**Figure 4. Tables to Control Resource Access**

#### 4. Design and Implementation of the System

We design a database consisting of many tables. A few of them needed to manage resource access control are shown in Figure 4. Users are categorized into groups and groups are categorized into roles. A role determines authority to access resources.



**Figure 5. Tables Need to Manage Products, Stores, and Providers**



**Figure 6. Tables Needed to Manage Orders**

We have many tables to manage products, providers, and stores. A few of them are shown in Figure 5. Products are categorized into categories and many providers can provide a product. A provider can be supported by many logistics.

Many tables are needed to manage orders. Several of them are shown in Figure 6. There is a payment for each order, for all orders. Many items can belong to one order. For each order, there is a delivery. A delivery can deliver many items. There is one order slip per order.

We have implemented common library methods such as `IsNullDataSet(DataSet)`, `IsNullString(object)`, `GetSubString(string, startIndex, length)`, `AlertAndMove(string message, string moveUrl)`, and `netSendMail( )`. The `netSendMail( )` method can send an email and defined as shown in Figure 7.

```
public static bool netSendMail(string MailServer, string SenderMail, string
ReceiverMail, string MailSubject, string MailContents)
...
    System.Net.Mail.MailMessage mM = new System.Net.Mail.MailMessage();
    mM.From = new System.Net.Mail.MailAddress(SenderMail);
    mM.To.Add(ReceiverMail);
    mM.Subject = MailSubject;
...
    System.Net.Mail.SmtpClient sC = new System.Net.Mail.SmtpClient(MailServer);
...
```

**Figure 7. A Part of the netSendMail( ) Method**

We have Cart.aspx.cs that handles all events occurring on the Cart page. A part of the class is shown in Figure 8. The Page\_Load( ) method initializes variables with default values when the Cart page opens. The BindList( ), Repeater\_OnPreRender( ), and Repeater\_ItemDataBound( ) methods invoke basket.GetItemList to fetch a DataSet and bind it to the user interface. The BindThumbnail, BindDetail, BindPrice methods also bind thumbnail, detail information, and price, respectively, to the user interface. The ModifyButton\_Click(), DeleteButton\_Click(), and OrderButton\_Click() methods handle the events of clicking the quantity, delete, and Order buttons, respectively.

We defined Order\_Step2.aspx.cs that allows users to write an order form and invokes payment system. A part of the class is shown in Figure 9. The LGDInit( ) method initializes the LG payment module. The GetParamForDetail() method sets the URL and parameter values to move to the "detail product information" page. The GetRowspan() calculates the total price. The Member() method reads the customer's information. The BindAddrList and BindAddrListOld methods bind addresses to the user interface. The lbtnSubmitButton\_Click() method opens the payment page whereas the lbtnCancelButton\_Click() method cancels the order and opens the page designated by Master.

```
...
protected void Page_Load(object sender, EventArgs e)
private void BindList()
protected void Repeater_OnPreRender(object sender, EventArgs e)
protected void Repeater_ItemDataBound(object sender, RepeaterItemEventArgs e)
private string BindThumbnail(DataRowView data)
private string BindDetail(DataRowView data, bool free)
private string BindPrice(DataRowView data, out bool free, out double deliveryCode)
protected void ModifyButton_Click(object sender, EventArgs e)
protected void DeleteButton_Click(object sender, EventArgs e)
...
```

**Figure 8. A Part of the Methods Defined in the Cart.aspx.cs**

```
...
protected void LGDInit()
private string GetParamForDetail(object objSubCategory, object objProductsCode)
private int GetRowspan(string sProviderNo)
protected void Repeater_ItemDataBound(object sender, RepeaterItemEventArgs e)
private string BindThumbnail(DataRowView data)
private string BindDetail(DataRowView data, bool free)
private string BindPrice(DataRowView data, out bool free, out double deliveryCode)
private void Member()
private void BindAddrList()
private void BindAddrListOld()
protected void ModifyButton_Click(object sender, EventArgs e)
protected void lbtnSubmitButton_Click(object sender, EventArgs e)
protected void lbtnCancleButton_Click(object sender, EventArgs e)
...
```

**Figure 9. A Part of our Order\_Step2.aspx.cs**

## 5. Experiments

We have performed experiments of testing our user management system. User registration has been tested as shown in Figure 10.

We have performed experiments to test our implementation. A screenshot of the main page is shown in Figure 10 (upper part of the main page) and 11 (bottom part of the main page). As we emphasized earlier in this paper, we can see a media player window in the main page. We can watch the video in a full screen. In the bottom part of the main page, we can find the telephone number and the email address of the customer center and the FAQ (frequently asked questions) section.

