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Towards Successful Cloud Ordering Service

Yan-Kwang Chen, Yi-Ju Chen
National Taichung University of Science and Technology, Department of Distribution Management, Taiwan
Fei-Rung Chiu
Overseas Chinese University, Department of Hotel and M.I.C.E Management, Taiwan
Cheng-Yi Wang
National Chung Hsing University, Institute of Technology Management, Taiwan

Abstract

Background: The rise of cloud services has led to a drastic growth of e-commerce and a greater investment in development of new cloud services systems by related industries. For SaaS developers, it is important to understand customer needs and make use of available resources at as early as the system design and development stage. **Objectives:** This study integrates E-commerce Systems (ECS) Success model and Importance-Performance Analysis (IPA) into empirical research of the critical factors for cloud ordering system success. **Methods/Approach:** A survey research is conducted to collect data on customer perceptions of the importance and performance of each attribute of the particular cloud ordering service. The sample is further divided according to the degree of use of online shopping into high-usage users and low-usage users in order to explore their views regarding the system and generate adequate coping strategies. **Results:** Developers of online ordering systems can refer to the important factors obtained in this study when planning strategies of product/service improvement. **Conclusions:** The approach proposed in this study can also be applied to evaluation of other kinds of cloud services systems.

Keywords: E-commerce Systems Success model, Importance-Performance Analysis, cloud ordering service

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Introduction

Cloud computing has been recognized as a technology next to Web 2.0 that can bring important business opportunities to the IT industry (Armbrust et al., 2010; Wang et al., 2010). Forrester predicted that the global market for cloud computing — including the public cloud, the private cloud and the virtual private cloud — will leap

from $40.7 billion in 2010 to more than $241 billion in 2020 (O'Neill, 2011). Merrill Lynch also forecasted that the global cloud market will be at least 12% of size of the global software market within the next five years. This rapid market growth will cause a tremendous impact on related industries. Information services providers and hardware suppliers, for instance, have been driven to invest in research and development of cloud services (Tan et al., 2013; Neves et al., 2011).

Cloud computing is not a brand new innovation. Essentially, it is an extension of distributed computing (Pallis, 2010). It is a model of network computing where a task is broken down into multiple smaller tasks so that multiple servers connected through the Internet can process the smaller tasks at the same time. The computing results obtained by multiple servers will be combined and delivered to the user. In cloud computing, cloud services are like a "black box" (Habib et al., 2012; Lee, 2012). Users input their task and wait for the result. They do not need to know how the task is processed in the "black box".

Cloud services are generally classified into three models, including (1) Infrastructure as a Service (IaaS), (2) Platform as a Service (PaaS), and (3) Software as a Service (SaaS) (Dikaiakos et al., 2009; Rani et al., 2014). IaaS model is where the cloud infrastructure or IT facilities are provided and maintained by IaaS providers. Unlike conventional models, where businesses bear all the costs of hardware, software, storage, power, and bandwidth to provide an online service, this model allows businesses to pay on a utility basis. In other words, businesses can acquire IT resources more efficiently and at a lower cost. PaaS refers to a service system platform or a virtual solution leased to users at a cost. In this model, users can develop and run their software applications on a cloud platform without the cost and complexity of deploying and managing the server and the operating system (OS). Google Apple Engine and Amazon web services are cloud platforms of this type. SaaS is a model of accessing software services through the Internet. It is also the most prevalent cloud service model on the market. Software on demand is a SaaS service. It offers customers a wide range of software applications from office applications (e.g. e-mail, word processors) to data analytic applications (e.g. customer relationship management, sales process management, and human resources management). Google, Salesforce, and Microsoft are some of the well-known providers of SaaS. Many cloud services that we are familiar with, such as Line, What's App, Google Earth, and Facebook, are also SaaS. These cloud services have been closely incorporated into our diet, clothing, living, transportation or recreation and are becoming a part of our daily life (Buyya et al., 2008).

With IT advancement, cloud has been applied in a wide spectrum of areas. The high diversity of cloud platforms, software programs, and applications on the market indicates that cloud services are being developed toward having multi-support, integrated functions, and varying specifications (Zhu, 2010). However, the success of a cloud service system usually depends on its strength in a number of constructs, such as user interface, system functions or system quality, and how its weaknesses, such as market competitiveness, are addressed. In this study, a survey research method based on E-commerce System Success (ECSS) model was used to collect user opinions on a cloud ordering system—EZOrder, and perform Importance-Performance Analysis (IPA) to extract critical success factors from the collected data. The results are expected to contribute to design and development of cloud service systems.

Backgrounds

E-commerce Systems (ECS) Success Model

With the advancement of the Internet and World Wide Web (WWW), more and more companies have chosen to use e-commerce to retail their products and provide customer services, in a hope of creating a competitive advantage in the market. This growth in e-commerce is the reason behind recent attempts to measure the success of e-commerce (Brown et al., 2008).

