

An Empirical Study on the Factors Impacting the Repurchase Intention of Cleaning Robots

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Abstract. This paper examined the factors influencing the repurchase intention of cleaning robots based on the Expectation-Confirmation Model in IT. The results suggested that the perceived usefulness of the cleaning robot was determined by subjective norms, product quality and confirmation between expectations before and experiences after using it. It also found that user satisfaction was determined by the perceived usefulness and the confirmation. Finally the satisfaction impacted the users' repurchase intention. All the hypothesized paths were moderated by the individual innovativeness of the users.

Keywords: Cleaning Robot, Post Adoption model, Perceived Usefulness, Expectation Confirmation Theory, ECM-IT, Individual Innovativeness

1 Introduction

In terms of the product life cycle, the cleaning robot is in the early growth stage. Cleaning robot production increased by 68% in the period between 2010 and 2013 but customer dissatisfaction rose by 227% in the same period [1]. There were a number of studies regarding customer behavior in terms of the acceptance of innovative products. However, according to [2], the eventual success of a new technology is more dependent on the users' continued usage of the technology rather than the initial adoption of the technology itself. Ineffective usage of the new technology after the initial adoption may cause undesirable costs or result in wasted effort in developing the technology [3].

Among the theories regarding consumer post-purchase behavioral process, the Expectation-Confirmation Model (ECM) has been widely used to explain consumer satisfaction and repurchase decision. Bhattacharjee[2] developed ECM-IT to investigate the substantial differences between initial adoption and continued usage behavior in the IT context. ECM-IT posits that a user's expectation toward using an IT product after gaining experience should be different from the user's expectation before using it. Individuals keep updating their expectations toward using an IT product as they gain experience from using it. From this perspective, ECM-IT theorized that expectation after initial adoption plays an important role in determining IT users' satisfaction decision. ECM-IT represents post-adoption expectation as perceived usefulness. Perceived usefulness has long been identified as the most consistent and salient factor in determining user intention in IT adoption and usage [4].

2 Research Model and Methodology

2.1 Research Model

Based on ECM-IT this study developed a research model incorporating external variables for usefulness as shown in Fig1. Confirmation (C) and perceived usefulness (PU) were set up as the independent variables of satisfaction (S) as in ECM-IT. Repurchase intention (RI) replaced ECT-IT's continuous IT usage intention. We set up two external variables for perceive usefulness, Subjective norm (SN) and product Quality (PO). Individual innovativeness (II) was set up as a moderator. Individual innovativeness has been identified as an individual characteristic that has a persistent moderating effect on the acceptance decision across multiple technologies [5]

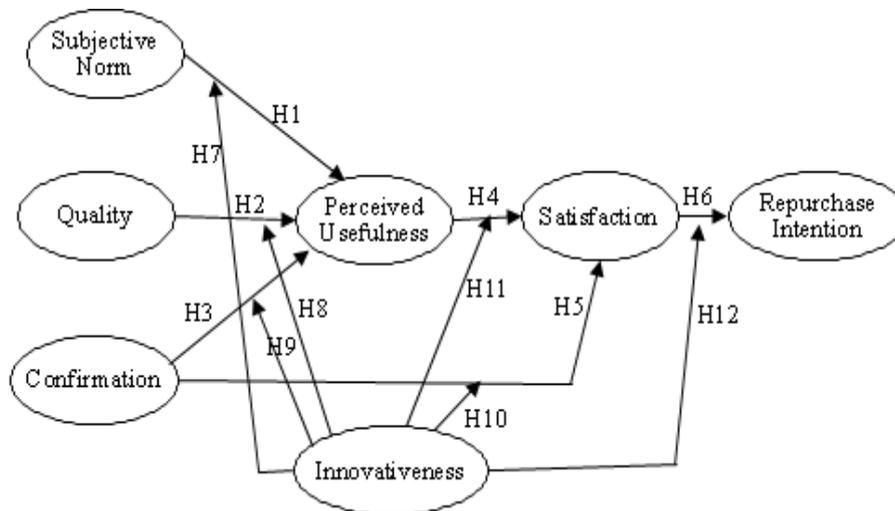


Fig. 1. Research Model

2.2 Questionnaire

The items of the questionnaire were adopted from previous studies and reworded to suit the context of the current study. The measurement items in this study were comprised of 4 items on the subject norm, 4 items for individual innovativeness, 4 items on product quality, 4 items on confirmation, 5 items on perceived usefulness, 3 items on satisfaction and 3 items on repurchase intention. All items used a seven point Likert scale anchored between “strongly disagree” and “strongly agree”.

