# The Continuous Service Usage Intention in the Web Analytics Services

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**Abstract**

*The World Wide Web (WWW) has continued to grow at very rapid speed in both the sheer volume of traffic and size and the complexity of Web sites. Web Analytics Industry also has been growing rapidly. Web Analytics is to analyze web log files to discover accessing patterns of web pages. In this paper, we identify factors which can affect the continuous usage intention of a firm using services in web analytics services and empirically validate the relationships between the identified factors. For this purpose, we analyze 174 Korea firms. The analysis results show that the satisfaction is significantly associated with service quality and switching cost and the service usage period is not significantly associated with continuous service usage intention. We measure the service quality using SERVQUAL. It turn out that two dimensions of SERVQUAL, reliability and empathy are significantly associated with satisfaction, but another dimension of SERVQUAL, responsibility, is not. Finally, satisfaction is significantly associated with continuous service usage intention.*

**Keywords:** web, Web Analytics Services, Servequal

## 1. Introduction

The World Wide Web (WWW) has continued to grow at very rapid speed in both the sheer volume of traffic and size and complexity of Web sites. Also, E-business model (B2B, B2C) based on World Wide Web been changed and grown. As the technology of WWW has improved, the complexities of tasks such as web site design, web server design, and of simply navigating through a web site have increased along with this growth. The Gartner Group (2001) reports that the worldwide B2B e-commerce market size would increase from $433 billion in 2000 to $8,500 billion in 2005. As the B2B e-market has been rapidly expanding, many researchers have conducted their researches on B2B e-market related issues. Sculley & Woods (2000) state that the unique feature of a B2B exchange is that it brings many buyers and sellers together in one central virtual market space and enables them to buy and sell from together at a dynamic price that is determined by the exchange rules. Kaplan & Sawhney (2000) define the landscape for B2B marketplaces along two key characteristics: product use and procurement method. Lucking-Reiley & Spulber (2001) identify three types of B2B exchanges. Reuters (2003) estimates that the market for web analytics is worth $520 million in 2001 but will quickly grow to over $4 billion by 2005. Web analytics services are services of data mining techniques to large web-data repositories in order to produce results that can be used in management, web-design, and so on. Web analytics service are about to enter on growth period and many service providers are facing some stiff competition from its competitor. So, many service providers have trouble in holding their customers, because there is no barrier in changing partner A ratio of changing a service provider is highly increasing.

The purpose of this study is to identify factors which may affect the continuous usage intention of the firms using web analytics services and examine the relationship among the identified factors.

## 2. Theoretical Background

### 2.1 Web Analytics

According to the Wikipedia, web analytics is the study of online behavior in order to improve it. There are two categories; off-site and on-site web analytics. Off-site web analytics refers to web measurement and analysis irrespective of whether you own or maintain a

website. On-site web analytics measure a visitor's journey on your website once. Web analytics is to reveal the knowledge hidden in the log files on one or more websites. The goal is to capture, model, and analyze the behavioral patterns and profiles of users interacting with a website. Web analytics uses the secondary web data such as web server access logs, proxy server logs, browser logs, user profiles registration data, user sessions or transactions, cookies, user queries, bookmark data, mouse clicks and scrolls, and any other data generated by the interaction between users and the web. The discovered patterns are usually represented as collections of pages, objects, or resources that are frequently accessed by groups of users with common needs or interest.