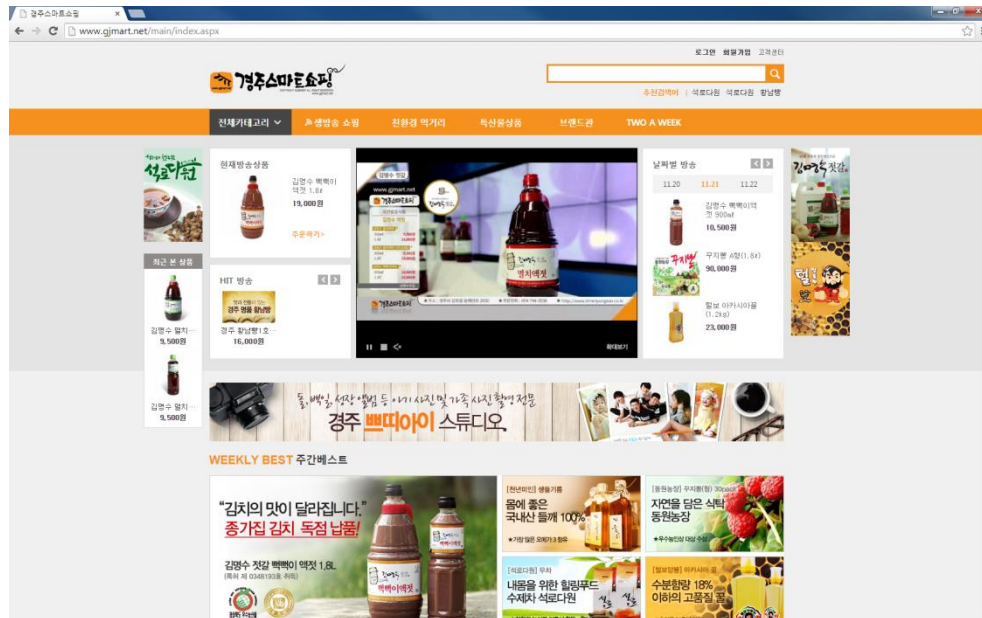


Figure 10. The Upper Part of the Main Page



Figure 11. The Bottom Part of the Main Page

After selecting products to purchase and putting them into the cart, or basket, they proceed to the "order" phase by clicking the "order" button. A part of an example "order" page is shown in Figure 12. In the "order" phase, they can type in their address and phone number. They can also select a payment method, credit card or money transfer. Then, they can move to the payment phase after checking the details of their order by clicking the "payment" button.



