



# A Meta-analysis of the Relationship between Mediator Factors and Purchasing Intention in E-commerce Studies

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## Abstract

Meta-analysis is a statistical integration method that delivers an opportunity to overview the entire result by integrating and analyzing many quantitative research results. This study will find meaningful mediator variables for criterion variables that affect purchase and repurchase intentions in e-commerce, on the basis of the results of a meta-analysis. We reviewed a total of 114 e-commerce studies published in Korean journals between 2000 and 2014, where a cause and effect relationship is established between variables that are specified in the conceptual model of this study. In this meta-analysis, the path between trust and purchase intention showed the biggest effect size. The second biggest effect size was found in the path between commitment and purchase intention, while the smallest one was obtained with perceived. Thus, we present the theoretical and practical implications of these results and discuss the differences among these results through a comparative analysis with previous studies.

**Index Terms:** E-commerce, Meta-analysis, Purchase intention, Satisfaction, Trust

## I. INTRODUCTION

Currently, with the development of information and communication technology (ICT) along with the proliferation of the Internet culture, Internet-based e-commerce has matured and is showing a steady growth trend. As a result, a wide variety of Internet-based business models have emerged. These changes in Internet-based e-commerce have also brought considerable changes in the operation processes, customer communications, and transaction systems of various companies. In 2014, the e-commerce market was expected to have grown to 1 trillion dollars. The competition in the e-commerce market is becoming fierce between industries, as well as within the industry. Recently,

the businesses and business (B2B), business and consumer (B2C), and consumer and consumer (C2C) sectors have started using e-commerce. In addition, m-commerce based on cell phones and smartphones is growing rapidly.

On the other hand, a study on the factors related to new products and services that affect potential buyers and induce them to choose these products and services is a very essential and interesting topic to researchers. This can be attributed to the belief that when companies and service providers launch new products and services, they can imprint important factors and remove the concerns of the consumer in order to speed up the adoption and diffusion of these products and services. Further, an analysis of the current customers' awareness on products and services is

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helpful to effectively forecast future demands of these products and services. This study will find meaningful mediator variables for criterion variables that affect purchase and repurchase intentions in e-commerce, on the basis of the results of a meta-analysis. In addition, the purpose of this study is a comparative analysis with similar previous studies, in the meta-analysis.

## II. PREVIOUS RESEARCH

Previous e-commerce research in Korea is mainly focused on online shopping malls and related topics. With the development of ICT and wireless communication technology, the environment of e-commerce is moving from being Internet-based to being cellphone and smartphone based. This movement has promoted active research on e-commerce in the mobile environment.

In previous e-commerce research, researchers studied various combinations of mediator variables to examine their effect on purchase intention, depending on the objectives and directions of the studies. The top mediator variable adopted by many researchers was the trust factor, followed by the satisfaction factor. Further, we could find that many other previous studies on the purchase intention model adopted the factors of both trust and satisfaction.

Many researchers adopted the loyalty factor as the third most important mediator variable. Further, factors of perceived value, attitude, and commitment were adopted to build their models. In general, many re-searchers preferred to combine these mediator variables to build their models, instead of employing these factors independently. Other researchers adopted factors of perceived risk, usefulness, ease of use, playfulness, involvement, and word-of-mouth and discredit. Hence, in this study, we constructed a conceptual model to find meaningful factors that affect purchase intention in e-commerce research, as shown in Fig. 1.

To determine the effect of the abovementioned factors on purchase intention, we selected a few studies from the field of e-commerce. In [1], Joh stated that the excellent quality of agricultural products satisfies consumers and increases the trust of the shopping mall, and eventually connects consumers to purchase intention. In [2], the author identified that the satisfaction factor has positive effects on trust, repurchase intention, and positive viral marketing. In [3], the authors revealed that mediator variables of e-satisfaction and e-loyalty have significant effects on repurchase intention.