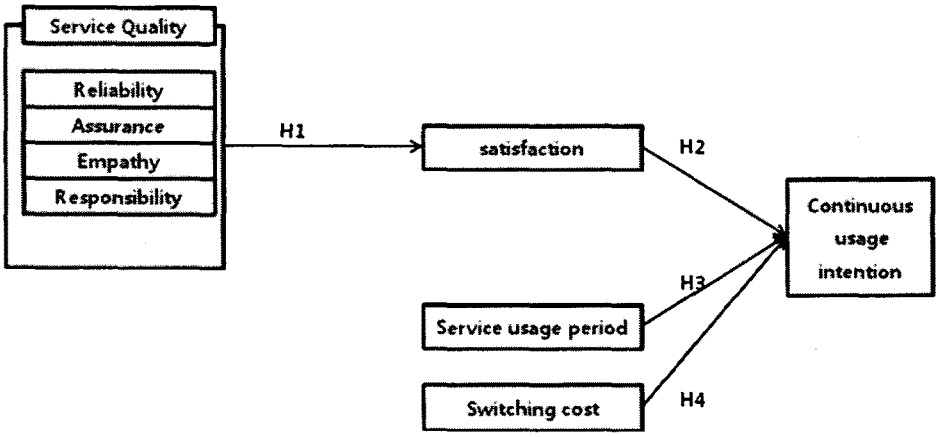
Up to now, many researchers have taken an interest in web analytics. Cooley et al. (1997; 2000) do in-depth research to all the procedure of web usage mining. They discuss methods to pre-process the user log data and t separating web page references into those made for navigational purposes and those made for content purposes. Ramli (2005) explores the use of web usage mining techniques to analyze web log records collected from e-learning portal using apriori algorithm. Drott (1998) explains the various web server logs mining methods that could be used to improve site design. Sarukkai(2000) has discussed about link prediction and path analysis for better user navigations. He propose a Markov chain model to predict the user access pattern based on the user access logs previously collected.

### 2.2 Service Quality and Satisfaction

Based on extensive series of focus group interviews, Parasuraman et al. (1985) argue that service quality is founded on a comparison between what the customer feels should be offered and what is provided. Other marketing researchers also support the notion that service quality is the discrepancy between customers' perceptions and expectations. Parasuraman and his colleagues (Parasuraman et al., 1985; 1988) assert that service quality could be assessed by measuring customers' expectations and perceptions of performance levels for a range of service attributes. They suggest SERVQUAL with five dimensions (tangibles, reliability, responsiveness, assurance, and empathy) that are used by customers when evaluating service quality, regardless of the type of service. In addition, Pitt et al. (1995) propose the use of the SERVQUAL instrument from marketing (Parasuraman et al., 1985; 1988) to operationalize the IS service quality construct. They propose modification of the wording of the instrument to better accommodate its use in the context. They conclude that SERVQUAL is proper to assess service quality.

Kettinger & Lee (1997), for IS services, suggest four dimensions of SERVQUAL, excluding tangibles out of the original five dimensions proposed by Pitt et al. (1995) and Parasuraman et al. (1985; 1988) since most IS services are requested, not by a visit to the department of IS, but rather by sending mail, phoning, or by visiting a web site. As a result, the tangibles of an IS department is not important to the user of information. Service quality of transactions, likewise, in the web analytics services can be measured by four dimensions of SERVQUAL: (1) reliability, (2) responsibility, (3) assurance, and (4) empathy.

Although service quality and satisfaction are closely correlated, their concepts may be clearly separated (Bitner et al., 1994). Cronin & Taylor (1992) validate that service quality is a preceding variable of satisfaction from their research. As a consequence, it is possible that service quality is measured by SERVQUAL, which has an affirmative effect on satisfaction.



[Table 1] Operational Definitions and Measures of the Variables

| Variable | | Operational definition | Source |
|---|---|---|---|
| Service Quality | Empathy | Caring, individualized attention the service provider gives its customers | Parasuraman et al. Pitt et al. Kettinger & Lee |
| | Reliability | Ability to perform the promised service dependably and accurately | |
| | Assurance | Knowledge and courtesy of employees and their ability to inspire trust and confidence | |
| | Responsiveness | Willingness to help customers and provide prompt service | |
| Switching cost | | Switching cost which occurs by changing of an service provider | Jones Jones et al. |
| Service usage period | | Period of using service | transform into natural logarithm |
| Satisfaction | | Degree of sufficiency for using service compared to expectation | Rusbult |
| Continuous service usage intention | | Intention through the service satisfaction | Oliver McDougall & Levesque |

## 3. Research Model & Hypotheses

### 3.1 Operationalization of Research Variables

Operational definitions and measurement of the research variables are provided in Table 1. We developed outcome variables based on relevant literature. Those variables were measured by a seven-point Likert scale (1=strongly disagree, 7=strongly agree). Switching cost items were developed based on marketing research such as Jones (1998). Measurement of service quality came from studies such as Pitt et al. (1995; 1997; 1998) and Parasuraman et al. (1985; 1988). Since IS service uitilizes mail, phone, or website instead of directly visiting IS department, we measured the four dimensions of SERVQUAL (Kettinger & Lee, 1997): (1) reliability, (2) responsibility, (3) assurance, and (4) empathy. Satisfaction items were developed based on Rusbult et al. (1982, 1988). The service usage period was measured by natural logarithm. The measurement of continuous usage intention was developed based on Oliver's (1997) as well as McDougall & Levesque's (2000).

