Summer 5-26-2017

# Research on Performance Influence Factors of O2O Website with Interpretative Structure Model

Jiangping Wan
*School of Business Administration, South China University of Technology, China*, csjpwan@scut.edu.cn

Qiaowen Jiang
*School of Business Administration, South China University of Technology, Guangzhou, China*, lilowow@163.com

Guangwei Pan
*School of Business Administration, South China University of Technology, Guangzhou, China*

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# Research on Performance Influence Factors of O2O Website with

# Interpretative Structure Model

*Jiangping Wan*[1*] *, Guangwei Pan* [2] *, Qiaowen Jiang* [3]

[1,2,3] School of Business Administration, South China University of Technology, Guangzhou, China

**Abstract:** The O2O business model is booming, but there are still gaps in the field, especially on O2O website design, performance and the influence factors. We identified the top 10 performance influence factors through the qualitative method based on literature research and interviews, and the deep logic of the top 10 influence factors were analyzed with the interpretative structure model. Finally, we built its interpretative structure model, and the model illustrates that the web attraction is the root factor, network infrastructure and consumption habits are the direct factors, and we put forward suggestions for improvement according to O2O definition and digital economy successful factors.

**Keywords**: digital economy, O2O, website performance, influence factors, deep logic, interpretative structure model

## 1.    INTRODUCTION

What is O2O model? What status is O2O applications in toady China? Yue G.Y. gave the definition of O2O e-commerce model, and investigated and analyzed the current status of Chinese application of O2O e-commerce model, and then revealed several main problems such as the gap between the products and services provided by merchants and the expectation of customers, the various integrities of merchants and the simplex business model of O2O websites [1].

What features does O2O have? How to figure them out? Yang et al figured two important features of O2O commerce out, i.e., offline experience and the integration of online and offline information, were incorporated into an empirical model to examine their influences on the technology and economics attributes of O2O commerce from the perspective of consumers [2].

The Internet is the media of electronic commerce, merchants display their products or services and advertising on the website, the consumers chose the products or services online and pay for them. The construction and operation of O2O website has become increasingly important, so does the performance evaluation of O2O website. As Berline & Brimson said: performance evaluation is a key factor to ensure the success of the enterprise strategy implementation[3]. In our understanding, O2O website performance has impact on O2O enterprise performance evaluation.

The paper is organized as follows: Section 2 is a literature review, explains the concepts of O2O business model, website performance evaluation，interpretative structural model and research values. Section 3 is method description. Section 4 is to identify the influence factors of O2O website performance. Section 5 is to establish interpretative structural model of O2O website performance influence factors. Finally, the section 6 is the conclusions.

## 2.    LITERATURE REWIEW

### 2.1    The concept of O2O

Alex Rampel defined the O2O model as searching the consumers online and took them to the reality store. O2O is mixture of payment model and offline store passenger flow to realize offline purchase [4]. Y.L. Ma defined Online to offline to provide the marketing information of the businesses through wired or wireless

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*    Corresponding author. Email: csjpwan@scut.edu.cn (Jiangping Wan) , lilowow@163.com (Qiaowen Jiang)

Internet, gather effective purchasing groups and pay for the corresponding cost, then they can go to the reality products or services supplier offline, and complete their consumption with various forms of credentials [5]. The main characteristic of O2O is mixture of the online virtual economy with the operation of offline entity stores.

The definition of O2O in our research is as follow: O2O is a new business model which realizes the virtual world and the real world fusion effectively with multi-channel promotion and interaction closed-loop in the living consumption. Its essence is integration pattern to connect with digital social media, and its brand cultivation is data-driven individual marketing. The future of O2O will be a kind of multi-level and multi-dimensional compound ecological system and will evolve forward to pluralism and cross boundary value net with "resources transfer" and "cross subsidy" in the era of mobile Internet [6].

## 2.2    Research status of website performance evaluation

The Italian economist and sociologist Pareto put forward the concept of efficiency in the early 20th century [7]. After more than a century of research, many scholars have reached the consensus, and the choice of performance evaluation indexes from the beginning of single index gradually to the development of multiple indicators [8]. Foreign scholars mainly focused on the evaluation of functions and services quality of electronic commerce, and the performance of electronic commerce technology became the mainly research field of domestic scholars [9] (Table 1).

