Research on Application and Evaluation of E-commerce Platform based on Eclipse and FTA

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Abstract: This paper uses Eclipse and a series of Fault Tree Analysis (FTA) knowledge to start research. Based on the relevant factors affecting the construction of e-commerce websites, the FTA method is used to analyze the website features, website technology, website content, website implementation, status of the website, website performance, website service quality, user experience, etc., and the main factors that affect the construction of the website are found. According to the results of the analysis, a more rational e-commerce website has been built using Eclipse technology and the following functions can be accomplished: two-way communication and scene presentation, private customization, o2o platform.

1. Research background

With the development of computer and Network Technology, e-commerce platform is emerging constantly, and there are many types. But most lack the relative integrity and scientific evaluation system, so its development trend has gradually slowed down. Under such circumstances, e-commerce platforms need to overcome their shortcomings and create new economic growth points. The accident tree analysis method is a better method to solve this kind of reliability problem. It is widely used in various fields. Analysis and evaluation of factors between platform sub modules by means of Fault Tree Analysis(FTA). From the perspective of the platform as a whole, it can effectively guide the platform operator to rationally distribute the reliability of the platform's indexes, thus establishing and improving the e-commerce platform which is more in line with the needs of consumers.

2. Fault Tree Analysis(FTA)

Fault Tree Analysis (FTA) , a method of scientific Analysis and computation, was developed by the US Bell Labs Watson et Al. . It is mainly used to solve the reliability of complex systems and evaluate indicators. An accident tree analysis uses tree diagrams to show the logical relationship between possible accidents and the factors that lead to them. It uses the event at the top of the system as the target for analysis, and it finds all the factors that might affect the target by stepping up the extrapolation. Before the establishment of e-commerce websites, the main factors affecting the construction of the site were identified through the qualitative and Quantitative analysis of the FTA. This will allow the creation of a stable and reliable e-commerce system. FTA has been used in aerospace technology, petrochemical and other fields.

The qualitative analysis of FTA refers to the minimum cut set, the minimum diameter set and the structure importance of the accident tree. The Quantitative analysis refers to the probability of occurrence, the importance of probability, etc. on the top of the tree. The calculation can be done by the following formula:

$$T=\sum_{i=1}^{k} A_i$$

T is the minimum cut set, and A_i is a factor in making the event happen. The minimum cutting

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sets are obtained by the row-column method, Bourg algebraic method and so on.

$$T' = \prod_{i=1}^{k} A'_i$$

T' assemble for the smallest diameter set, A'_i is a state that prevents an accident from happening.

$$I_i = \frac{1}{k} \sum_{j=1}^{m} \frac{1}{R_j}$$

I_i is the structural importance of the first basic event, k is the minimum total number of cut sets, m is the minimum cut set number that contains the basic event of the first, and R_j is the number of basic events in the j minimum cut set containing the basic event of the first.

$$F = \sum \varphi(x) \prod_{i=1}^{n} q_i^{x_i} (1-q_i)^{1-x_i}$$

F is the probability of an event at the top, φ(x) is the top event state value (0 or 1) , x_i represents the first fundamental event state value (0 or 1) , and q_i indicates the probability of the first basic event.

$$\Delta g_i(t) = \frac{\partial g[F(t)]}{\partial F_i(t)}$$

Δgi(t) is the probability importance, g[F(t)] is the probability of event occurrence at the top, and $F_i(t)$ is the unreliability of the event.

For e-commerce website construction, the FTA analysis steps are as follows：(1)A clear analysis of objects-building a reliable, stable, secure and functional e-commerce website as a top event E. Follow up layer by layer from top to bottom until the influencing factors are indistinguishable. The most basic factor is determined as the "basic event" X_i, and the factors that affect the underlying event are defined as "intermediate events" M_i. (2)the logical relationship between the fundamental factors and their effects should be determined, such as "or" relationship, "and" relationship , etc.(3)Creating an accident tree based on the basic needs and conditions of the site.