H-1: Service quality has an effect on service client firm's satisfaction.

H-1a: Reliability has an effect on service client firm's satisfaction.
H-1b: Responsibility has an effect on service client firm's satisfaction.
H-1c: Empathy has an effect on service client firm's satisfaction.

[Table 2] Sample Characteristics

| Measure | | Frequency | Percentage |
|---|---|---|---|
| Sales | under $1million | 29 | 16.67 |
| | from $1million to $5million | 54 | 31.03 |
| | from 5million to $10million | 72 | 41.38 |
| | over $10million | 19 | 10.92 |
| Respondent's Position | CEO | 31 | 17.82 |
| | CIO | 60 | 34.48 |
| | Department Manager | 59 | 33.91 |
| | Department Chief | 24 | 13.79 |
| Total | | 174 | 100% |

H-1d: Assurance has an effect on service client firm's satisfaction.

H-2: Service client firm's satisfaction has an effect on service client firm's continuous usage intention.

H-3: Service client firm's service usage period has an effect on service client firm's continuous usage intention.

H-4: The service client firm's switching cost has an effect on service client firm's continuous usage intention.

## 4 Research Method

### 4.1 Data Collection

The instruments of the study were developed based on the relevant literature and the results of prior interviews with the leaders of the web analytics company in Korea. A pilot test was conducted with 25 firms used by the web analytics service provider, "Acecounter" in Korea. We installed a Web-based questionnaire system within the Acecounter.com site in December 2006. In total, 203 firms participated in the web-survey during a three weeks' period. We, however, discarded 29 cases with a lack of consistency in the answers of the companies, and finally 174 cases were used for the analysis.

### 4.2 Analysis and Testing

#### 4.2.1 Reliability and Validity

The internal consistency reliability of the variables was assessed by computing Cronbach's alphas. The Cronbach's alpha values of all the variables, ranging from 0.795 to 0.900, were well over 0.700, which can be considered satisfiable (Nunally, 1978). Reliability and assurance which were expected to be served a indepentdent factors of service qaulity were grouped into a singular factor by a factor analysis. We, then, renamed the factor as Reliability.

Each variable was measured by multiple items, so a factor analysis was conducted to check their uninten-

[Table 3] Factor Analysis Results for Independent Variables

| | Component | | | | | Cronbach's α |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| REL2 | .774 | .237 | .157 | .296 | .120 | .890 |
| REL1 | .697 | .312 | .106 | .082 | .135 | |
| REL3 | .691 | .269 | .180 | .248 | .048 | |
| ASU2 | .666 | .328 | .115 | .352 | .274 | |
| ASU1 | .638 | .431 | .103 | .266 | .256 | |
| RES2 | .216 | .877 | .094 | .157 | .100 | .900 |
| RES1 | .278 | .787 | .039 | .186 | .147 | |
| RES3 | .329 | .759 | .135 | .099 | .241 | |
| RES4 | .309 | .734 | .146 | .176 | .123 | |
| SWC2 | .263 | .074 | .778 | .115 | .065 | .846 |
| SWC3 | .091 | .058 | .772 | .030 | .117 | |
| SWC4 | -.092 | .140 | .772 | .070 | -.005 | |
| SWC1 | .265 | .034 | .763 | .042 | .133 | |
| SWC5 | .052 | .074 | .740 | .135 | .137 | |
| SAT2 | .134 | .100 | .101 | .819 | .067 | .851 |
| SAT3 | .334 | .210 | .114 | .788 | .083 | |
| SAT1 | .465 | .234 | .149 | .692 | .170 | |
| EMP4 | .067 | .106 | .146 | .022 | .836 | .795 |
| EMP5 | .432 | .230 | .192 | .153 | .694 | |
| EMP3 | .202 | .406 | .182 | .415 | .547 | |
| EMP2 | .158 | .325 | .087 | .431 | .457 | |
| Eigenvalue | 9.031 | 2.481 | 1.361 | 1.131 | .922 | |
| Percentage of Variance Explained | 43.005 | 11.815 | 6.480 | 5.385 | 4.389 | |
| Cumulative Percentage | 43.005 | 54.820 | 61.300 | 66.685 | 71.075 | |

tionality. Most of the factor loadings for the items appeared above 0.6. The items were well grouped corresponding to each singular factor, which demonstrates a high convergent validity. As the factor loadings for a variable (factor) were greater than the factor loadings for the other variables, it supported the instrument's discriminant validity (Chin, 1998).