**Table 1. The efficiency evaluation method of e-commerce website**

| Method | Description | Advantage | Disadvantage | Example |
|---|---|---|---|---|
| **Expert assessment** | Applying the regulated procedures prescribed with the questionnaire survey or interview and so on, make an evaluation of the website with comprehensive evaluation of the experts according to the expert's knowledge and experience. | Make full use of the expert's knowledge and reach the result of brainstorming. | Specialists are limited and the representative limitations; expert personal bias and pundits personal impact on the conclusion | In 1999, the selection of 1999 China excellent site evaluate those website with the online voting and the evaluation of the jury. |
| **Index statistics of website traffic** | Statistical traffic index of website by specific software. | Data analysis with certain objectivity. | The authenticity of data can't be guaranteed. | Domestic and foreign statistics agency for website visits: Media Metrix company, NetEase Chinese website ranking, etc. |
| **Questionnaire** | Evaluate website by online sample survey. | Large number of samples can represent the suggestion to websites in some extend. | Invalid questionnaire can't be avoided; Quality of the questionnaire affects the evaluation result directly; subjective factors will affect the result. | User experience questionnaire |
| **Comprehensive evaluation** | Comprehensive the methods above to evaluate - e-commerce websites. | Comprehensive, various method complement each other. | Difficult to implement and heavy workload. | Olsen et al evaluate security electronic business with comprehensive method [10]. |

Marsico and Lecialdi established a website evaluation index system from user's perspective, including personal, social and network [11]. Muyilea, Steveand et al. thought that the accuracy of information and the speed of e-commerce site will affect the network user's satisfaction [12].Schubert evaluated the EWAM website with the TAM evaluation model[13]. Sedera applied the information success model to evaluate the success of information system [14]. Denise E locked the young consumers with the perspective of consumers, and forecasted evaluation decision of young consumers online from their personal preferences, ability, etc[15]. Niwattisaiwong Seksiri et al. evaluated the performance of mobile insurance e-commerce in Thailand and Singapore with the subsection regression method [16].When Szymarski David M analysis e-commerce website, he found that the

description of product and service on the website, web page design and payment security will directly affect consumer's intent to buy[17]. Plamer mainly focused on the performance and information content of website[18].

### 2.3 Interpretative Structural Model

Interpretative structural model (ISM) is a qualitative analysis method to apply the participants knowledge of actual experience and computer technology analysis the complex chaotic relationship between elements in the system, and divides elements into several subsystems, those subsystems would form a classes structural model[19], [20]. In other words, the ISM is used to describe the relationship between the structure (deep logic) of each element in the complex system with the graphic matrix and logical operation.

J.P.Wan and D. J. Li figured out eleven kinds of common mindbugs among the twenty five kinds of mindbugs with questionnaire. The relationship between the six original risk factors of implementation of the information technology service management project and these common mindbugs were also identified [21]. J. P. Wan and J. J. Hou studied the possible risk factors during SAP Business One implementation with depth interview [22]. J. P. Wan, et al studied the comprehensive risk management system with the software project features of H Corp., the causal relationships among risks were discovered, and corresponding risk structure model was established with ISM [23]. J. P. Wan etc. established the comprehensive risk management system based on the software project features of V Corp. Four original risk factors were found with ISM, including analysis risk of product design, communication risk, human resource risk and decision making risk. Finally, some solutions were put forward to help e-business V Corp. improve the ability of software project risk management [24].

### 2.4 Research Value

The values of research on performance influence factors evaluation of O2O are as follows: (1) Now domestic and overseas scholars mainly focus on the business model of O2O, few researchers pay attention to the performance of O2O website, and this study can enrich O2O website performance evaluation research. (2) Now, website performance studies most are confined to the efficiency of the site, little studies focus on the influence of those factors further. (3) Provide referential suggestions for the construction and development of O2O website in China. (4) Establish the interpretative structure model of O2O website performance evaluation, and help O2O enterprises to understand the inner mechanism (deep logic) of the top 10 performance influence factors, and promote O2O website's performance. (5) Enrich the research on application of structure complexity.