Many discussions on e-commerce success have been based on DeLone & McLean information system (IS) success model, which is based on the classic communication theory of Shannon & Weaver (1949) and Mason (1978) to mesure the IS impact. The model consists of the following constructs: (1) system quality, (2) information quality, (3) use, (4) user satisfaction, (5) individual impact, and (6) organizational impact. Since introduced in 1992, DeLone & McLean IS success model has been applied in many studies and viewed as an important framework for evaluating the success of an IS. Many extended models have also been proposed (e.g., Pitt et al., 1995; Seddon et al., 1996; Skok et al., 2001).

In the E-commerce context, the primary system users are customers or suppliers rather than internal users. Customers or suppliers will use the system to make selling or buying decisions and execute business transactions (DeLone et al., 2004). Hence, e-commerce systems (ECS) can be viewed as a new form of IS.

Molla & Licker (2001) first proposed that the original DeLone & McLean model could be extended to measure ECS (DeLone et al., 2004). In addition to system quality (e-commerce system quality), information quality (content quality), use and user satisfaction (customer e-commerce satisfaction), they also stressed that user satisfaction with the transaction processes in the ECS could be affected by trust and service quality (support and service).

DeLone & McLean (2003) discussed many of the important IS research efforts that proposed enhancement to their original model, and proposed an updated DeLone & McLean IS success model, which include the core dimensions of information quality, system quality, use, user satisfaction, intentions to use, net benefits, and service quality. DeLone & McLean (2004) illustrated how the updated model could without modification be used to evaluate e-commerce success.

In response to the call for continuous challenge and test of IS success models within the e-commerce context, Wang (2008) criticized the updated DeLone & McLean IS success model is somewhat inconsistent with the IS acceptance and marketing literature. Also, he asserted that the measures, DeLone & Mclean recommended for net benefits in e-commerce settings, overlapped with the measure of user satisfaction and further that user satisfaction is essentially a surrogate for the net benefits in the context of e-commerce (Chen et al., 2013). Based on the IS and marketing literature, Wang re-specified and validated a multidimensional model for assessing ECS success. The validated model consists of six dimensions: information quality, system quality, service quality, perceived value, user satisfaction, and intention to reuse.

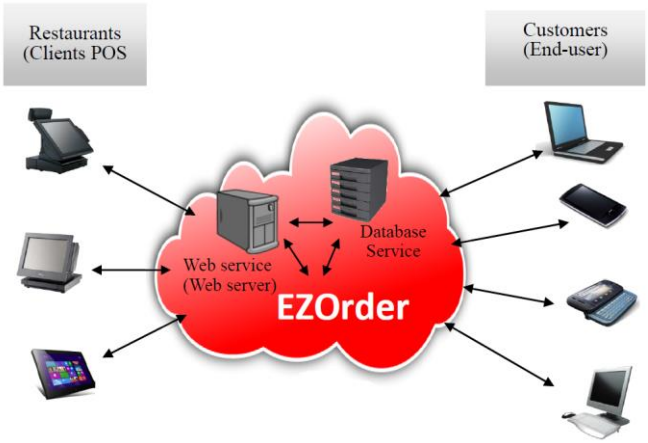
More recently, Fang et al. (2011) extend DeLone & McLean IS success model by introducing justice (fair treatments received from the exchanging party) and trust into a theoretical model for studying customers' repurchase intentions in the context of online shopping. The research results showed that trust, net benefits, and satisfaction are significant positive predictors of customers' repurchase intentions toward online shopping. Information quality, system quality, trust, and net benefits, are significant determinants of customer satisfaction.

Other ECS success models (e.g., Torkzadeh et al., 2002; Quaddus et al., 2005; Lin et al., 2011) have been proposed. However, unlike Molla et al. (2001), DeLone et al. (2003), Wang (2008), and Fang et al. (2011), these proposed models didn't identify the relationship between factors.

EZOrder cloud ordering system

EZOrder is a SaaS-based cloud ordering system. It is designed to bill clients by the volume of resources consumed (or by transaction amount). Food and beverage providers (clients) can subscribe to EZOrder services based on their actual needs. As shown in Figure 1, the EZOrder's service model involves three roles, including (1) customers, (2) food and beverage provider, and (3) EZOrder. In this model, consumers and the food and beverage provider use EZOrder to send and receive orders respectively. More specifically, EZOrder offers online ordering as a Web service to consumers. Consumers can use various kinds of Internet-connected devices, including Smartphone, personal computer, and other types of mobile devices, to browse the menu prepared by the food and beverage provider and place their orders online. EZOrder features a highly compatible database service design, which allows it to support various kinds of point-of-sale (POS) systems. EZOrder retrieves the latest menu from its clients about every three seconds and stores it in the database (synchronized with the Web service). Hence, consumers can always access the up-to-date menu information from the Web service. Besides, EZOrder delivers new orders to its clients every three seconds on average (an automated mechanism). Under this SaaS service model, all the operations can be done by both parties using a web browser on a PC or a mobile device. There are no high hardware and software requirements for running EZOrder. In short, EZOrder offers a highly integrated online food/beverage ordering system that can be directly connected to the POS system at the store side and convert orders across systems in the shortest time without loss of data.