All the eigenvalues of the each factor were all greater than 1.000 and the five derived factors explained were above 70% of the total variance. It implied that the reliability and validity of research variables were all acceptable.

#### 4.2.2 Hypothesis Testing

Table 4 shows the results of the multiple regression analysis, testing the six hypotheses. The results indicate that the two regression models were significant at the $p<0.01$ level (F-value=49.420, 60.781). Also, the predictors of each model explained 45% and 50% of the total variance, respectively. In hypothesis H-1, the reliability and empathy were significantly related to the satisfaction ($\beta=0.525$, $p<0.01$; $\beta=0.197$, $p<0.01$).

However, the responsibility was not significantly related to the satisfaction. Hypothesis H-1$^b$ was not one of the supported hypotheses, while both H-1$^a$ and H-1$^c$ were supported. In hypothesis H-2, the satisfaction was significantly related to continuous usage intention ($\beta=0.677$, $p<0.05$), but the service usage period and switching cost was not significant. Therefore, neither Hypothesis H-3 nor H-4 was supported.

## 5. Discussion and Conclusion

### 5.1 Discussion and Implications

The purpose of this study is to understand the continuous service usage intention in web analytics services. service usage period and switching costs which have been considered as important varibables in the areas of organization, strategy, and marketing. Results and implications of the findings are:

First, the continuous usage intention in web analytics services was significantly and positively associated with the satisfaction. This implies that web analytics services satisfaction would be important factor. Improving a service quality of web analytics helps service providers hold their customers.

The satisfaction is significantly associated with the-continuous service usage intention. When there are multiple service providing firms or the service of the existing partner is unsatisfied, service client firms may actually consider "exit."

Second, the switching cost was not related to the continuous service intention. The reason for this is not hard to see: it is because the switching cost which may cause sunk cost or continuality cost is not important for service clients, which implies that in Korea, web analytics service markets are not mature yet. However, we might find a clue for interpretation in that, generally, there is little investment on the transaction-specific asset between two firms in the case of web analytics services. In addition, the service usage period was not significantly related to continuous service intention. The main reason may be related to the factor that the service usage period of the firms which participated in this survey was not more than two years. A maximum of two years may be not enough to affect the continuous service intention.

Third, the two dimensions of service quality, reliability and empathy, were significantly associated with satisfaction while responsibility was not. The responsibility may be a mandatory or a prior condition in web analytics services rather than service quality itself.

**[Table 4] Results of Hypotheses Tests**

| Model | $R^2$ | adj. $R^2$ | F | Standardized coefficient (β) | |
|---|---|---|---|---|---|
| **(1) Satisfaction (SAT)** | | | | | |
| **SAT = REL+RES+EMP+errors** | 0.466 | 0.456 | 49.420*** | | |
| **REL** | | | | 0.525*** | O (H1a) |
| **RES** | | | | 0.021 | X (H1b) |
| **EMP** | | | | 0.197** | O (H1c) |
| **(2) Continuous Usage Intention (CUI)** | | | | | |
| **CUI = SAT+SWC+SUP+errors** | 0.518 | 0.509 | 60.784*** | | |
| **SAT** | | | | 0.677*** | O(H2) |
| **SWC** | | | | 0.105 | X(H3) |
| **SUP** | | | | -0.014 | X(H4) |

** $p < 0.05$, ***$p < 0.01$

To predict continuous usage intention of the client firms, we adopted the three variables, satisfaction

### 5.2 Study Limitations and Future Research Directions

In spite of the research implications, there are some limitations in this study.

First, since the survey participant firms' service usage period is relatively short (average is two years), the service usage period may not be related to the dependency. Thus, to overcome the limitation, future research should include firms with long periods of using services.

Second, the cross-sectional data collection is limited to our findings: For example, satisfaction is generally created and accumulated over a long period of time. Therefore, a longitude study might be required in the future research.

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