## 3. METHOD DESCRIPTION

This research figures the top 10 performance influence factors of the O2O website out, and identifies the deep logic among the 10 factors, then we build its interpretative structure model ( Figure 1)

## 4. IDENTIFY THE INFLUENCE FACTORS OF O2O WEBSITE PERFORMANCE

We figured the O2O website performance factors (Table 2) out according to the characteristics of the O2O website as well as the specific market environment in our country, the scholars' opinions are extracted from the four dimensions as follows: environment mechanism, construction investment, staff efforts, and consumer experience.

Payment system indicates the payment method, payment terms and others of O2O e-commerce in our country. Network infrastructure indicates the China's overall status of Internet infrastructure. Codes of practice indicate the China's Internet related laws, regulations and policies. Consumption habit indicates consumers' habit to different products in our country. Website information indicates the information capacity, update rate and timeliness, etc. Publicity and promotion of website indicates the advertising, information promotion and others of O2O website. The professionalism of website indicates whether the O2O website focuses on the right
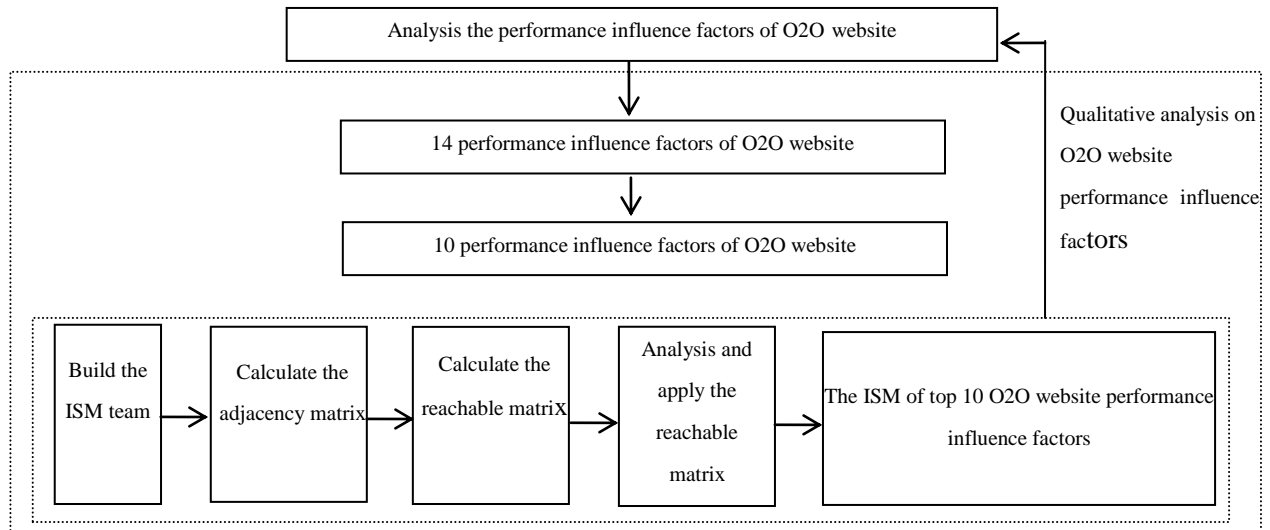
**Figure 1 Method description**

**Table 2.    Influence factors of O2O website performance**

| Dimension | Factors |
|---|---|
| Environmental mechanism | Payment system |
| | Network infrastructure |
| | Codes of practice |
| | Consumption habit |
| Construction input | Website information |
| | Publicity and promotion of website |
| | The professionalism of the website |
| | Technical support |
| | Funding |
| Staff effort | The management concept |
| | Management maturity |
| | Integrity mechanism |
| Consumer experience | Site safety |
| | User feedback |

product positioning and the information is professional. Technical support indicates the related technical personnel quantity and technological status in the O2O website. Funding indicates the cost of investment in all aspects of the O2O website. Management concept indicates the enterprise management and the development strategic concept from those managers in O2O enterprise. Management maturity indicates the related management problem in the whole O2O website enterprise, including management personnel quality, management method, etc. Integrity mechanism indicates the authenticity of the information that the website posted, and the standardization of the exchange,etc. Site safety indicates if there is any loophole that will be danger to consumers potentially. User feedback indicates the communication mechanism between consumers with the website.

