Pak. j. life soc. Sci. (2024), 22(2): 23257-23263 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-22.2.001655

RESEARCH ARTICLE

Factors Influencing the Intention for Continuous Use of Tap Water during the Implementation of the "ANTI SALINITY TOOL (ANSAT) Innovation" to Address Brackish Water Issues

Krisada Kaweeyarn[1*], Natphasuth Patthirasinsiri2, Amnuay Saengnoree[3]

[1,2,3] College of innovation and industrial management, King Mongkut's Institute of Technology Ladkrabang

ARTICLE INFO

Received: Oct 22, 2024

Accepted: Dec 28, 2024

Keywords

The Intention for Continuous Use

Tap Water

Innovation Service

Brackish Water

***Corresponding Author:**

…….

ABSTRACT

This study aims to develop a factorial structural equation model (FSEM) to analyze the factors influencing the intention for continuous use of tap water during the implementation of the "Know-How to Combat Salinity" innovation service or ANTI SALINITY TOOL (ANSAT) innovation" to address brackish water issues. These factors include the perceived value, the innovation attributes, the intention to use, and the subjective norm to see if there is a causal relationship with the intention for continuous use of tap water or not. The quantitative approach was employed, using questionnaires, and the structural equation model (SEM) was analyzed using a ready-made program to perform descriptive statistical analysis and assess the reliability of the questionnaire. The research results found that the factors affecting the intention for continuous use of tap water during the implementation of the ANSAT innovation to solve the brackish water problem were the perceived value, the innovation attributes, the intention to use, and the subjective norm that had a causal relationship with the intention for continuous use of tap water. The findings from this study revealed that the perceived value of use had the highest direct influence on the intention for continuous use of tap water during the implementation of the innovation to solve the problem of brackish water. Therefore, the service provider must prioritize creating a strong perception of value in the service users, including fostering a positive attitude towards the use of the innovation, which can be created through the perception of benefits and ease of use. These factors ultimately lead to a sustained intention to use the service, which subsequently results in continued actual usage. The research findings can be applied to benefit relevant organizations, particularly the MWA. Moreover, the findings can serve as a foundation for enhancing the efficiency of services.

1. INTRODUCTION

At present, the Metropolitan Waterworks Authority)MWA(has a mission to survey, procure, and produce clean tap water that meets the standards of the WHO for consumption of people in the service areas of three provinces: Bangkok, Nonthaburi, and Samut Prakan ensuring adequate and comprehensive water distribution across these areas. However, the areas of Bangkok, Nonthaburi, and Samut Prakan are considered the central hubs of trade, tourism, education, industry, and the important economy of the country, all of which require clean tap water with strong flow throughout. Since Thailand has been experiencing increasingly severe droughts, the amount of water reserved in the main dams has decreased, especially the dams in the Chao Phraya River basin during the dry season that cannot discharge enough water from these dams to prevent saltwater intrusion, causing saltwater to extend as far as the Sam Lae Raw Water Pumping Station of the MWA. Consequently, the raw water used for tap water production has exhibited elevated salinity. And since the tap water

production system of the MWA has been designed to standards suited for freshwater surface raw water, it cannot remove excessive salinity from the raw water. Tap water with salinity levels exceeding the specified criteria is consequently supplied to consumers, which may pose significant health risks to a large number of users and cause damage to the industrial sector as well as the overall national economy. From the above-mentioned problems, the MWA has developed a "Know-How to Combat Salinity" or ANTI SALINITY TOOL (ANSAT) innovation incorporating tools and methodologies designed to address salinity issues. The implementation of ANSAT innovation has significantly reduced the hours during which raw water salinity exceeded standard thresholds. The efficiency of using such innovative services by the MWA led the organization to receive the International Innovation Awards (IIA) 2020, the First Prize in the category of innovation in services and problem-solving (Services & Solutions) from the Enterprise Asia organization in 2020 (MWA, 2020).

The researcher aims to examine the factors of the SEM influencing the intention for continuous use of tap water during the implementation of the ANSAT innovation to address brackish water issues. The findings from this study are intended to benefit relevant organizations, particularly the MWA. The insights can serve as a guideline for adapting to both proactive and reactive challenges, enabling the MWA to enhance its service delivery and improve efficiency.

