A Study of Factors Predicting Repurchase Intention of Integrated Circuit Designed Products-Based: An Expectation Confirmation Theory Perspective

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Abstract—**Integrated Circuit-designed products are one of the most important and widely applied fields in major electronic industry. IC-designed products are further used in consumer electronic devices including Digital Video Disk (DVD), MP3s, digital still cameras, digital televisions, mobile electronics, toys and other products. Due to the universality of digital and mobile electronic trends, consumer electronic products will be an important growth area for future IC design industries. Besides product characteristics, some other factors will also affect the repurchase intention when selecting and using the IC products by consumers. This study investigates the critical variables that affect the repurchase intention among consumers. The researchers employed Expectation Confirmation Theory (ECT) to explore the relationships among the study variables.**

Empirical results from the structural equation modeling conclude that (1) degree of confirmation, service quality, marketing experience positively affected user satisfaction; (2) service quality positively affected the degree of confirmation and perceived value; (3) product creativity had no significant effect on perceived value; (4) perceived value positively affected user satisfaction; (5) User satisfaction and perceived value positively affected repurchase intention. Implications and suggestions for future research were discussed.

Keywords: Degree of confirmation, Repurchase intention, Structural equation modeling, User satisfaction.

I. INTRODUCTION

Integrated circuit (henceforth, IC)-designed products were invented by Bells Laboratory in 1947. After the establishment of Taiwan's Hsinchu Science and Industrial Park in 1980, Taiwan's IC industry formed cooperation among upstream, midstream and downstream industries after 34 years of development. By using a vertical disintegration approach, the IC industries in Taiwan were mainly divided as design, manufacture, packing and testing of IC.

The IC design system sectors in Taiwan are mainly focusing on research and development designs as demanded by clients to carry out marketing and supply activities.

Through the strategic industrial divisions, downstream OEM sectors will be in charge or the manufacturing of photomask, wafer and sealing procedures. As a last step in the manufacturing process, it will be handed to professional testing factory for testing procedure and before selling to clients. IC designed products are mainly segmented into Memory IC, Logic IC, Micro IC and Analog IC.

IC-designed products are mainly used in the computer industry, communication products, consumer products and other general purpose products, such as Field Programmable Gate Array (FPGA), which is burned into the internal components of IC-designed products.

When users of IC-designed products purchased and used these products, consumers will consider not only the specifications of the products, but also other factors to determine their repurchase intention [15, 16, 17]. In this study, we first discuss the variables that will affect the user's satisfaction and repurchase intention. This research follows with the background and motivation of the study. We also included a section on literature to find out variables to build a research structure and to discuss the affection of every variable. The purpose of this study will discuss about the relationships among the following study variables: innovation, degree of confirmation, service quality, marketing experience, perceived value, user satisfaction and repurchase intention of IC-designed product users.

II. RELATED RESEARCH

A. Expectation Confirmation Theory

Expectation Confirmation Theory (henceforth, ECT) refers to an unknown expectation from the users before using a product or a service. In the process of determining repurchase intention, users will decide their satisfaction against the product or service by comparing expectation and actual performance before making a purchase decision [11].

The degree of conformation will be determined by users according to their initial expectation and judgment against a product or a service. Oliver stated the evaluation by users is often based on the specifications, appearance, function and the services they received in the consumption process [11].

The degree of confirmation will be demonstrated by the confirmation when users become satisfied with their consumption experience. At the same time, user satisfaction will also predict the behavioral intention [4, 9].

B. Service Quality

Service quality refers to an evaluation process made by users based on chronicity and comprehensiveness on the services they received (citations needed). is the concept also addresses a behavior evaluation on the service provider by users; therefore, perceptions and reactions will be harder for entity products to evaluate and quantify [1, 7, 10].