In this paper, we increased the interview with the senior supervisor in O2O website enterprise and experts in e-commerce field to ensure the accuracy of the O2O performance influence factors. The interviewers mainly were manager H, the director of Meituan delivery in Guangzhou, Mr. W, the market department of Uber, Mrs Y, senior consultants Accenture Consult co.LTD, Director Pan, senior consultants Ericsson Market Consult co.LTD. The interview was mix of telephone interview and field interview. Each interview is controlled within 40 minutes, while recording content associate the research subject closely during interview process. The interview outline covered all aspects of the research (see appendix).

After sorting those interview's recording, we made the follow corrections: delete payment system factors, because the consumption habit covers payment system in some extend, the current payment system contributes

to the current consumption habit in a certain extend, so we thought the consumption habit could reflect payment system. We merged the publicity and promotion of website to funding, because the funding includes website promotion, website construction, etc according to the interview summary. The factor website information and professional were merged, and renamed as website attraction. Management concepts and management maturity are merged and renamed as management mechanism. Other factors remain the same. Top 10 performance influence factors of O2O website are concluded as follows: network framework, codes of practice, consumption habits, website attraction, technical support, funding, management mechanism, integrity mechanism, site safety, user feedback, and network security.

## 5. ESTABLISH INTERPRETATIVE STRUCTURAL MODEL OF O2O WEBSITE PERFORMANCE INFLUENCE FACTORS

### 5.1 Built ISM team

We selected 8 relevant experts engaged in O2O field to constitute the ISM team, including scholars in e-commerce field, high-level leadership in O2O enterprise, consultants in consultancy company, they all has related research or implementation experience about O2O website, and are willing to provide sincerely help. The experts 1, expert 2, and expert 3 are domestic well-known O2O service platform product manager, experts, expert 4, expert 5, and experts 6 are e-commerce professors of universities, expert 7 and expert 8 are domestic well-known consulting company customer manager.

We used the mail to discuss and set the general modeling issue for "will factor A affect factor B", sent the problem in the form of questionnaire to all ISM team member, after collected and sorted the questionnaire, we feedback the conclusion and reason of experts decision to each member, and let them modify again, and repeated, at the end we used the text message or email to determine the time and place, then interviewed with ISM team member. After more than 1 hour to discuss seriously, the 8 experts eventually formed the unified opinions, and determined the final internal influence relationship (deep logic) among top 10 performance influence factors (Table 3) .

In this paper, the top 10 influence factors are numbered as $K_1$, $K_2$, $K_3$, $K_4$, $K_5$, $K_6$, $K_7$, $K_8$, $K_9$, $K_{10}$ and "X" represents the mutual influence between the factors in rows and columns, "V" represents the factors in rows has influence to factors in columns, "A" represents the factors in columns has influence to factors in rows, "space" represents there is no mutual influence between the factors in rows and columns. We established the adjacent matrix for influence factors of O2O website according to the result of the above discussion, as for the factors $K_i$（$i＝1$，$2…10$）, if $K_i$ has influence to $K_j$ it would be expressed with "1", if $K_i$ has no influence to $K_j$, it is expressed with "0". The above relationship diagram can be expressed as the follow adjacency matrix:

### 5.2 Calculating reachability matrix

According to $(A+I)^{k-1} \neq (A+I)^k = (A+I)^{k+1} = R$, (I is the unit matrix), we calculated the adjacency matrix(1) with the software tool (http://www.93337.com/ism/) and could get the reachability matrix(2).

We could get the collection of each element $K_j$ with adjacency matrix R.