LITERATURE REVIEW

1. Perceived value in use is the perception of elements of value from the consumer experience in deciding to purchase products or services. It can be recognized from the purchasing process that affects the customer's knowledge, thoughts, and positive and negative attitudes towards the product or service. (Sheth, Newman and Gross, 1991)
2. Every type of innovation has 5 important attributes that are relative advantage, compatibility, complexity, trainability, observability. (Rogers and Shoemaker, 1917)
3. Subjective norm is the expectation that the reference person or group wants us to do that behavior or wants us to know. Reference groups include family, friends, people in the same community, expert, etc. It is the perception of social pressure that influences an individual to do or not perform a certain behavior. (Hawkins and Mothersbaugh, 2010, p. 234)
4. Intention to use, that is behavior or deciding to do something with a plan or using effort to do that behavior. Intention to use is influenced by attitude and various variables that affect the behavior. (Engel et al.,1995, Ajzen and Fishbein, 1980)
5. Intention to use continuously is the user's experience of using the service. Intend to continue using it in the future, with duration and frequency of use varying from person to person. (Chen, et al., 2018)

HYPOTHESIS AND CONCEPTUAL FRAMEWORK

A conceptual framework offers a clear visualization of the ralationships between variables in a study. In examining the factors Influencing the Intention for Continuous Use of Tap Water during the Implementation of the " ANTI SALINITY TOOL (ANSAT) Innovation" to address brackish water issues, the framework includes independent variables)perceived value, innovation attributes, subjective norm(, mediating variable)Intention to Use(and the dependent variable)continuous usage(. This framework helps to delineate the connections among these elements based on the insights from the provided references

In this study, the researcher formulated the following hypotheses:

Hypothesis 1 (H1): Perceived value of use has a direct influence on the intention to use

Hypothesis 2 (H2): Innovation attributes have a direct influence on the intention to use.

Hypothesis 3 (H3): Subjective norm has a direct influence on the intention to use.

Hypothesis 4 (H4): Perceived value of use has a direct influence on the intention for Continuous use

Hypothesis 5 (H5): The intention to use has a direct influence on the intention for continuous use

The researcher related the factors include the perceived value, the innovation attributes, the intention to use, subjective Norm and the tap water continuous usage intention during the implementation of the ANSAT innovation to address brackish water issues in Figure 1, Thus, the researcher concluded the following research framework:

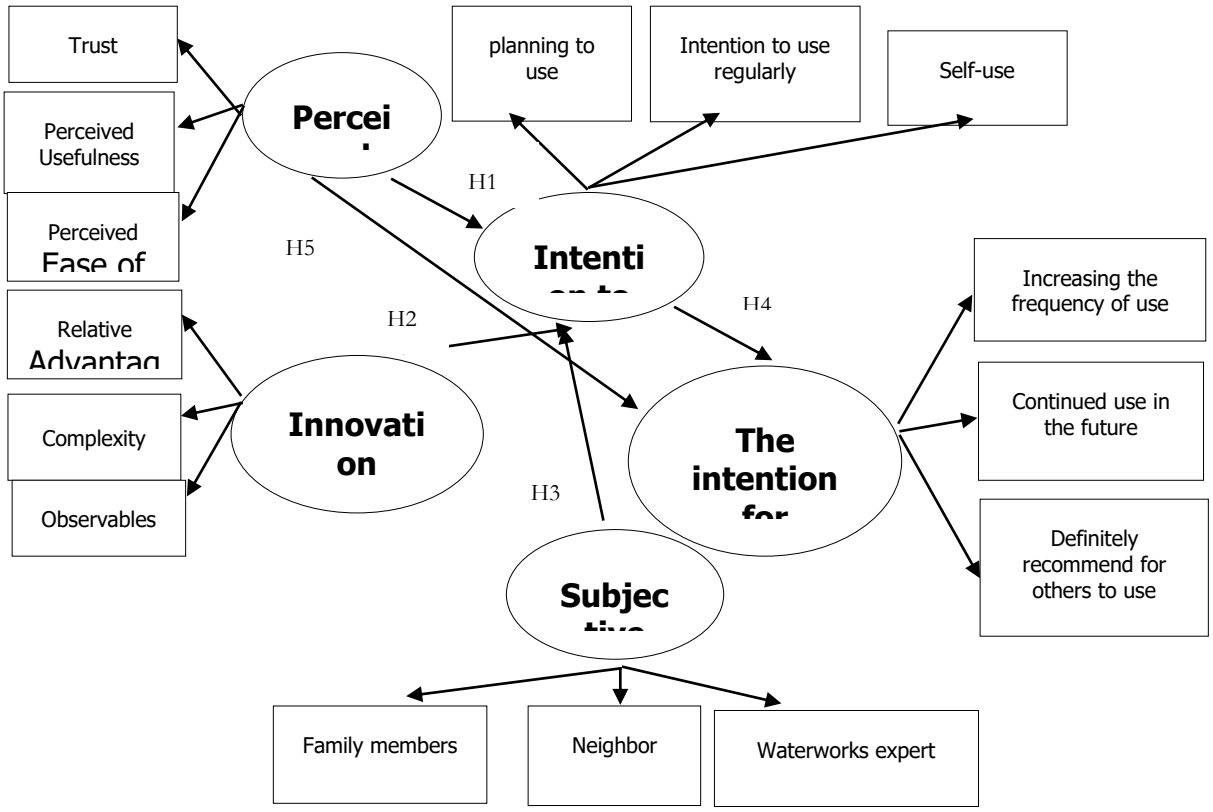

Figure 1: Conceptual framework

RESEARCH METHODOLOGY

This research aimed at examining the FSEM influencing the tap water continuous usage intention during the implementation of the ANSAT innovation to address brackish water issues. The study employs a quantitative research approach, utilizing questionnaires as the primary data collection instrument. The target population consists of households using tap water provided by the MWA in the eastern districts of Bangkok. These districts include Klong Sam Wa, Khan Na Yao, Bang Kapi, Bueng Kum, Prawet, Min Buri, Lat Krabang, Saphan Sung, and Nong Chok. The target households must have been utilizing tap water during the implementation of the ANSAT Innovation aimed at addressing brackish water issues. The sample for this study was determined based on criteria aligned with the SEM. The parameter estimation was conducted using the Maximum Likelihood method. Thus, in this study, it was found that there were 15 observed variables. When multiplied by the maximum recommended factor of 20, the appropriate sample size was determined to be 300 participants (15 variables × 20 times). The researcher employed a non-specific random sampling strategy, selecting a sample of households in the eastern districts of Bangkok that utilize tap water services.

The research instrument used in this study was a questionnaire consisting of two parts. Part 1 was a questionnaire on the respondents' personal factors, which included gender, age, marital status, education, occupation, household characteristics, water usage volume, and water usage activities. Part 2 of the questionnaire assessed the respondents' opinions on various factors, including the perceived value of use, the innovation attribute, the subjective norm, the intention to use, and the intention for continuous use. The questions were designed using a 5-point Likert scale. To ensure the quality of the research instrument, the researcher had five experts review the alignment between the questions and the variables. The content validity index (CVI) for this study was 1.00. And the researcher also conducted a reliability test to assess the internal consistency of the overall quality, using a sample of 30 individuals from the general public in Bangkok who had used the ANSAT

innovation to address brackish water issues. This sample was not part of the random sample. The Cronbach's alpha coefficient for the reliability test ranged from 0.766 to 0.925, which is above the acceptable threshold of 0.70 for all items.

SUMMARY OF RESEARCH RESULTS

Descriptive statistics were used to present the general information of the respondents.

General characteristics of the sample group

This study focused on a sample group comprising households of water customers served by the MWA in the eastern region of Bangkok. The region includes the following districts: Klong Sam Wa, Khan Na Yao, Bang Kapi, Bueng Kum, Prawet, Min Buri, Lat Krabang, Saphan Sung, and Nong Chok. The target households for this study were required to have used tap water during the implementation period of the ANSAT initiative, which aimed to address the issue of brackish water. The study included 300 samples. The findings on the general characteristics of the sample group revealed that most respondents were male (53.70%) and aged between 41–50 years (49.70%). The largest proportion had attained a bachelor's degree (73.00%). The majority were company employees or workers (36.70%). Most households were detached houses or townhomes (26.70%). The most common water consumption level was approximately 8.50 cubic meters per month (45.00%). For the primary water usage activity, the majority used tap water for bathing (96.70%) on a weekly basis.