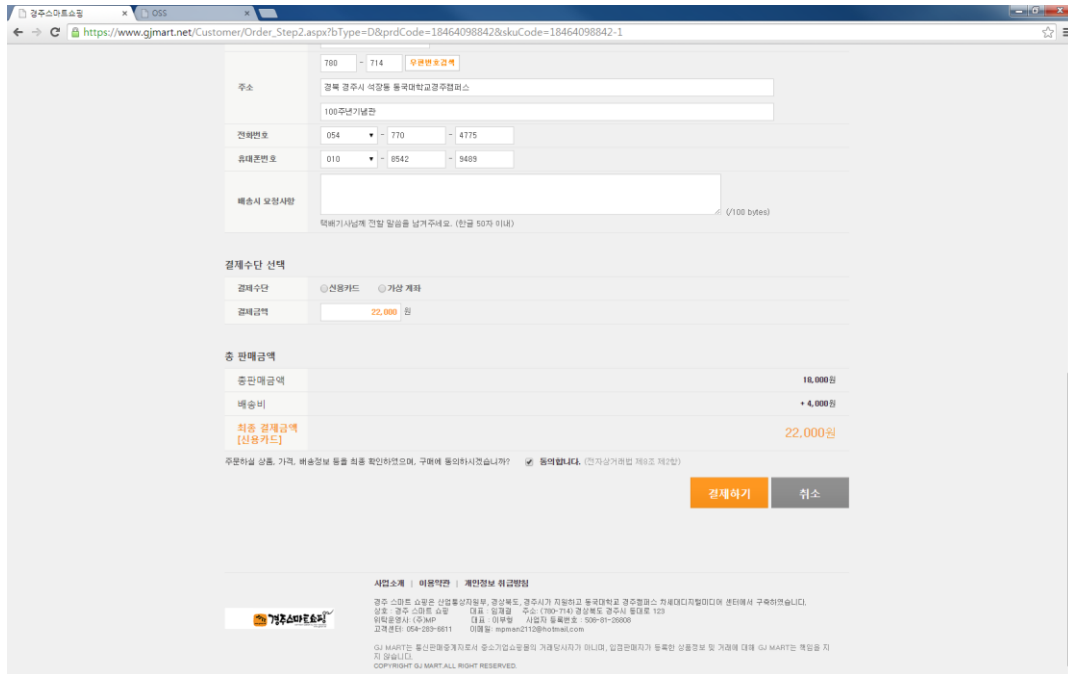


Figure 12. A Part of the Order Page

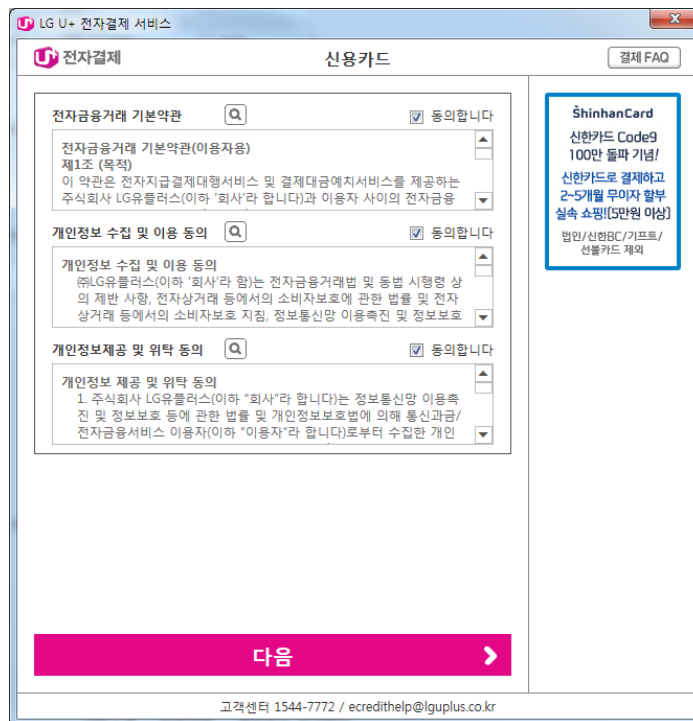


Figure 13. The First Page of the Payment Process

The first page of the payment process is shown in Figure 13. They have to agree to the Electronic Financial Transaction Act before moving to the actual payment page. After payment, they can check the status of delivery as shown in Figure 14.

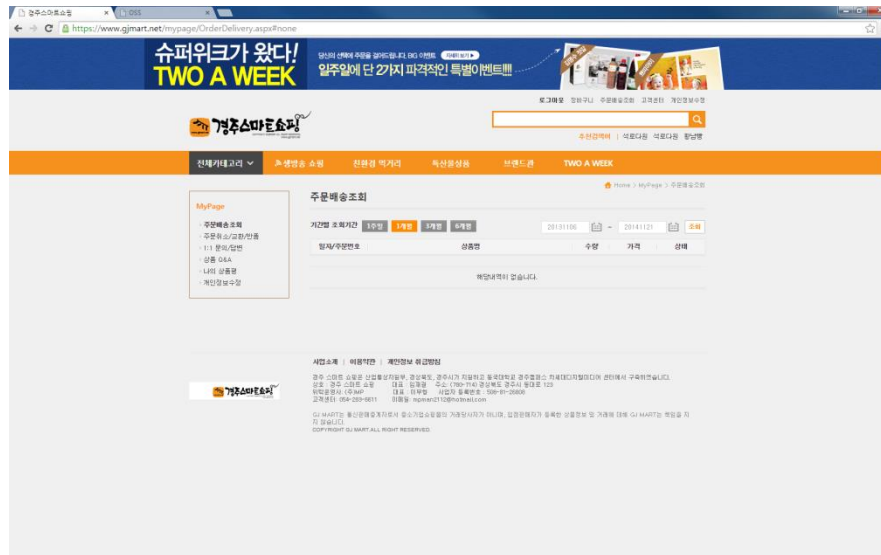


Figure 14. The Delivery Status Page

## 7. Conclusions

We introduced our design and implementation of an E-commerce system that is specialized to regional product. In addition to all the salient features of online shopping, price comparison, guarantee of the product quality, comments of other buyers, and so on, home-shopping like Internet TV channels are provided by the system. Video clips advertising local product are played on the media player window in the main page of the system. It is well-known that home-shopping TV is a highly profitable business. Most of home-shopping TVs operate in the black whereas most of new E-commerce sites close themselves within a year from their open. We believe that our strategy of integrating home-shopping like Internet TV channels into our E-commerce is well worth trying.

## Acknowledgment

This work was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education (NRF-2011-0006942), by ‘Development of Global Culture and Tourism IPTV Broadcasting Station’ Project through the Industrial Infrastructure Program for Fundamental Technologies funded by the Ministry of Knowledge Economy (10037393) and the Dongguk University Research Fund of 2015.

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