The term, service quality, was formed by two concepts: 'service' and 'quality' as implied in this term. 'Service' can be categorized into four main characteristics: intangibility, inalienability, heterogeneity, and fugitiveness. By definition, service quality refers to what users perceive in terms of the difference of expectation and actual services they receive. The formula below could explain this concept: Service Quality = Expectation Service-Perceived Service. If Expectation Service is higher than Perceive Service, consumers will perceive the service quality to be low in the consumption experience. If both of them are equal in the formula, this means that the service quality is perceived to be acceptable and ordinary. On the other hand, if "expectation service" is lower than perceived service", this will mean the service quality is perceived to be better [12].

The concept, Service Quality, is an evaluation that is made by users based on chronicity and comprehensiveness on the services they received. Kim et al. also showed that consumers will develop their evaluation based on store images and services provided by counter employees in different department stores [7].

C. Experience Marketing

The definition of experience marketing is to generate consumer behavioral changes as a result of identifying with a brand to increase product value after every customer observes or participates in a particular event to experience the product. The practice of experience marketing is to encourage users to create an environment where users are satisfied with the service encounter and let them gain extra value through visual communication, situational experience and feeling from the heart of the consumers [14].

Based on previous experience marketing, this new marketing approach proved that it is different with other traditional marketing. Experience marketing focuses on features, quality perceptions, and benefits of a product, and emphasizes customer's experiences without ignoring the features and qualities. Another scholar showed that consumers pursue products that will create wonderful memories, and consumers will switch to rational behavior by paying equal attention to rationality and emotion. Consumers are attracted to the products or services because they are also searching for an unforgettable consumer experience. On the other hand, there is also significant relationships among satisfaction repurchase intention and service quality of chained coffee shops through experience marketing [3].

D. Product Innovation

The definition of product innovation is to create new products, services and marketing programs. In the same way, every step that requires a new technology, financial, management design, production and marketing in the process can be considered as product innovation [2].

Different scholar suggested the definition of innovation is related to company's technology application. Broadly, it can be distinguished into product innovation and process innovation. Based on technical novelty, innovation could be defined as the mode of new products and product improvement. Another scholar mentioned that the innovated services of glass business could cause resonance between consumers [6].

E. User Satisfaction

User satisfaction is defined as a psychological state of customer when emotions and expectations exist inconsistently. Such an expectation is accumulated by their previous purchase experience. User satisfaction is best understood as the evaluation of usage experience [17].

User satisfaction is a subjective perception, describing the user's satisfaction after they bought what they expect. It is an evaluation process from the customer's perspective after they purchase the product and gain experience from the product consumption. The evaluation process is the result of comparison between pre-purchase and post-purchase expectation. Perceived value will appear in every phase after the buying process. In general, user satisfaction is an evaluation made after product purchase and use. User satisfaction refers to a feeling when a person produces happiness or disappointment and is derived from the perception of the user as a result of the performance of the product and expectation for the product itself. Customer satisfaction is perceived performance and function expectation of the product itself. The function is as below: user satisfaction = feeling from the product's service expectation of the product service [8, 17].

F. Perceived Value

Perceived value refers to a relationship between ''give'' and ''get'' of a product. A holistic evaluation can be made through the trade-off between perceptions and perceptual, integrity of utility evaluation is perceived value. Perceived value thus refers to the measurement between "get" and "pay" of a product by the user. It is also an evaluation for the effectiveness of the product [13].

For users, product's target price and price perception are the indicators to measure perceived quality and perceived sacrifice. Through the comparison and measurement between perceived quality and perceived sacrifice, consumers will have a subjective feeling on perceived value. If the quality is higher

than sacrifice, consumers will have a positive perception on the value of the product or services. And this perception will have a positive influence on repurchase intention [13, 18].

G. Repurchase Intention

The definition of repurchase intention is the repurchase action taken by users for future purchase. As one of the dimensions of behavior intention, this concept refers to an act of consciousness that users are willing to use the product or service. It is a degree of identity with a service. However the cost of the recruitment of new users is about five times more than the existing cost of maintaining loyal and satisfied customers. As a result, consumers purchase intention is a very important factor for corporate revenue [16].