After reviewing 72 previous domestic and foreign studies in a meta-analysis on online trust, Baek [4] reported that the effect size of a weighted mean between trust and purchase intention is  $r = 0.566$  and has an explanatory power of 32% on the dependent variable, purchase intention. The study of Nam et al. [5], which is a review of 28 Korean studies on behavioral intention for information technology, revealed

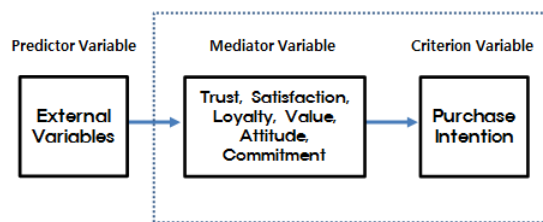


Fig. 1. Conceptual model.

that the effect size of a weighted mean between attitude and action intention is  $r = 0.571$  and has an explanatory power of 33% on the dependent variable, action intention. However, no meta-analyses that propose other mediator variables for the conceptual model of our study were published in Korea.

## III. META-ANALYSIS

Meta-analysis is a statistical integration method that provides an opportunity to overview the entire result by integrating and analyzing many quantitative research results [5]. Meta-analysis is sometimes expressed as an analysis of another analysis. Meta-analysis is quantitative, so we use the summary statistics through simple data integration. Further, by calculating the effect size, researchers can convert results of studies where different scales and methods are used, into common units and thus, can integrate and compare these results. Moreover, a generic conclusion can be drawn through a meta-analysis. In addition, a small difference between studies can be neglected for generalization even when different effect sizes are used [6].

This study investigated e-commerce studies published in Korean journals between 2000 and 2014, where a cause and effect relationship is established between the dependent variable, purchase intent, and other variables of trust, satisfaction, loyalty, perceived value, attitude, and commitment. Social science research paper data-bases, including KISS, DBpia, and RISS, were searched to find relevant Korean journal papers, with the key-words of 'e-commerce purchase intention,' 'online purchase intention,' and the 'Internet shopping purchase intentions.' Search results displayed a total of 792 papers, including 570 papers through RISS, 118 papers through DBpia, and 104 papers through KISS. Only 150 papers out of these 792 well expressed the cause and effect relationships between purchase intention and mediators. From this pool, 114 papers that met the conditions of the conceptual model of this study were selected and analyzed for the final meta-analysis.

The homogeneity test in the meta-analysis was performed on these research subjects to find that the effect sizes of multiple independent studies are values extracted from the same population. The null hypothesis for the statistical

**Table 1.** Results of homogeneity test

Path	<i>Q</i>	<i>df</i>	<i>p</i> -value
TRU → PIT	1364.9	51	0.000
SAT → PIT	1218.4	45	0.000
LOY → PIT	300.1	15	0.000
VAL → PIT	17.4	4	0.000
ATT → PIT	536.1	17	0.000
COM → PIT	187.8	5	0.000

Q: Q statistics, df: degree of freedom, TRU: trust, PIT: purchase intention, SAT: satisfaction, LOY: loyalty, VAL: value, ATT: attitude, COM: commitment.

homogeneity test is that there is no difference in the estimated effect sizes of the individual study results. Therefore, if the null hypothesis is proved, we can perform a meta-analysis to obtain estimates of the overall effect size by incorporating effect size estimates. The interpretation of the homogeneity test is based on a chi-square distribution for the test statistic, *Q* value, since the *Q* value is equal to the chi-square distribution. The results of the homogeneity test conducted in this study are presented in Table 1.

*Q* values from paths between TRU → PIT, SAT → PIT, LOY → PIT, VAL → PIT, ATT → PIT, and COM → PIT are 1364.9, 1218.4, 300.1, 17.4, 536.1, and 187.8, respectively. When the degrees of freedom are 51, 46, 15, 4, 17, and 5, the limit values of the chi-squared distribution become 67.50, 67.50, 25.00, 9.49, 27.59, and 11.07, respectively, where *p* = 0.05. Since the *Q* values are larger than the limit values, the null hypothesis of homogeneity is rejected. Thus, we can establish an estimation that these are extracted from a heterogeneous population, rather than the same population. This explains that the distribution of effect sizes in all paths exceeds the standard error. In this heterogeneous case, we calculate the average effect size by using calibrated inverse variance weighting values with the random-effects model, not the fixed-effects model [7, 8]. In [9], the author proposed a method to interpret the effect size, where *ESr* ≤ 0.10 is defined as a small effect size; *ESr* = 0.25, a medium effect size; and *ESr* ≥ 0.40, a large effect size.

