RESEARCH BRIEF

Water Ozonisation/Ozonation for ASEAN Environmental Resource Sustainability: A Structural Equation Model Analysis

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Ozonisation is a chemical water treatment technique based on the infusion of ozone into the water, which can be a powerful oxidant, destroying a wide range of organic compounds and microorganisms (Environmental Protection Agency, 1999; Meijers, 1977; Tzortzakis & Chrysargyris, 2016). In 2014, one of the most modern wastewater treatment plants in the world was established in Dübendorf, Switzerland, which was the first facility in the country to treat micropollutants by ozonation followed by a proprietary sand filtration process (McArdell, 2015). This plant was designed to protect Lake Zurich in accordance with new Swiss legislation.

Limiting the micropollutants discharge in the environment has also become a new issue in connection with organic pollution, with organizations needing to recover and preserve their surface and groundwater environments. Conventional municipal wastewater treatment plants (WWTP) have also become important targets for the upgrading and the implementation of advanced ozone water treatment technologies as tertiary treatment appears essential to protect receiving water bodies (Eggen, Hollender, Joss, Schärer, & Stamm, 2014; Rice, 2002).

Reasons for this industry's growth are numerous as it has long been established that ozone neutralizes bacteria, viruses, fungi, and parasites in aqueous media, which has prompted the creation of water purification processing plants in numerous major municipalities worldwide (Sunnen, 2003). Also, ozone can be viewed as the most powerful oxidizing and disinfecting agent that is available for pool and spa water treatment (World Health Organization, 1993).

Ozone is additionally being used in multiple industrial, municipal, and residential water systems. These include potable water, wastewater, process water, and semiconductor applications (BCC Research, 2015). This is consistent with a report from the US Environmental Protection Agency (1999) in which it was stated that ozone has been employed successfully by a large number of European and Canadian water utilities, with Europeans, in particular, employing ozone for a wide variety of applications which cannot be accomplished on a practical basis by other treatment techniques. Ozone was also found to be highly effective in removing organic chemical contaminants in the study. Although chlorination has traditionally been

used in the disinfection of municipal water systems, ozone has many advantages over chlorine in this application (Evans, 1972):

1. Safety problems of chlorine storage, handling, and transportation are eliminated. Ozone is produced on-site.
2. Ozone destroys both bacteria and viruses, while chlorine is not very effective against viruses.
3. Shorter treatment times (1–10 min for ozone vs. 30–45 min for chlorine).
4. Lesser pH and temperature effects with ozone.
5. High dissolved oxygen concentration from ozonation improves receiving stream quality.
6. No toxicity to aquatic life has been found in studies of ozone disinfection.
7. No buildup of bio-accumulatable residuals has been observed in ozone-treated effluents.
8. There is no increase in total dissolved solids in ozone-treated water.
9. Wastewater quality improvements such as turbidity reduction and effluent de-colorization accompany ozone treatment.

This is consistent with the research by Rogers (1995), which stated that ozone technology equipment has a promising growth rate in the wastewater treatment equipment, in municipalities, and other water treatment segment, including swimming pools and spas. This growth is attributed to the many benefits associated with the technology. High oxidation potential, quicker processing time compared to other traditional disinfection techniques, no harmful by-product, and long-run cost benefits are some of the major advantages of ozonation (Phapinyo et al., 2007; Persistence Market Research, 2014).

Simple technology and lack of regulatory requirement for ozone generators in most parts of the world has led to the emergence of many small private label regional companies, serving their clients with customized solutions. Seeing the current market and domestic growth opportunities, as well as the potential sector growth from the integration of Thailand into the AEC (ASEAN Economic Community) at the end of 2015, many Thai companies have stepped into the production and marketing of ozone cleaning technology. However, for large buyers, brand image also plays an important role (Persistence Market Research, 2014).

The above detailed health and safety benefits and characteristics, therefore, played a key role in the rationale for further research. Therefore, this study was undertaken to research the determinants of *ozonation* water treatment technology used by Thai industrial estate organizations.

Ozone Water Treatment History

Boglarski and Telikicherla (1995) stated that ozone was used as early as 1893 in Europe for drinking water treatment, and today is the most commonly used disinfection process in Europe (Cheremisinoff, 2002). Christian Friedrich Schönbein discovered the ozone molecule in 1839 at the University of Basel and Werner v. Siemens developed the first ozone tube to generate ozone in 1857 (Kogelschatz, 2003). After that date, different ozone applications were investigated, and in the 1890s, the first full-scale drinking water plants were using ozone to treat water. The first major ozone installations in drinking water plants using ozone for disinfection were built in Paris (1897) and Nice (1904), France, and in St. Petersburg, Russia (1910).

Until the early 1990s, ozone generation was the major industrial application of DBDs (dielectric-barrier discharge), with thousands of installed ozone generating facilities being used in water treatment applications (Kogelschatz, 2003). For this reason, the dielectric-barrier discharge is sometimes also referred to as the "ozonizer discharge."