Figure 1
The framework of EZOrder cloud ordering system



Source: Authors

Methodology

Research instrument

In this study, we attempted to investigate the importance of each attribute (service or function) of EZOrder for consumers using a questionnaire. The research surveyed Taiwanese people who often eat out. According to Global Views Monthly, the population of people used to eating out has exceeded 70% of the total population in Taiwan. This population consists of people from all walks of life, including labor (including nine-to-fivers), public servants, students, and housewives. However, young students, freshmen in the society, and nine-to-fivers with no more than 10 years of working experience constitute the majority. The questionnaire was administered by an interviewer in person to consumers selected by purposive sampling. Respondents were first asked to go through the EZOrder's ordering process (see Appendix A) first before answering the questionnaire. The ordering process involved the following steps: log in, choose product category, select location, choose store, select items to order, choose details for the item, confirm order, fill in buyer's data, confirm before sending the order, and confirm acceptance of the order.

The questionnaire comprised three sections, including basic data, online shopping habits, and opinions about EZOrder after using it. The online shopping habits were evaluated using items evaluated by Naseri et al. (2011) and Gainsbury et al. (2012). The opinions about the success of the ordering system was evaluated based on Molla and Licker's (2001) ECSS model, which consists of six constructs including EC system quality, content quality, use, e-commerce customer satisfaction, trust, and support and service (see Appendix B). Among these constructs, system quality, content quality, use, and e-commerce customer satisfaction were evaluated using items developed according to DeLone et al. (1992), Molla et al. (2001), and Skok et al. (2001); trust was measured using items developed according to Kim et al. (2009), Lee et al. (2001), and McKnight et al. (2002); items for the support and service dimension were designed based on Molla et al. (2001) and Skok et al. (2001). Each respondent was required to evaluate the importance of each item as well as the performance of the system on each item. All the items were designed to be evaluated on a five-point Likert scale. For items of satisfaction, the scale ranges from 1-"very unsatisfied" to 5-"very satisfied"; for items of performance, the scale ranges from 1-"very unimportant" to 5-"very important".

Research sample

The survey period spanned two months. During this period of time, a convenient sample of 260 respondents was collected from four organizations in Taiwan, and 235 of which were valid. The valid response rate reached 90.38%. After an initial classification of the responses, we performed Importance-Performance Analysis (IPA) to capture the importance of and the system's performance on each attribute.

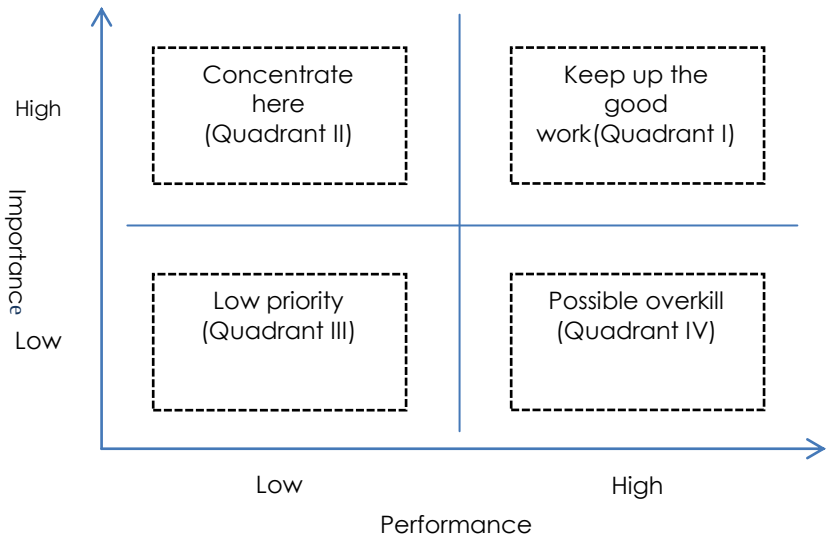
Research methods

Importance-Performance Analysis (IPA) was introduced by Martilla et al. (1997). It has been frequently applied to research of marketing, business management, service improvement or strategy development. The main purpose of IPA is to find the priority of each product attribute for improvement based on consumers' perception of the importance of and the performance on each attribute. In the conventional IPA model as shown in Figure 2, importance is shown along y-axis, while performance is depicted along x-axis. Based on consumers' perceptions, the attributes can be plotted on a two-dimensional matrix. Attributes with higher importance but lower

performance are given a higher priority and should be improved first (Ainin et al., 2008).