Analysis of perception levels on each factor

The study analyzed the perceptions of respondents regarding several key factors: the perceived value of use, the innovation characteristics, the conformity to reference individuals, the intention to use, and the intention for continuous use. The questions were measured using a 5-point Likert scale. The findings revealed the following average scores for factors influencing the behavior of intention for continuous use of tap water during the implementation of the ANSAT innovation to address brackish water issues: The findings were as follows: the perceived value of use had the highest mean score)$\bar{x}$ = 3.77), the intention to use)$\bar{x}$ = 3.72) ranked second, the innovation characteristics)$\bar{x}$ = 3.67) came next and the conformity to reference individuals)$\bar{x}$ = 3.52) scored the lowest among the factors studied with corresponding standard deviations of 0.577, 0.779, 0.421, and 0.428, respectively.

Results of hypothesis testing using structural equation modeling)SEM(analysis

The SEM analysis examined the regression coefficients within the model, identifying the FSEM influencing the intention for continuous use of tap water during the implementation of the ANSAT innovation. The results of the analysis are presented in Figure 2

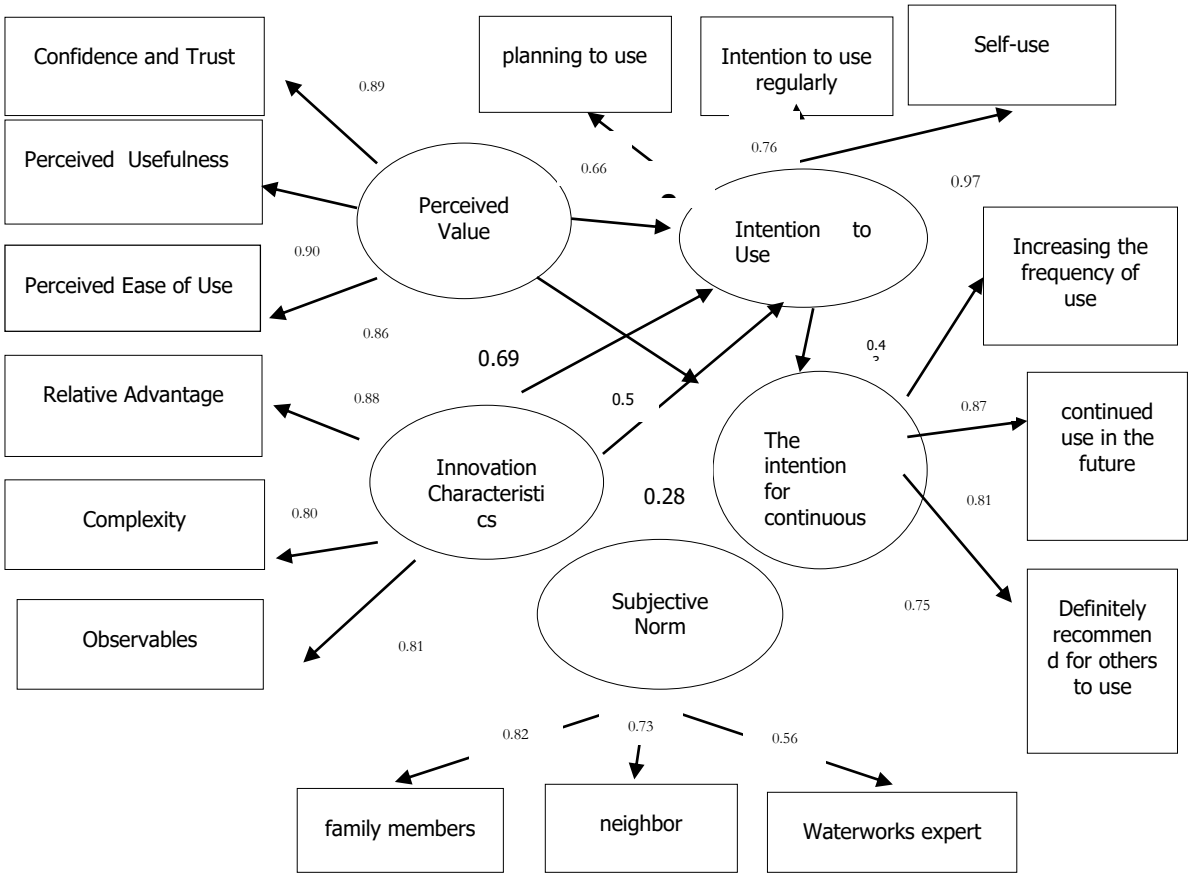

Figure 2: Standardized regressions

Figure 2 illustrates the relationships among variables within the SEM. The analysis of the relationships among these variables within the SEM reveals the following key insights:

Table 1: Direct)DE(and indirect effects)IE(

Dependent Variables	**R^2**	**Effects**	**Independent Variables**			
			The perceived value to use	**The innovation attributes**	**The subjective norm**	**The intention to use**
The Intention to use	0.39	DE IE TE	0.61** - 0.61**	0.54 ** - 0.54 **	0.28** - 0.28**	- - -
The Intention to continue usage	0.47	DE IE TE	0.69** 0.26** 0.95**	- 0.23** 0.23**	- 0.12** 0.12**	0.43** - 0.43**

In the Table 1 direct)DE(and indirect Effects)IE(and the total effects, we see the cumulative impact of direct and indirect effects path way on the Intention to use and the Intention to continue usage. When interrelated factors were analyzed to develop the FSEM using Structural Equation Modeling (SEM) analysis, it was found that all causal variables in the model positively influenced the behavior of intention for continuous use of tap water during the implementation of the ANSAT innovation. When considering the total influence on the behavior of intention for continuous use of tap water during the implementation of the ANSAT innovation, the variable perceived value of use (PV) exhibited the highest total effect, with an influence magnitude of 0.69. Following this, the variable innovation attributes (IA) demonstrated the second-highest total effect, with a magnitude of 0.54. When analyzing the direct and indirect effects on the behavior of intention for continuous use of tap water during the innovation period (BIU), it was found that PV had a significant direct influence on BIU, with an effect size of 0.69. This influence was statistically significant at the 0.01 level. In addition to the direct influence of the perceived value of use (PV) on the behavior of the intention for continuous use of tap water during the implementation of the ANSAT innovation (BIU), other variables also exerted significant direct effects. Specifically, the variable Intention to use (IU) was

directly influenced by three variables: the perceived value of use (PV), with a direct influence magnitude of 0.61, the innovation attributes (IA), with a direct influence magnitude of 0.54, the and subjective norm (SN), with a direct influence magnitude of 0.28. All of these effects were statistically significant at the 0.01 level.

The results from the SEM development indicated that perceived value of use (PV) had the strongest influence on the behavior of the intention for continuous use of tap water during the implementation of the ANSAT innovation (BIU). Following this, the variables with the next highest levels of influence were the intention to use (IU), the innovation attributes (IA), and the subjective norm (SN), respectively.

Table 2 provides crucial insights into the relationships among the key variables under investigation. Starting with H1, the estimate suggests a strong positive relationship between perceived value of use and intention to use and the intention continuous use, with a coefficient of 0.61 and 0.69 respectively. Thus, supporting H1 and H5. It implies that perceived value of use factors can influence in the purchase behavior.

Table 2: Hypotheses testing

Path)From → To(	**Estimate**	**P**	**Hypotheses**
Perceived value of use → the intention to use	0.61	P<0.01	H1
Innovation attributes→ the intention to use	0.54	P<0.01	H2
Subjective norm→ the intention to use	0.28	P<0.01	H3
Perceived value of use→ the intention continuous use	0.69	P<0.01	H4
The intention to use → the intention for continuous use	0.43	P<0.01	H5

CONCLUSION

This study employed SEM analysis and model fit testing to evaluate the proposed hypotheses and identify the causal relationships within the structural model.

The findings revealed that the factors of the perceived value of use, the innovation characteristics, and the conformity to reference individuals have a direct influence on the intention to use, while the intention to use directly influences the intention for continuous use of the innovation. Among these factors, the perceived value of use, analyzed through observable variables such as trust and confidence, perceived benefits of the innovation, and perceived ease of use, had the most significant impact on the intention to use the ANSAT innovation to address the problem of brackish water. Anyhow, these results were consistent with the previous studies by Yulianto & Tanamal (2019), Escudero Guirado et al. (2018), and Mohd Fodli Hamzah et al. (2022), which emphasized that the perceived value of use, including perceived benefits and perceived ease of use, significantly affects the intention to use the innovation. Furthermore, all five hypotheses tested in this study showed statistical significance at the .01 level. Then, this model demonstrates the capability to predict the behavior of intention for continuous use ANSAT innovation in solving brackish water issues. The study also revealed that other factors, such as innovation characteristics, notably comparative advantages, and observable attributes play a crucial role in motivating users to adopt and consistently use the innovation. This leads to regular use, increased frequency, and autonomous intention to continue using the innovation. Therefore, the MWA can apply the findings of this research to enhance its management strategies and further develop the ANSAT innovation effectively, fostering greater confidence and trust among water consumers in the innovation.