On the other hand, users who maintain a friendly relationship with suppliers and product providers after using a product or receiving a service also show their intention of repurchase the same product after consumption and willing to make another purchase on the same product.

In the same line of reasoning, users' satisfaction after using the product will also affect their subsequent repurchase intention, which means that the user satisfaction will reinvent users attitude at the product and their decision to repurchase that product. This will affect their repurchase behavior in the future. When users have complained about a particular product, appropriate and positive service recovery will affect the overall satisfaction and future repurchase intention. When the user is satisfied with their consumption after purchase, in addition to repurchase intention, recommendation to the public or internal give-away will occur. This is a very important factor because it will increase the benefits of the industry [15, 16].

III. RESEARCH METHOD

A. Research Framework

This study assumes that perceived value and user satisfaction are very important for the repurchase intention of IC-designed product customers. This study aimed to understand consumers' consideration when making decision to purchase IC-designed products. Such a consideration will affect customer's expectation and satisfaction of the product features in the decision-making process. If customers have a high perceived value and degree of satisfaction, their repurchase intention on the product will increase.

This research is structured to discuss the effects of degree of confirmation, service quality, experience marketing and product innovation on customers in the consumption of the product, and also the effects of perceived value and user satisfaction management on their repurchase intention. The hypothesized relationships among study variables are shown in Figure 1.
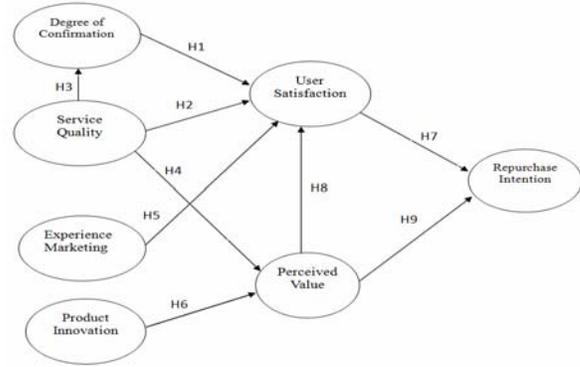

Figure 1. Research model.

B. Research Hypotheses

The assumptions and hypotheses of this study are as below:

- H1. Degree of confirmation has a positive effect on user satisfaction.

- H2. Service quality has a positive effect on user satisfaction.

- H3. Service quality has a positive effect on degree of confirmation.

- H4. Service quality has a positive effect on perceived value.

- H5. Experienced marketing has a positive effect on user satisfaction.

- H6. Product innovation has a positive effect on perceived value.

- H7. User satisfaction has a positive effect on repurchase intention.

- H8. Perceived value has a positive effect on user satisfaction.

- H9. Perceived value has a positive effect on repurchase intention.

The target population of this study is IC designed product users. Interviews and questionnaire distribution were done in different factories of two countries, Taiwan and China. The duration of sampling started on 1/3/2015 and ended on 31/5/2015, a total of 400 questionnaires were distributed. After collecting the questionnaires and excluding incomplete questionnaires, there are 308 valid questionnaires that were included in data analysis. Response rate of questionnaires was 77%.

IV. DATA ANALYSIS

A. Analysis of Reliability and Validity

This study uses Composite Reliability (CR) value to measure reliability coefficients of the scales. According to Fornell and Larcker research, when CR value is above 0.7, which means the reliability is acceptable. The results of reliability analysis on every study variable were reported in Table 1. All CR coefficients are above 0.7, which means the questionnaire of this instrument has a high degree of reliability [5].

TABLE I.   RELIABILITY RESULT

Dimension	No. of items	CR	AVE
Product Innovation	6	0.933	0.698
Degree of Confirmation	6	0.927	0.680
Service Quality	16	0.963	0.624
Experience Marketing	5	0.936	0.744
Perceived Value	5	0.937	0.746
User Satisfaction	6	0.941	0.727
Repurchase Intention	7	0.935	0.674

Discriminant validity mainly tests questionnaire items to endure a high degree of relevance between different facets. Discriminant validity of the instrument is reported in Table 2 by examining the square root of average variance extracted (AVE) to see if portions are larger than the amount of the value of each facet correlation coefficient, and therefore a part of the judgment of this study discriminant validity [5].