In the two-dimensional matrix shown in Figure 2, Quadrant I characterized by high importance and high performance is labelled "Keep up the good work", and attributes that fall into this region are the sources of strength of the organization; Quadrant II characterized by high importance but low performance is labelled "Concentrate here", and attributes in this region are key areas that need to be improved first for higher customer loyalty and less customer loss; Quadrant III characterized by low importance and low performance is labelled "Low priority", and it is not necessary to allocate an excessive amount of resources to attributes in this region; Quadrant IV characterized by low importance but high performance is labelled "Possible overkill". Improving performance on attributes in this region will not lead to a substantial improvement in customer satisfaction, so a reduction of resources allocated to these attributes is suggested.

Figure 2
Importance-Performance Analysis Matrix



Source: Martilla et al., 1977

IPA is a helpful method for business managers, product designers, and product developers. The scales and positions of quadrants in the matrix can be configured depending on research issue (Martilla et al., 1977). According to Hollenhorst et al. (1992), the attributes can be more effectively differentiated when the overall mean of all the attributes is used as the divider.

Results

Sample characteristics

As shown in Table 1, the sample consisting of 235 responses and both genders are represented in almost equivalent proportions. Most of the respondents were in the age group of 21~30 years old, and respondents aged between 21~40 took up nearly 60% of the sample. Most of the respondents were students and reported to have a college/university education degree. As students were the majority of the

respondents, those with an average monthly income below NT$20,000 also constituted the largest group. The above statistics show that most of the respondents were young and highly educated. This sample composition supported the findings of previous research (Lohse et al., 2000; Roman, 2010; Christodoulides et al., 2013; Lu et al., 2013) indicating that most online consumers were younger and spent a longer time online in their daily life.

Table 1
Demographic variables

Demographic variables	Sample (N=235)
Gender	
Female	44.69%
Male	55.31%
Age (years)	
Below 20	38.76%
21-30	44.24%
31-40	15.30%
41 or above	1.70%
Occupation	
Employed	10.62%
Freelance	9.76%
Military, public, educational servants	4.22%
Housekeeper	0.85%
Business	20.45%
Agricultural	0.85%
Student	53.15%
Education degree	
Junior high or lower	0.39%
Senior / vocational high	4.69%
College / university	89.82%
Graduate school	5.10%
Monthly income (NTD)	
20000 or less	54.86%
20001-30000	23.43%
30001-40000	11.57%
40001-50000	6.77%
50001 or more	3.37%

Shopping habits

In order to examine if the respondents' Internet usage behaviour and online shopping habits would affect their responses to the questionnaire, we adopted the K-means method to describe the sample by usage of online shopping into two groups, one high and one low. K-means is a simple and effective statistical clustering technique, grouping a set of objects in ways that objects in the same cluster or group are more similar to each other than to those in other clusters or groups (MacQueen, 1967).

The high-usage group clustered by the K-means method consists of 53 observations, whereas the low-usage one consists of 182 observations. Table 2 shows the online shopping habits for the two groups. As can be seen from Table 2, the

differences between the two groups in average frequency of requesting delivery of meals or beverages per month, average frequency of shopping online, average frequency of ordering meals or beverages online per month, and average amount of dollars spent on online orders are significant. These differences confirmed that consumers' habits of online shopping would affect our IPA results.

Table 2
Online shopping habits

Online shopping habits	Group I*	Group II*
Frequency of requesting delivery of meals or beverages per month (times)		
5 times or fewer	64.2%	83.0%
6-10	22.6%	2.1%
11-20	9.4%	3.8%
21 or more	3.8%	1.1%
Daily usage of the Internet (hours)		
3 or fewer	26.4%	36.3%
4-6	47.2%	43.4%
7-9	11.3%	14.8%
10 or more	15.1%	5.5%
Average frequency of shopping online per month (times)		
3 or fewer	83.0%	91.2%
4-6	15.1%	7.1%
7-9	1.9%	1.1%
10 or more	0%	0.5%
Frequency of ordering meals or beverages online per month (times)		
5 or fewer		
6-10	96.2%	100%
11-20	1.9%	0%
21 or more	1.9%	0%
	0%	0%
Average amount of dollars spent on each order (NTD)		
100 or less	28.3%	100%
201-300	24.5%	0%
301 or more	47.2%	0%

* Group I: respondents with high-usage of online shopping; Group II: respondents with low-usage of online shopping

Results of the Importance-Performance Analysis

The quality of an analysis hinges on the quality of the questionnaire used to collect data for the analysis. To ensure accuracy and reliability of the analysis results, the questionnaire should be developed with good validity and reliability. Reliability is a measure of consistency, stability, and reliability. In this study, internal consistency of the questionnaire items was assessed by Cronbach's alpha. Table 3 shows the results of the reliability test and the descriptive statistics for the items of each scale.