$P(K_i)=\{ K_j\ m_{ij}=1 \}$；   $Q(K_i)=\{ K_j\ m_{ji}=1 \}$；  $P(K_i) \cap Q(K_i)=T(K_i)$

Among them, $P(K_i)$ is called adjacency set which is the set of all elements that can be reached from the $K_i$; $Q(K_i)$ is called the prior set which is the set of all elements that can reach the element $K_i$; $T(K_i)$ is called the universal set which belongs to adjacency set also belongs to prior set (Table 4).

**Table 3. The relationship between the performance influence factors of O2O website**

| $K_i$ | Factor | $K_1$ | $K_2$ | $K_3$ | $K_4$ | $K_5$ | $K_6$ | $K_7$ | $K_8$ | $K_9$ | $K_{10}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $K_1$ | Network security | $K_1$ | | | | | | | | | |
| $K_2$ | Technical support | X | $K_2$ | | | | | | | | |
| $K_3$ | Funding | V | V | $K_3$ | | | | | | | |
| $K_4$ | User feedback | V | V | X | $K_4$ | | | | | | |
| $K_5$ | Network infrastructure | A | | A | | $K_5$ | | | | | |
| $K_6$ | Website attraction | V | V | V | V | | $K_6$ | | | | |
| $K_7$ | Codes of practice | V | A | A | A | | | $K_7$ | | | |
| $K_8$ | Consumption habits | A | | | | A | | | $K_8$ | | |
| $K_9$ | Integrity mechanism | | V | V | V | | | V | V | $K_9$ | |
| $K_{10}$ | Management mechanism | V | V | V | V | | A | | V | V | $K_{10}$ |

$$
\begin{array}{c}
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K_1 \\ K_2 \\ K_3 \\ K_4 \\ K_5 \\ K_6 \\ K_7 \\ K_8 \\ K_9 \\ K_{10}
\end{array}
\begin{array}{cccccccccc}
K_1 & K_2 & K_3 & K_4 & K_5 & K_6 & K_7 & K_8 & K_9 & K_{10} \\
\left(\begin{matrix}
1 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\
1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
1 & 1 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 \\
1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 1 & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 0 \\
1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1
\end{matrix}\right)
\end{array} \quad (1)
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\begin{array}{c}
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K_1 \\ K_2 \\ K_3 \\ K_4 \\ K_5 \\ K_6 \\ K_7 \\ K_8 \\ K_9 \\ K_{10}
\end{array}
\begin{array}{cccccccccc}
K_1 & K_2 & K_3 & K_4 & K_5 & K_6 & K_7 & K_8 & K_9 & K_{10} \\
\left(\begin{matrix}
1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 \\
1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 \\
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1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 0 \\
1 & 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1
\end{matrix}\right)
\end{array} \quad (2)
$$

A: adjacency matrix                    R: reachability matrix

**Table 4. Adjacency Set, Prior Set and Universal Set of O2O website performance influence factors**

| $K_i$ | $P(K_i)$ | $Q(K_i)$ | $T(K_i)$ |
|---|---|---|---|
| $K_1$ | 1,2,5,7,8 | 1,2,3,4,6,7,9,10 | 1,2,7 |
| $K_2$ | 1,2,5,7,8 | 1,2,3,4,6,7,9,10 | 1,2,7 |
| $K_3$ | 1,2,3,4,5,7,8 | 3,4,6,9,10 | 3,4 |
| $K_4$ | 1,2,3,4,5,7,8 | 3,4,6,9,10 | 3,4 |
| $K_5$ | 5 | 1,2,3,4,5,6,7,9,10 | 5 |
| $K_6$ | 1,2,3,4,5,6,7,8,9,10 | 6 | 6 |
| $K_7$ | 1,2,5,7,8 | 1,2,3,4,6,7,9,10 | 1,2,7 |
| $K_8$ | 1 | 1,2,3,4,6,7,8,9,10 | 8 |
| $K_9$ | 1,2,3,4,5,7,8,9 | 6,9,10 | 9 |
| $K_{10}$ | 1,2,3,4,5,7,8,9,10 | 6,10 | 10 |