TABLE II.   DISCRIMINANT VALIDITY RESULT

	DC	EM	PI	PV	RI	SQ	US
DC	0.825						
EM	0.611	0.863					
PI	0.802	0.614	0.836				
PV	0.590	0.826	0.582	0.864			
RI	0.589	0.713	0.566	0.785	0.821		
SQ	0.774	0.780	0.754	0.753	0.678	0.790	
US	0.616	0.776	0.608	0.791	0.842	0.743	0.853

DC:Degree of Confirmation, **EM**:Experience Marketing, **PI**:Product Innovation, **PV**:Perceived Value, **RI**:Repurchase Intention, **SQ:**Service Quality, **US**: User Satisfaction.

B. Descriptive Statistical Analysis

308 people were recruited to take part in this study. In terms of their gender, men and women were 84.7% and 15.3%, respectively. By age, the most respondents are between 30 and 39 years old, about 34.1% of the total sample, followed by 20 to 29 years old (28.2%). 84.7% of them were married, and the majority of them have university degree. Questionnaires are distributed between IC-design product users from Taiwan (49.4%) and China (50.6%). Factory interviewees were mainly from Northern Taiwan (47.7%) and China Hua Dong (Eastern China) area (35.7%). Factories with 2000 employees are 30.8% in the sample, while those between 501-1000 people are 25.6%.

The top three interviewees are power suppliers (25%), NB (24%), and PC (22.1%). Total percentage of NB and PC IT industries is 46.1%. Depending on various functional departments, 49.7% is from Research and Development Department, followed by Quality Assurance Department (19.5%), these interviewees have experiences in using IC-designed products. Most of the samples have an experience of using an IC-designed product for between 1.5 years to 3 years (30.2%), experience with 1.5 years was about 27.3%. The ratio of power management IC users is 27.9%.

When it comes to the amount of IC products usage, users of 4 and 9 products account for 38.3% of the sample, followed by users of 10 and15 products (35.1%). For the expenditure on IC designed products, those who spent 1 million-1.99 million were about 46.2%, those who spent 1 million-1.5 million and 1.5 million-1.99 million accounted for of 23.1% respectively.

Interviewee that uses new IC products in 6 months has a top ratio of 28.2%, followed by those with 1.5 year (27.6%). 28.2% of interviewees had indicated that that they use IC-designed products due to their new features while 24.7% were customer's demand.

C. Structural Equation Model

The partial least squares (PLS) approach was employed to analyze the research model. Model explanation is to check whether there is consistency between the result of the model and the model proposed at the beginning. Also to review whether main relationships have empirical support form the result of the model. The larger standardized coefficient means the causal relationship are more important. This study uses bootstrap re-sampling to analyze the coefficient path within the structural equation model, which includes degree of significance (Refer to Figure 2). The relationships between each variable were shown in Table 3.
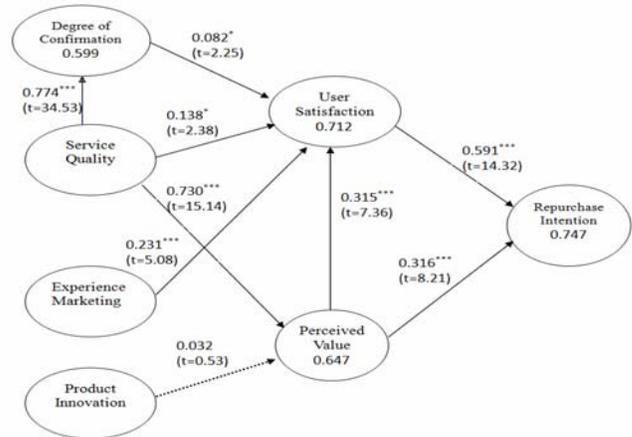

Figure 2.   SEM model verification figure.