Table 3
Reliability test and descriptive statistics

Constructs	Items	Score		Cronbach's a	
		I	P	I	P
System Quality	The functions of EZOrder	3.84	3.83	0.854	0.823
	EZOrder has a human-centered user interface	3.82	3.91		
	The overall order-processing efficiency of EZOrder	3.78	3.97		
	The correctness of menu information offered by EZOrder	3.78	4.13		
	EZOrder's system stability	3.65	4.03		
Content quality	The diversity of food categories offered by EZOrder	3.68	3.91	0.844	0.851
	The content of orders placed by EZOrder	3.64	3.89		
	The diversity of menu categories offered by EZOrder	3.62	3.88		
	The integrity of products ordered through EZOrder	3.60	4.01		
	The diversity of taste choices offered by EZOrder	3.66	3.90		
Use	EZOrder utilizes a simple operating procedure and is easy to use	4.00	4.15	0.781	0.811
	EZOrder allows customers to have a clear knowledge of its services	3.96	3.97		
	EZOrder allows customers to have a clear knowledge of services provided in each step of online ordering	3.80	3.84		
E-commerce customer satisfaction	The overall performance of EZOrder	3.81	3.95	0.903	0.857
	EZOrder assures faster processing of my orders during peak hours	3.97	4.17		
	EZOrder effectively improves mistakes that are common in orders placed by telephone	4.11	4.17		
	EZOrder effectively improves the diversity of choices for customers requesting large orders	4.12	4.17		
	EZOrder effectively improves the diversity of choices for customers requesting large orders	4.00	4.00		
	EZOrder offers more convenience than fax orders	4.04	3.91		
	EZOrder meets customers' expectations	3.81	3.91		
Trust	I trust the safety of placing orders on EZOrder	3.67	3.96	0.837	0.773
	The menu information offered by EZOrder is reliable	3.71	3.99		
	EZOrder assures security of consumers' order data (including personal data)	3.35	4.07		
	I trust the safety of all the transaction processes in EZOrder.	3.46	3.97		
Support and service	EZOrder offers information on how to use the system	3.51	3.86	0.860	0.830
	EZOrder offers order inquiry / tracking services	3.67	3.91		
	EZOrder has coping measures for special conditions	3.51	3.91		
	EZOrder offers customer service channels (e.g. a dedicated service line)	3.59	3.87		

Note: **I** stands for importance; **P** stands for performance.

As shown in Table 3, all the dimensions had a Cronbach's alpha above 0.7, suggesting high internal consistency. Validity is a measure of the effectiveness of the instrument in capturing the results of the research variables. Common validity indices include content validity, criterion-related validity, and construct validity. In this study, we assessed the content validity of the questionnaire items. As the entire

questionnaire items were developed based on related literature, an acceptable degree of content validity was ensured.

In this study, we performed IPA of consumer perception of the importance and performance of each attribute of EZOrder. By identifying weaker attributes of EZOrder that should be reinforced first, we hoped to help improve customer satisfaction and market competitiveness of this system.

As suggested by Hollenhorst et al. (1992), we used the overall means of importance and performance ratings as the dividers between the four quadrants. From the high-usage group, we obtained the mean importance level of 4.1 and the mean performance level of 3.74. Based on these two mean values, we divided the matrix into four quadrants to differentiate the attributes and generate suggestions for EZOrder (as shown in Table 4). Likewise, from the low-usage group, we obtained the mean importance level of 3.94 and the mean performance level of 3.76. Based on these two values, we divided the matrix into four quadrants to differentiate the attributes and generate suggestions for EZOrder (as shown in Table 5). By comparing results shown in Table 4 and Table 5, we obtained the following conclusions:

1. *Keep up the good work:* All the attributes that both groups of consumers placed in the quadrant of "high importance and high performance" belong to the "use" or the "e-commerce customer satisfaction" construct. These attributes include "EZOrder utilizes a simple operating procedure and is easy to use", "the overall system performance", "EZOrder assures faster processing of orders during peak hours", "EZOrder effectively improves mistakes that are common in orders placed by telephone", and "EZOrder effectively improves the diversity of choices for customers requesting large orders". However, the two groups had divergent opinions regarding to some attributes of EZOrder. For instance, in addition to the above attributes, the high-usage group placed "system stability" and "EZOrder offers more convenience than fax orders" in this quadrant; the low-usage group placed "the overall order-processing efficiency of EZOrder" and "the correctness of menu information offered by EZOrder" in this quadrant.
2. *Concentrate here:* For system designers or developers, attributes that fall into this quadrant are especially important. These attributes are perceived as very important, but the performance levels of these attributes are low. Our findings show that both groups agreed that "the content of online orders" and "the security of order data" should be improved with top priority. In addition to the above attributes, the high-usage group also placed "the correctness of menu information" and "the safety of all the transaction processes" in this quadrant; the low-usage group also placed "system stability" and "the reliability of menu information" in this quadrant.
3. *Low priority:* The two groups' views on many attributes of low priority overlapped. These attributes include "the diversity of meal categories", "the diversity of menu categories", "the integrity of products ordered through EZOrder", "the diversity of food choices", "the safety of placing orders on EZOrder", and all the items in the "support and service" construct. In addition to these attributes, the high-usage group also placed "the human-centered user interface" and "the reliability of the menu information" in this quadrant, and the low-usage group also gave "the safety of all the transaction processes" a low priority.
4. *Possible overkill:* The high-usage group found that EZOrder provides sufficient information on the system functions and the ordering procedure but perceived these two aspects as unimportant. The low-usage group suggested that "the human-centered user interface" may have been overly emphasized.