DISCUSSION OF RESEARCH FINDINGS

The findings from this study can be applied in various ways to improve water management and address the issue of brackish water in affected areas. These applications include:

1. **Development of water management plans:** The MWA can use the data from this study to enhance and optimize the production of tap water, especially in the eastern areas of Bangkok, which are facing high salinity levels. Strategic planning for the management of raw water and water drainage from reservoirs, in collaboration with the Royal Irrigation Department, can lead to sustainable solutions for mitigating the salinity problem.

2. **Communication and building understanding with water consumers**: The study highlights the importance of the perceived value and the innovation characteristics in driving the intention to use the service. The MWA can use the results of this research to develop communication strategies for water users to understand the benefits and easy use of the innovations, such as providing information through online media or awareness campaigns that focus on the advantages of the ANSAT innovation.
3. **Promote industry participation:** For industries that use large amounts of water, such as ice production factories and hotels. The MWA can encourage the industrial sector to install reverse osmosis water filtration systems and collaborate on the efficient use of water resources.
4. **Further innovation with AI technology:** The research also provides an opportunity to explore the development of AI systems to effectively manage raw water and control water distribution. AI can analyze data and predict the situation of saltwater in advance, facilitating faster and more effective water management processes.
5. **Enhancing long-term water security:** The research emphasizes the importance of building trust and satisfaction among water users. The application of the results of this study will help the MWA to develop a more reliable water supply system. This will strengthen long-term water security and foster better relationships with water users. Additionally, implementing these findings will help to manage the saltwater problem more sustainably and effectively. At the same time, it will build confidence in water users and reduce the negative impact on the local industrial sector.

SUGGESTIONS FOR FUTURE RESEARCH

The findings of this research reveal that the perceived value of use has a positive influence on the intention to use, while also positively affecting attitudes toward usage and the behavior of intention for continuous use. When consumers perceive the value of an innovation or technology, it fosters a stronger desire to adopt and utilize such innovations and technologies. Perceptions of benefit from the innovation enhance operational efficiency. Future research should explore the factors influencing consumer satisfaction with the use of the service innovation provided by the MWA. This will help the organization make informed decisions on the deployment of future innovations and technologies in the water services industry, ensuring the maximization of benefits for the public.

REFFERENCES

Ajzen, I. & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood, NJ: Prentice-Hall.

Chen, Y. M., Hsu, T. H., & Lu, Y. J. (2018). Impact of flow on mobile shopping intention. Journal of Retailing and Consumer Services, 41, 281–287.

Duangporn Ratsinthorn.)2019(. TECHNOLOGY PERCEPTION AFFECTING SERVICE INTENTION CONSUMER'S USAGE VIA QR CODE IN BANGKOK METROPOLITAN AREA. Master of Business Administration for Society Srinakharinwirot University.

Engel, J. F., Blackwell, R. D., & Miniard, P. W. (1995). Consumer Behavior (8th eds.). New York: The Dryden Press.

Fishbein, M. & Ajzen, I.)1975(. Belief, Attitude, Intention, and Behavior: An Introduction to theory and research. Reading, MA: Addison-Wesley.

Metropolitan Waterworks Authority. (2020(. Sustainability Report 2020.

Hawkins and Mothersbaugh. (2010). Consumer Behavior Building marketing strategy. New York: McGraw-Hill.

Rogers Everett M. and Shoemaker F. Floyd.)1971(. Communication of innovation: A cross-cultural approach. New York: The Free Press.

Sheth, J. N., Newman, B. I., and Gross, B. I.)1991(. "Why we buy what we buy: A theory of consumption values,"Journal of Business Research in Marketing, (12), pp 137-156.