### 5.3  Establish interpretative structure model

The multi-degree interpretative structure model of the O2O website performance influence factors was established according to the hierarchical division of the O2O website performance influence factors (Figure 2).
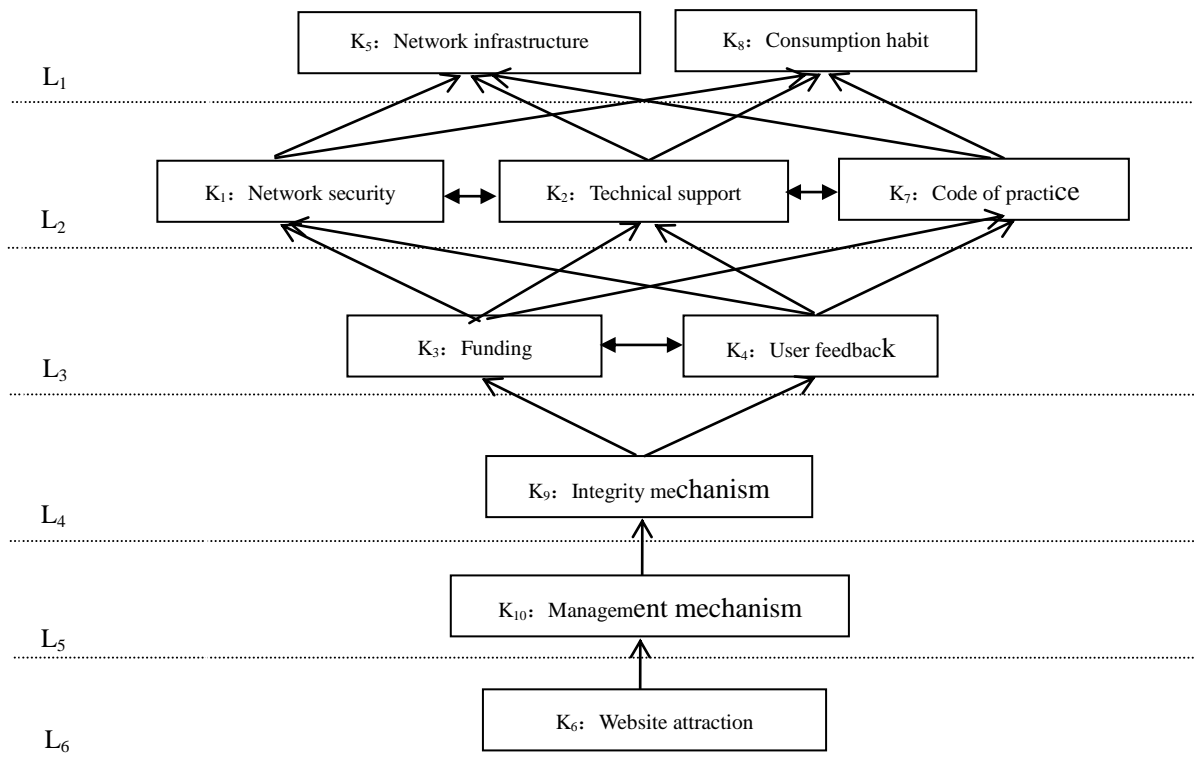


**Figure2. Interpretative structure model of O2O website performance influence factors**

There are 6 faces in the interpretative structure model of O2O website performance influence factors. The 1 risk factor in the sixth will directly affect the 1 risk factors in the fifth, and will also affect the factors in the first，the second，the third，and the fourth indirectly; By the same token, the 1 factors in the fifth will directly affect the 1 factor in the fourth, will also affect the factors in the first，the second，the third, and so on. The root factor is web attraction, and network infrastructure and consumption habits are directly factors. The third floor of the causal relationship between two factors, and the second layer of three factors form the causal loop, because these five factors are still not clearly defined and distinction today.

Network infrastructure and consumption habit are the directly factors influence the O2O website, the result is in line with the actual situation. The integrity of network infrastructure is the directly factor which influences the efficiency of the whole network, consumption habit is also the directly influence factor of O2O website performance. Consumption habit not only affects the site content resources of the whole O2O website, it also affects many aspects, such as site safety performance. It's obvious that the market was dominant by consumer, and the consumer habit is the main factor that affects the consumer behavior in the view of market environment of O2O business. Web attraction is the root factor that affects the performance of O2O website, it's key to success of O2O web site, so do O2O business operation.