Table 4
Distribution of attributes and suggested strategies based on views collected from the high-usage group

Quadrant	Construct	Item
Quadrant I Keep up the good work	EC system quality	EZOrder's system stability
	Use	EZOrder utilizes a simple operating procedure and is easy to use
	E-commerce customer satisfaction	The overall performance of EZOrder
		EZOrder assures faster processing of my orders during peak hours
		EZOrder effectively improves mistakes that are common in orders placed by telephone
		EZOrder effectively improves the diversity of choices for customers requesting large orders
		EZOrder offers more convenience than fax orders
Quadrant II Concentrate here	EC system quality	The correctness of menu information offered by EZOrder
	Content quality	The content of orders placed by EZOrder
	Trust	EZOrder assures security of consumers' order data (including personal data)
		I trust the safety of all the transaction processes in EZOrder.
Quadrant III Low priority	EC system quality	EZOrder has a human-centered user interface
	Content quality	The diversity of food categories offered by EZOrder
		The diversity of menu categories offered by EZOrder
		The integrity of products ordered through EZOrder
		The diversity of taste choices offered by EZOrder
	Trust	I trust the safety of placing orders on EZOrder
		The menu information offered by EZOrder is reliable
	Support and service	EZOrder offers information on how to use the system
		EZOrder offers order inquiry / tracking services
		EZOrder has coping measures for special conditions
		EZOrder offers customer service channels (e.g. a dedicated service line)
Quadrant IV Possible overkill	EC system quality	The functions of EZOrder
		The overall order-processing efficiency of EZOrder
	Use	EZOrder allows customers to have a clear knowledge of its services
		EZOrder allows customers to have a clear knowledge of services provided in each step of online ordering
	E-commerce customer satisfaction	EZOrder meets my expectations

Table 5
Distribution of attributes and suggested strategies based on views collected from the low usage-group

Quadrant	Construct	Item
Quadrant I Keep up the good work	EC system quality	The overall order-processing efficiency of EZOrder
		The correctness of menu information offered by EZOrder
	Use	EZOrder utilizes a simple operating procedure and is easy to use
	E-commerce customer satisfaction	The overall performance of EZOrder
		EZOrder assures faster processing of my orders during peak hours
		EZOrder effectively improves mistakes that are common in orders placed by telephone
		EZOrder effectively improves the diversity of choices for customers requesting large orders
		EZOrder effectively improves the diversity of choices for customers requesting large orders
Quadrant II Concentrate here	EC system quality	EZOrder's system stability
	Content quality	The content of orders placed by EZOrder
	Trust	The menu information offered by EZOrder is reliable
		EZOrder assures security of consumers' order data (including personal data)
Quadrant III Low priority	Content quality	The diversity of food categories offered by EZOrder
		The diversity of menu categories offered by EZOrder
		The integrity of products ordered through EZOrder
		The diversity of taste choices offered by EZOrder
	Trust	I trust the safety of placing orders on EZOrder
		I trust the safety of all the transaction processes in EZOrder
	Support and service	EZOrder offers information on how to use the system
		EZOrder offers order inquiry / tracking services
		EZOrder has coping measures for special conditions
		EZOrder offers customer service channels (e.g. a dedicated service line)
Quadrant IV Possible overkill	EC system quality	The functions of EZOrder
		EZOrder has a human-centered user interface
	Use	EZOrder allows customers to have a clear knowledge of its services
		EZOrder allows customers to have a clear knowledge of services provided in each step of online ordering
	E-commerce customer satisfaction	EZOrder offers more convenience than fax orders EZOrder meets my expectations

Through IPA, we differentiated the 28 attributes of EZOrder based on perceptions of the two groups and obtained a foundation to devise coping measures. As shown in Table 6, the two groups had more divergent views on attributes in the "system quality" and "trust" constructs. Therefore, we suggest EZOrder system developers adjust the design of EZOrder depending on which group they target. For instance, if they consider the views of the high-usage group as more important, they can prioritize "the correctness of menu information" and "the safety of all the transaction processes" in their improvement of the system. If they view both groups as equally important, they can first improve the attributes placed in "Concentrate here" by

both groups, such as "the content of orders" and "the security of consumers' order data". Besides, if there are redundant resources, the system developers can allocate the resources to attributes that one group placed in the "Concentrate here" and the other placed in the "Low priority", such as "the safety of all the transaction processes". After these attributes, they could consider attributes that both groups placed in "Low priority". Attributes that one group placed in "Keep up the good work" or "Possible overkill" and the other group placed in "Concentrate here" or "Low priority" could be temporarily ignored.