By using the FTA method to analyze the e-commerce building station, we can clearly understand the index factors that affect the construction of the website, and further analyze the results. Thus, it is possible to build an e-commerce website that is in line with social development and consumer needs.

3. Analysis of index factors in E-commerce Web site

Table 1 e-commerce website construction factor table

website features	website technology	website content	website implementation	Status of the website	website performance	website service quality	user experience
Business Model Innovation	Visual effects	The degree of "third-rate" integration	Planned mission completion	Website access rate	Social benefits	Customer satisfaction	Interface aesthetics
Functional Integrity	Technical Practicalities	Information quality	Progress control	Information update rate	Economic benefits	Employee satisfaction	Product type
Functional Effectiveness	Response Speed Link Validity	Information quantity	/	Website promotion	Integrated design	/	Interaction degree
/	/	/	/	Transaction rate	/	/	Shopping process convenience

There are many factors influencing the construction of e-commerce website. This paper starts from two main aspects: website construction and website application. The e-commerce website analyses and studies the top events. The main impact factors are as shown in Table 1, website features, website technology, website content, website implementation, status of the website, website performance, website service quality, user experience.

In order to solve the problem of e-commerce website construction, two large modules are analyzed, "website construction" and "website application" . The two modules are divided into four parts and have twenty-four index factors. Because of the factors that affect the construction of the website, variable can be used respectively. In general, accidents do not occur at the same time for every initial cause. Certain initial conditions can cause top events to occur. Such a set is called a cut set. This article uses the FTA to build an e-commerce site accident tree, as shown in figure 1.

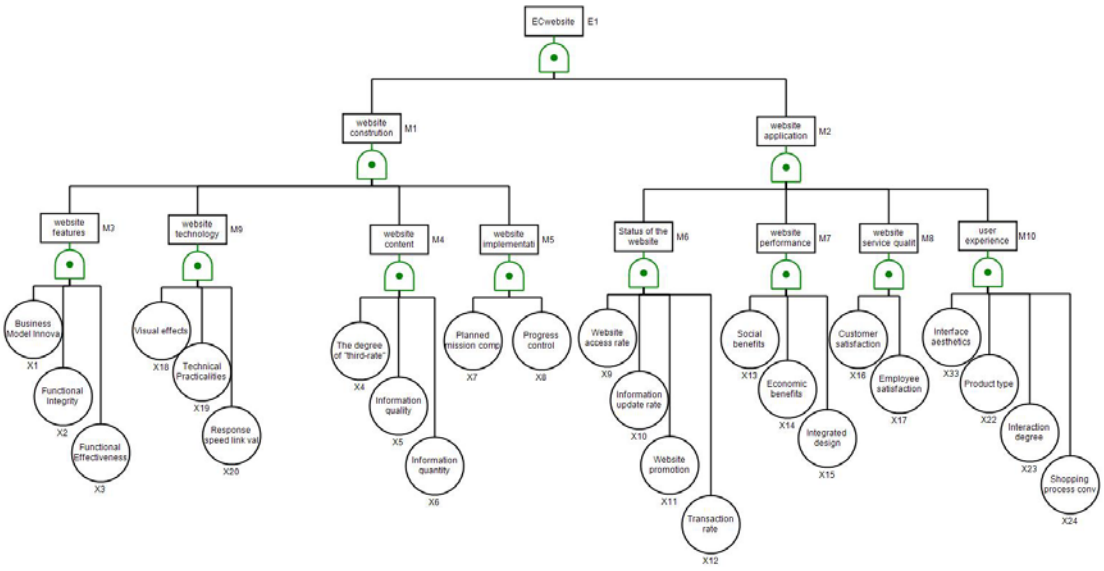

Figure 1 E-commerce site accident tree

4. E-commerce website construction

Using the accident tree analysis method, the index factors of the construction of e-commerce website are analyzed. Through the analysis, the construction of e-commerce website not only needs the basic demand, such as the website runs normally, consummates the website function and so on, also need through the investigation to understand and meet the latest consumer needs. Based on the analysis results, we use Eclipse technology developer city platform, which is based on computer 3-d technology, network technology, and online payment technology.