2.3 Data Collection and Analysis Method

The survey was conducted online. The sample of 200 respondents was comprised of panel members of an Internet survey company. All of them had experience in using a cleaning robot. SmartPLS 3.0 was used for data analysis.

3 Empirical Analysis

3.1 Demographic Characteristics of Respondents

There were 103 males (51.5%) and 97 females (, 48.5%). The number of respondents in their 20s, 30s, 40s, 50s, and 60s were 23 (11.5%), 64 (32.0), 63 (31.5%), 31 (15.5%) and 19 (9.5%) respectively. The length of time that individuals owned the cleaning robot was less than one year, less than two years, and less than three years at 58(29%), 78(39%) and 31(15.5%) respectively.

3.2 Measurement Model Estimation

A confirmatory factor analysis was conducted to estimate the measurement model using SmartPLS 3.0. The reliability of each construct was assessed by examining the composite reliability estimate and Cronbach' s alpha using a criterion cutoff of 0.7 for both. All reliability measures were higher than the recommended value, indicating acceptable levels of reliability [6]. Convergent validity was tested by AVEs (Average Variance Extracted: recommended cutoff value is 0.5) and individual item loadings (recommended cutoff value is 0.6) [6]. All items met the requirements, indicating adequate convergent validity. To test discriminant validity, we compared the shared variances between the constructs (i.e., squared correlations) with the AVEs. As a result, all squared correlations were lower than the AVEs, suggesting adequate discriminant validity.

3.3 Structural Equation Model Estimation and Hypothesis Testing

The model fit of this study was estimated based on the R^2 values of endogenous variables. The model accounted for 64.7% of the variance in perceived usefulness, 86.7% in satisfaction and 78.2% in repurchase intention [7]. As Table 1 shows all the hypothesized paths were found significant.

Table 1. The summary of the path coefficients

Path	Path coefficient	STDEV	t value	p value
SN -> PU	0.158	0.066	2.412**	0.008
PQ -> PU	0.330	0.100	3.297***	0.001
C -> PU	0.381	0.113	3.383***	0.000
PU -> S	0.690	0.051	13.464***	0.000
C -> S	0.289	0.054	5.373***	0.000
S -> RI	0.884	0.024	37.201***	0.000

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

The moderating effect of user innovativeness was tested using the t test [8]. The results were summarized in table2. All the paths were significant and those from hypothesis 7 to hypothesis 12 were all adopted.

Table 2. The results of moderating effect

Path	Examined group				t value
	Higher innovativeness (n=98)		Lower innovativeness (n=102)		
	β_1	SE ₁	β_2	SE ₂	
SN ->PU	0.220	0.012	0.167	0.009	3.463**
PQ -> PU	0.259	0.013	0.350	0.013	-4.534**
C -> PU	0.385	0.015	0.327	0.014	2.796**
C -> S	0.324	0.009	0.263	0.007	5.225**
U -> S	0.666	0.009	0.695	0.007	-2.612**
S -> R	0.911	0.002	0.800	0.006	18.401**

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

4 Conclusions

The results of this study showed that the subjective norms, product quality and confirmation had a significant effect on the users' perceived usefulness of the cleaning robots. Confirmation and perceived usefulness had a significant impact on satisfaction. Satisfaction had a significant impact on repurchased intention. These results for cleaning robots were somewhat consistent with the results of previous research in innovative technology acceptance and continuous usage behavior.

In addition, individual innovativeness of the cleaning robot user had a significant moderating effect on all the relationships between each variable in this study. But the moderating effects between product quality and perceived usefulness and between perceived usefulness and satisfaction were negative. This all means that the group who with lower levels of innovativeness perceived that the quality and usefulness of the cleaning robot was more important.

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