Table 6
Comparison of distribution of attributes and suggested strategies between the two groups

Construct	Item	High usage of online shopping	Low usage of online shopping
System Quality	The functions of EZOrder	QIV	QIV
	EZOrder has a human-centered user interface	QIII	QIV
	The overall order-processing efficiency of EZOrder	QIV	QI
	The correct menu information offered by EZOrder	QII	QI
	EZOrder's system stability	QI	QI
Content quality	The diversity of food categories offered by EZOrder	QIII	QIII
	The content of orders placed by EZOrder	QII	QII
	The diversity of menu categories offered by EZOrder	QIII	QIII
	The integrity of products ordered through EZOrder	QIII	QIII
	The diversity of taste choices offered by EZOrder	QIII	QIII
Use	EZOrder utilizes a simple operating procedure and is easy to use	QI	QI
	EZOrder allows customers to have a clear knowledge of its services	QIV	QIV
	EZOrder allows customers to have a clear knowledge of services provided in each step of online ordering	QIV	QIV
E-commerce customer satisfaction	The overall performance of EZOrder	QI	QI
	EZOrder assures faster processing of my orders during peak hours	QI	QI
	EZOrder effectively improves mistakes that are common in orders placed by telephone	QI	QI
	EZOrder effectively improves the diversity of choices for customers requesting large orders	QI	QI
	EZOrder effectively improves the diversity of choices for customers requesting large orders	QI	QI
	EZOrder offers more convenience than fax orders	QI	QIV
	EZOrder meets customers' expectations	QIV	QIV
Trust	I trust the safety of placing orders on EZOrder	QIII	QIII
	The menu information offered by EZOrder is reliable	QIII	QII
	EZOrder assures security of consumers' order data (including personal data)	QII	QII
	I trust the safety of all the transaction processes in EZOrder.	QII	QIII
Support and service	EZOrder offers information on how to use the system	QIII	QIII
	EZOrder offers order inquiry / tracking services	QIII	QIII
	EZOrder has coping measures for special conditions	QIII	QIII
	EZOrder offers customer service channels (e.g. a dedicated service line)	QIII	QIII

Notes: QI: Keep up the good work; QII: Concentrate here; QIII: Low priority; QIV: Possible overkill

Conclusion

Cloud services have become a primary competitive model among modern businesses. In this model, the service provider offers a cloud infrastructure built on the Internet for businesses and consumers to provide and obtain services more instantaneously and at a lower cost. The success of a cloud service system depends largely on customer satisfaction. To better understand customers' needs, we designed a questionnaire based on ECS success model and administered the questionnaire to consumers who have used a cloud ordering system we developed. Later, we performed IPA of the collected data to capture their needs and generate suggestions for designers and developers of the system.

To validate the effectiveness of this method, we applied this method to a cloud ordering system. Like other studies, our empirical results found that the majority of online customers are younger who spends a long time online in their daily life. According to shopping habits, the online customers could be divided into two groups: The high-usage users and the low-usage one. As compared with the later, the former has higher frequency of requesting delivery of meals or beverages and higher amount of dollars spent on each order for each month. This research provides implications for practice. For both groups, the content of orders placed by the cloud ordering system, as well as assuring security of customer's order data, are the most important attributes that need to be improved first for higher customer loyalty and less customer loss. If the group of high usage users is the one the system developers target, more managerial attention will be required to provide correct menu information. If the group of low usage users is the one the system developers target, additional managerial attention to increase the trust of safety for all of the transaction process will be required.

The empirical study has limitations that can be addressed in the future research. First, this study identified critical factors for cloud ordering system success by integrating the IPA and Molla & Licker ECS success model. As a result, system quality, information quality, user satisfaction, and service quality have been taken into account for assessing the success of cloud ordering system. However, the dimension such as perceived value based on marketing literature has not been explored in this study. Further research would be required to include the marketing dimension to reassess the cloud ordering system success. Second, this study was conduct with a snapshot research approach. Additional research efforts are needed to evaluate the validity of the research results. Longitudinal research might be helpful to enhance our understanding the critical factors for a more successful cloud services system. Finally, this study has limitations stemming from the facts that large proportion of students is in the sample, and only one country is included. Further research may require data gathered from a widespread sample of respondents to increase the generalizability of the results.