According to the Steve Olenski [25], In today's digital economy these factors are not the only ones that need to be taken into account in order to be successful as follows: (1) Disruptive Marketing. (2) Your business can help consumers to a better, more plugged-in life. (3) How fast can you and your organization adapt. In our understanding, so does O2O business. The key factors of performance of O2O website were identified in the following: (1) Web attraction; (2) Management mechanism; (3) Integrity mechanism; (4) Network infrastructure;

(5) Consumption habit.

We put forward the following suggestions: (1) Disruptive Marketing should integrate all their marketing and advertising into one simple process that challenges the existing thinking and expectations of the marketplace. AR/VR, and AI can enhance the web attraction. But in essence, O2O business should be integrated the customer's personal life organically in the efficient way. It should be to make full use of the data information to understand the user's essential requirements, and users cannot again from the tailored living consumption products. (2) The future of O2O will be a kind of multi-level and multi-dimensional compound ecological system and will evolve forward to pluralism and cross boundary value net with "resources transfer" and "cross subsidy" in the era of mobile Internet. The capability, idea and decision making of managers are more rigorous than the ordinary managers. For example, who should pay for disruptive marketing? (3) Integrity mechanism affects the sustainable development of the website. For example, O2O must find a multi-party interest distribution mechanism, including consumers, brands, distributors, and industry practitioners. （4）Gartner predicts that the number of linked devices in the IoT will multiply nearly thirty-fold in just a little more than a decade, increasing from about 900 million connected devices in 2009 to plus 26 billion by 2020. The result will be everything – businesses, processes, datum, everything tangible, in fact – will be interconnected in a network. The sound network infrastructure is necessary for consumer experience and access of website. (5) O2O essence is integration pattern to connect with digital social media, and its brand cultivation is data-driven individual marketing. For example, how to realize effective integration of O2O service model and service chain in view of the O2O fragment analysis and virtualization user personalized demand, aid merchants VIP of acquisition and information collection, create label index automatically, and aid merchants accurately obtain the customer behavior preference to realize socialization of precision marketing with big data analytics. Context-driven design should be required to implement. In other word, you should take full advantage of the ever-changing digital economy is acceleration in gaining the proper insights at just the right time.

## 6   CONCLUSIONS

We discovered the influence factors of O2O website performance with literature research, those factors were modified through the interview as follows: network infrastructure, code of practice, consumption habits, website attraction, technical support, funding, management mechanism, integrity mechanism, site safety, user feedback, and network security. The interpretative structure model of O2O website performance influence factors was established to analyze the deep logical relationship among those factors. Consumption habits and network infrastructure were the directly factors, and web attraction was the root factor that influence the O2O website performance. Five key factors were also identified. The corresponding suggestions were put forward according to O2O definition and digital economy successful factors.

The future researches are as follows: (1) O2O website performance is evaluated based Internet platform to collect objective data (another paper to be appeared). (2) The O2O will transfer to the mobile terminal gradually, the performance of O2O app on mobile terminal should be analyzed, so that it will more fully reflect the state of the development of the O2O model in China, provide reference direction and theoretical support for O2O enterprise. (3) One specific factor, such as consumption habits or other specific factors, are researched more deeply in the future.

## APPENDIX   A QUESTIONNAIRE

1. Please talk about your understanding about the development of O2O model in our country.

2.When did the O2O e-commerce website be founded? What's your purpose to launch the e-commerce site? What's about the leadership's attitude to this business? Is there some other important information about your O2O e-commerce website?

3. There are abound products on the website, so are these all online selling now? Or offline selling simultaneously? What the different between the online sale and offline sale? If the price online is lower, will it affect the offline sales of similar products?

4. What's about the whole circulation system of your company?

5. What're about the input resources of O2O website construction? And how many technical personnel is there for the website maintenance?

6. What will you do to marketing about your O2O website? What the difference when there are different platforms? How about the cost of marketing?

7. What're about your company's main rivals ?

8. Which is most expensive of your O2O website ?

9. Please talk about the future of your company?

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