According to the results shown in Figure 2, 8 out of 9 assumptions/hypotheses are statistically significant, only H6 didn't reach the expected results which suggests that product

innovation do not affect perceived value. The results of SEM testing are shown in Table 3.

TABLE III.   THE RESULTS OF SEM TESTING

Hypothesis	Relationship of Potential Variables	T value	Results
H1	Degree of Condirmation→User Satisfaction	2.07	Supported
H2	Service Quality→User Satisfaction	3.20	Supported
H3	Service Quality →Degree of Condirmation	34.26	Supported
H4	Service Quality →Perceived Value	15.29	Supported
H5	Experienced Marketing→User Satisfaction	5.74	Supported
H6	Product Innovation→Perceived Value	0.53	Not Supported
H7	User Satisfaction →Repurchase Intention	15.34	Supported
H8	Perceived Value→User Satisfaction	9.84	Supported
H9	Perceived Value →Repurchase Intention	7.93	Supported

SEM analysis could be used to verify the setup of hypothesis. But SEM uses a confirmatory analyze method to verify hypothesis, much more precise than regression analysis. That is why this study uses SEM to determine the verification result.

V.   CONCLUSION

A.   Research Conclusion

This study confirmed that two factors affected users repurchase intention; that is user satisfaction and perceived value. The following description will discuss how these 2 variables affect users' repurchase intention of IC-designed products.

"User Satisfaction" refers to users' actual feeling when they are using a product or receiving a service. From the result of analysis, user satisfaction has positive influence on repurchase intention. This showed that, if a user is satisfied with the specifications, features, circuit structure, and overall evaluation, their willingness to repurchase the product will increase. At the same time, users will also enhance their overall evaluation for the industry that is associated with the product. If the users' satisfaction were maintained, their repurchase intention will sustain and the related industries will be profitable.

"Perceived Value" is a feeling of value from customers on the price, professional knowledge and service of a product. Perceived value has a positive influence on consumers' repurchase intention, which means when a product's price and service provided by the industry is above user's expectation, it will definitely enhance users' repurchase intention of the same product.

B.   Practical Implications

Practical implications are stated for three aspects as follows.

1)   Enhance user satisfaction: On the basis of the statistical analysis and hypothesis tested in this study, we conclude that degree of user satisfaction of IC-designed product will be affect by their degree of confirmation, service quality, experience marketing and perceived value of the product. The verification of hypothesis in our SEM modeling proved that degree of confirmation, service quality, experience marketing and perceived value have positive influence on user satisfaction. This study also suggests the dealers should assist their customers in their decision-making process. A follow- up from the company's technical personnel with the customers is also recommended so that they can generate consumer insights into their usage behaviors. Technical personnel should also have backgrounds similar to customers so that they can assist and communicate with their customers effectively.

2)   Enhance perceived value: On the basis of the empirical findings, we also conclude that that degree of satisfaction of IC-designed product users will be affected by service quality, but not by product innovation. This study suggests that dealers could discover the needs of their customer through conversation or entity technical reports, so that they could follow up with their customers. In response to unreasonable demands from customers such as price lowering, and expediting product delivering, dealers should discuss with their customers politely and professionally to prevent unpleasant moment from happening.

3)   Enhance repurchase intention: Our statistical analyses lent support to our hypotheses that repurchase intention of IC designed product users will be affected by degree of satisfaction and perceived value. User satisfaction and perceived value are useful to enhance user's repurchase intention on IC-designed products. When dealers are pursuing solutions to enhance consumer positive experience, sometimes they will ignore the amount of human resources needed to properly handle client complaint. Dealers are recommended to set up an internal resource organization with a team of professionals to track their customers on a regular basis to achieve substantial results.

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