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About the authors

Yan-Kwang Chen is currently a Professor in the Department of Distribution Management at National Taichung University of Science and Technology, Taiwan. His teaching and research interests include production planning, supply chain management, and decision-making problems. The author can be contacted at: **ykchen@nutc.edu.tw**

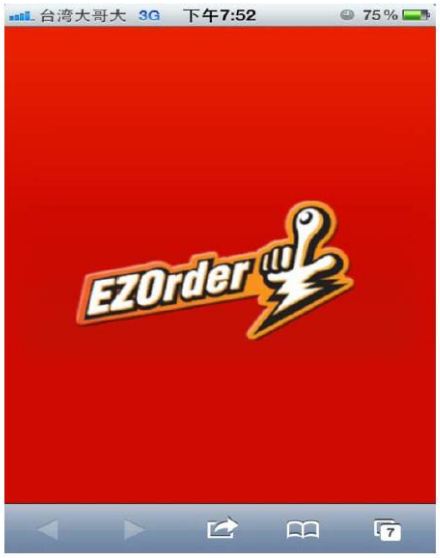
Fei-Rung Chiu is currently an Assistant Professor in the Department of Hotel and M.I.C.E Management at Overseas Chinese University, Taiwan. Her teaching and research interests include Information System Management In Hotel, Service Business Management, and Hotel Management. The author can be contacted at: **frchiu@ocu.edu.tw**

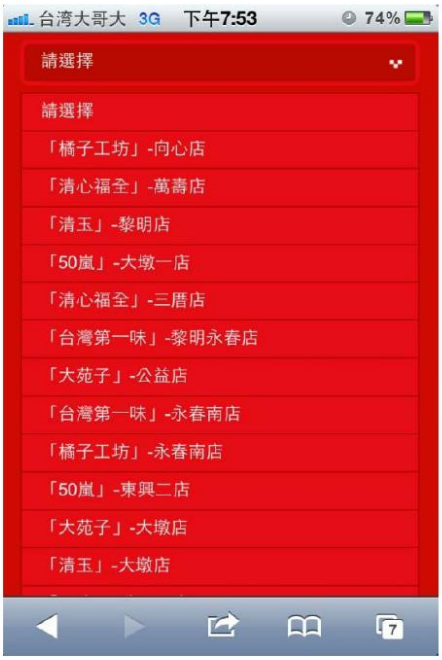
Yi-Ju Chen received her MS in Distribution Management from National Taichung University of Science and Technology, Taiwan. She is currently a project manager in MID Technologies Co., Ltd. The author can be contacted at: **rollrabbit@gmail.com**

Cheng-Yi Wang is currently a PhD student in Institute of Technology Management, National Chung Hsing University, Taiwan. He is also a senior consultant in MID Technologies Co., Ltd. The author can be contacted at: **rockytallen@gmail.com**

Appendix

Appendix A. The ordering process of EZOrder (on iPhone)

Step 1: Enter the log-in page of EZOrder	Step 2: Choose product category
	
Step 3: Select location	Step 4 (1): Choose the store
	

Step 4 (2): Choose the branch of the store	Step 5 (1): Choose items to buy
	
Step 5 (2): Choose details for the item	Step 6: Confirm order and fill in buyer data
	

Step 7 (1): Confirm before sending the order	Step 7 (2): Confirm acceptance of the order
	

Appendix B. Items for IPA

EC System Quality

Content Quality

- The diversity of food categories offered by EZOrder
- The content of orders placed by EZOrder
- The diversity of menu categories offered by EZOrder
- The integrity of products ordered through EZOrder
- The diversity of taste choices offered by EZOrder

Use

- EZOrder utilizes a simple operating procedure and is easy to use
- EZOrder allows customers to have a clear knowledge of its services
- EZOrder allows customers to have a clear knowledge of services provided in each step of online ordering

E-commerce Customer Satisfaction

- The overall performance of EZOrder
- EZOrder assures faster processing of my orders during peak hours
- EZOrder effectively improves mistakes that are common in orders placed by telephone
- EZOrder effectively improves the diversity of choices for customers requesting large orders
- EZOrder effectively improves the diversity of choices for customers requesting large orders
- EZOrder offers more convenience than fax orders
- Overall, EZOrder meets my expectations

Trust

- I trust the safety of placing orders on EZOrder
- I trust the menu information offered by EZOrder
- I trust the data (including personal data) protection mechanisms used by EZOrder
- I trust the safety of all the transaction processes in EZOrder

Support and Service

- EZOrder offers information on how to use the system
- EZOrder offers order inquiry / tracking services
- EZOrder has coping measures for special conditions
- EZOrder offers customer service channels (e.g. a dedicated service line)