The most problematic issue of integrating studies for the meta-analysis is the one related to study bias where unpublished papers were integrated with published papers into this study sample. Unpublished papers cover cases in which researchers may commit errors with insignificant research results, miss the right time of publication, and/or not meet the screening requirements of the reviewers. These problems are called publication bias, or the file drawer problem, and are explained to commit Type I mistakes [10]. This implies that papers published in journals have a high likelihood of positive results as compared to unpublished papers.

In the meta-analysis, we review the validity of the research by checking the deflection possession through the stability factor, or the concept of fail-safe *N*. In particular,

**Table 2.** Results of calculation of fail-safe number

Path	<i>N</i>	<i>d</i>	<i>Nfs</i>	<i>dc</i>
TRU → PIT	52	0.537	87.6	
SAT → PIT	47	0.542	80.4	
LOY → PIT	16	0.380	14.4	0.2
VAL → PIT	5	0.370	4.3	
ATT → PIT	17	0.476	23.5	
COM → PIT	6	0.536	10.1	

*N*: number of studies, *d*: effect size, *Nfs*: number fail-safe, *dc*: determination coefficient.

the stability factor or fail-safe *N* is the number of necessary studies to flip the significant findings into insignificant findings [8]. If the stability factor is 10, for example, the findings can be changed to a low effect size when 10 papers of effect size 0 are added. When fail-safe *N* is greater or the number of added papers is large, we can conclude that the consolidated treatment effect through a meta-analysis is true unless there is a sufficient number of unfound or unpublished papers. Based on the theory above, the results calculated using the medium effect size suggested by Cohen [9] are represented in Table 2. Therefore, any problem of publication bias is not found in any of the considered paths.

#### IV. CONCLUSIONS

The purpose of this study is to classify and re-analyze the results of previous studies, which contain cause and effect relationships between trust and purchase intention, satisfaction and purchase intention, loyalty and purchase intention, perceived value and purchase intention, attitude and purchase intention, and commitment and purchase intention with respect to e-commerce. In this study, were viewed a total of 114 e-commerce research papers published in Korean journals between 2000 and 2014, where a cause and effect relationship is established between the variables specified in the conceptual model of the present study. Based on information from these literature reviews, paths presented in the conceptual model of this study are converted to values of average effect size by using calibrated inverse variance weighting values and a random-effects model, as shown in Appendix.

After considering the meta-analysis results in detail, first, we concluded that the path between satisfaction and purchase intention had the largest effect size of (*r* = 0.542). Therefore, it is clear that the satisfaction factor is the antecedent of the purchase intention factor and shows an explanatory power of 30%. However, a comparative analysis is not possible since there is no prior meta-analysis research on the satisfaction factor, but a prior empirical analysis proved that the satisfaction factor is a significant factor in e-commerce.

Next, the effect size in the path between trust and purchase intention is ( $r = 0.537$ ), similar to the satisfaction factor. The trust factor is also an antecedent of the purchase intention factor and shows an explanatory power of 29%, similar to the effect size of the satisfaction factor. This result is close to that obtained by Baek [4]. Thus, we can infer that the user satisfaction with respect to e-commerce also increases the purchasing intention behavior. The effect size of the next path between commitment and purchase intention is  $r = 0.536$ , similar to the trust factor. The commitment factor is also the antecedent of the purchase intention factor and shows an explanatory power of 29%, similar to the trust factor. Further, no previous meta-analysis research on the commitment factor was found. However, it is proved clearly that the commitment factor is another significant factor in e-commerce. Next, the effect size of the path between attitudes and purchase intention is  $r = 0.476$  and shows an explanatory power of about 23%. This result is lower than the effect size of  $r = 0.571$  obtained by Nam et al. [5], but the result of [5] is based on 5,937 samples from 18 studies. The attitude factor is used primarily as an antecedent of the action attitude in the technology acceptance model and found in many studies that deal usage intention on information technology.