This e-mall has built a real 3-d shopping environment on the Internet. It is not just the static work of the existing mall, but it can be viewed from multiple angles. It realizes the process of functional demonstration and Interactive Learning of commodity production. In the process of system design and modeling, UML and object-oriented analysis and design methods are used, and Rose is used as a modeling tool. The Eclipse programming software is used to write the program, so as to speed up the updating of the software, and make the system safe, efficient, practical and support the running of different system platforms. Unlike the existing functions of the mall system, the mall system can perform the following functions: two-way communication and scene display, private customization, o2o platform, etc.

5. Two-way communication and scene display

The three-dimensional mall is based on a consumer perspective, and in a virtual 3D, consumers can walk around and interact with each other. In the process of interaction, more emphasis is placed on the two-way interaction with consumers and profits through the stimulation of desire to buy. The

interaction between enterprises and customers is embodied in the communication of information, and also in the emotional interaction, cultural exchange and other spiritual interaction. The consumer perspective in the 3D is designed in proportion to the proportion of people and cities in real life. The image can be viewed with the mouse randomly up and down, left and right, front and back. You can also zoom in and out of the scene with the mouse wheel.

6. Private customization

Making use of VR panoramic technology to make private customization module. Customizable includes custom wedding, custom travel and custom photography. Consumers can get different experiences based on different theme scenarios, content, forms, and processes. By clicking on different modules, consumers can present the scene from multiple angles and then create their own private customization.

7. O2O platform

The O2O platform is designed for the "group buying craze" that is now in full swing on the Internet. By analyzing the object-oriented Java Program Development Environment, Eclipse, the basic framework of the E-MALL is constructed. The system uses a database similar to mySql to store the data and realize the timely information acquisition. The platform has strong interactivity and has found a solution to the problems encountered in the O2O platform.

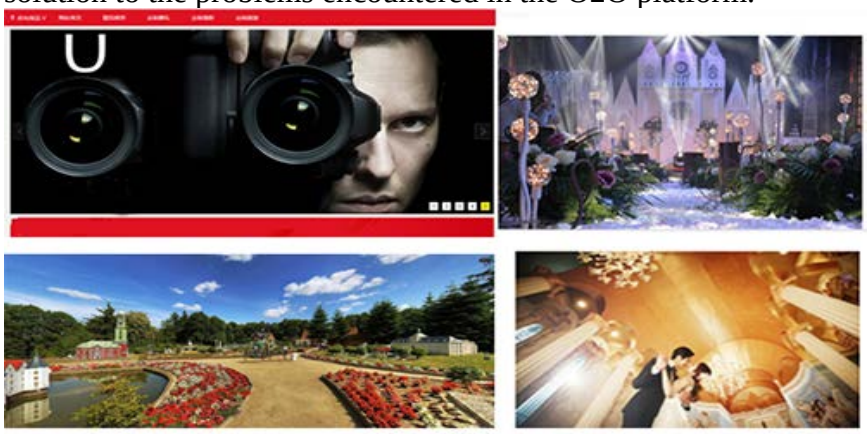

Figure 2 Functional display diagram of the shopping mall

8. Conclusions

In this paper, the influence factors of e-commerce website construction are analyzed by means of Fault Tree Analysis. On the basis of the analysis results, the virtual reality technology is used to improve the customer's shopping experience by combining with the dual environment of big data and e-commerce. Thus it can increase the user's viscosity, transforming the transaction rate, and promote e-commerce and socio-economic development.

The mall is a combination of real goods and 3D virtualization. The goods and models inside the mall are real. Customers can customize their products according to their size and height. The system has a huge database, and consumers can enter some of their own information. The computer will give you some advice based on the information, thereby reducing the error. Consumers can wander around the 3D mall and communicate online as if they were in a real mall.

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