Finally, with a small number of studies, the effect size in the path between loyalty and purchase intention is  $r = 0.380$  and that between perceived value and purchase intention is  $r = 0.370$ ; both show an explanatory power of about 15%. In conclusion, even though we failed to perform comparative analyses with other variables presented in the conceptual model of this study but not studied in previous meta-analysis studies, the result of the study is significant in that we can estimate effect sizes on the basis of paths. We expect that the results of by this study would be touchstones to researchers in similar studies.

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**APPENDIX**

Trust → Purchase Intention								
No.	Sample	Fish-Z	Corr	L-L	U-L	Z-v	P-v	Q
2	248	0.730	0.623	0.540	0.694	11.425	0.000	59.645
6	302	0.292	0.284	0.177	0.385	5.050	0.000	59.645
7	293	0.179	0.177	0.064	0.286	3.046	0.002	59.645
9	227	0.345	0.332	0.211	0.443	5.165	0.000	59.645
10	152	0.942	0.736	0.653	0.801	11.495	0.000	59.645
15	128	0.499	0.461	0.312	0.588	5.574	0.000	59.645
17	300	0.460	0.430	0.333	0.518	7.926	0.000	59.645
18	312	0.725	0.620	0.547	0.684	12.744	0.000	59.645
19	556	0.840	0.686	0.639	0.728	19.762	0.000	59.645
20	223	0.852	0.692	0.617	0.755	12.634	0.000	59.645
21	218	0.676	0.589	0.495	0.669	9.914	0.000	59.645
22	177	0.434	0.409	0.278	0.525	5.730	0.000	59.645
23	170	0.500	0.462	0.335	0.573	6.459	0.000	59.645
24	307	0.669	0.584	0.505	0.653	11.656	0.000	59.645
25	222	0.877	0.705	0.632	0.766	12.981	0.000	59.645
30	244	0.367	0.351	0.236	0.456	5.691	0.000	59.645
39	288	0.121	0.120	0.004	0.232	2.036	0.042	59.645
40	277	0.549	0.500	0.406	0.583	9.093	0.000	59.645
41	250	0.881	0.707	0.639	0.764	13.849	0.000	59.645
42	410	0.241	0.236	0.142	0.325	4.853	0.000	59.645
48	307	0.852	0.692	0.629	0.746	14.851	0.000	59.645
49	232	0.510	0.470	0.363	0.565	7.719	0.000	59.645
55	205	0.639	0.564	0.463	0.651	9.077	0.000	59.645
57	140	2.029	0.966	0.953	0.976	23.745	0.000	59.645
58	460	0.560	0.508	0.437	0.573	11.972	0.000	59.645
62	454	0.513	0.472	0.397	0.541	10.887	0.000	59.645
67	304	0.531	0.486	0.395	0.567	9.209	0.000	59.645
71	257	1.221	0.840	0.800	0.873	19.462	0.000	59.645
72	787	0.370	0.354	0.291	0.414	10.360	0.000	59.645
73	276	0.192	0.190	0.074	0.301	3.178	0.001	59.645
77	307	0.307	0.298	0.192	0.397	5.358	0.000	59.645
78	210	0.807	0.668	0.586	0.737	11.612	0.000	59.645
79	307	0.617	0.549	0.466	0.623	10.757	0.000	59.645
84	212	0.189	0.187	0.054	0.314	2.736	0.006	59.645
86	392	0.156	0.155	0.057	0.250	3.082	0.002	59.645
87	210	1.071	0.790	0.733	0.836	15.415	0.000	59.645
88	386	0.927	0.729	0.679	0.773	18.134	0.000	59.645
89	270	0.454	0.425	0.322	0.518	7.415	0.000	59.645





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