Although the USA was decades behind Europe in ozone use, it was not until the passage of the US Safe Drinking Water Act in 1973, that the use of ozone to treat drinking water was increasingly encouraged by the EPA (Environmental Protection Agency). With the identification of halogenated organic compounds formed in drinking water as a result of chlorination, the U.S. Congress quickly enacted the Safe Drinking Water Act in 1973. This original SDWA charged the U.S. EPA to develop and promulgate a number of regulatory initiatives. Subsequent SDWA amendments (1986 and 1996) added additional regulatory mandates to the EPA, many of which encourage the use of ozone (Rice & Overbeck, 1998).

In Thailand, water has become the center of both national and royal policies on sustainability. His late Majesty King Bhumibol Adulyadej, in his wisdom and concern for the Thai people, developed a plan (Sufficiency Economy Philosophy) to ensure availability and sustainable management of water and sanitation for all (Ministry of Foreign Affairs, 2015; Poungsuk, Pourpan, & Thongsuk, 2016). This is consistent with the 17 global sustainability goals (Sustainable Development Goals—SDGs) and 169 targets which were agreed upon in 2015 by a meeting of world leaders.

Research from the Netherlands has recently stated that wastewater and sanitation infrastructure in Thailand is underdeveloped (Netherlands Embassy in Bangkok, 2016), with the Thai government indicating that of 59 surveyed rivers and six natural reservoirs nationwide, 43% had fair water quality, 34% turned up good water quality, while 23% contained deteriorated water (Wipatayotin, 2017). We, therefore, wanted to examine how ozone water treatment technologies were being used and what factors were dependent on water *ozonation use through the use of both a qualitative and quantitative process.*

Literature Review

Strategy

Strategy and objectives were stated by Chotipanich and Lertariyanun (2011) as important components that organizations needed to define to meet the needs of each customer group. Corporate strategy leads to corporate formulation strategy (Harrison, 1995; Kananurak, 2011), which is focused on who will create opportunities to increase income in conjunction with enhancing organizational customer loyalty.

Corporate leaders must provide customers with a more even value proposition (Persson, 2012), with strategies that better serve business opportunity (Hagen, Haile, & Maghrabi, 2003), because different strategies will affect different organizations as well and affect the positioning of one's company (Kalafatis, Tsogas, & Blankson, 2000).

Curiosity

For the benefit of analyzing the adoption of technology from people who do not have any or limited knowledge and experience to help them form a clear viewpoint, their curiosity not only greatly increases their insight into possible benefits, but also enhances their confidence in their ability to handle the technology they are considering adopting (Lu, Yao, & Yu, 2005).

This is consistent with Gayle (2007) who stated that as the consumer wants more information, they really begin to wonder if the innovation can help them and are pro-active in seeking out new information, both explicit and tacit. Their quest is also influenced by sources both inside and outside the community.

Cognizance or Awareness

Cognizance or awareness is one of the key components in determining a customer's acceptance behavior with awareness being one of the variables of consumer brand preference (Alamro & Rowley, 2011).

Lionberger (1968), in early research, stated that awareness was a key to using innovative technology. Islam and Gronlund (2011) further stated that cognizance is a person's degree of attentiveness and ability to depict beliefs in a certain time and space as an object, influence is the process of creating this cognizance.

Sudhir, Pandey, and Tewari (2012) additionally showed that lack of awareness was one of the hurdles in customers not using wireless telecommunications technology.

Provisional Trial

Provisional trail is the seeding trial or marketing trial, which is a form of marketing conducted in the name of research, designed to target product sampling towards selected consumers. In software development, beta-testing may also be referred to as conducting seeding trials (Marsden & Justin, 2006).

This is consistent with Bhattacherjee (2001) who stated that influencing one's intention to continue using is determined by the user's satisfaction with information systems use and the technology's perceived usefulness. Additionally, the expectation-

confirmation model (ECM) has frequently been used to determine the satisfaction and continued use of information technology (IT) after its acceptance.

This theory, which is based in social psychology, has already proven to be useful in the testing of IT post-acceptance behavior (González, Ibarrarán, Maffioli, & Rozo, 2009).

Testing

Technology testing and evaluation are embedded everywhere throughout government agencies and corporate entities. It is an integral component leading up to the selection and use of any service or product.

According to the National Research Council (2004) report on improving water security, it was stated that the Technology Testing and Evaluation Program (TTEP) was implemented to advance effective security-related technologies by rigorously testing their performance free of charge to manufacturers and making this information available to end users.

Acceptance

Acceptance is when users make personal decisions to choose a particular kind of product or service (Kotler & Keller, 2016; Suki, 2013) with one of the most commonly accepted models for studying personal intentions to use or adopt technology being the Technology Acceptance Model (TAM).

In a research for the Malaysian wireless Internet industry, services were stated as depending on user acceptance, as well as technology improvement (Lu et al., 2005). This is consistent with Davis' (1998) study, which stated that investigating a user's intentions to accept technology has always been a crucial area in information systems research. Acceptance rate is, therefore, defined as the relative speed with which members of society accept an innovation and measured by the length of time required for a certain percentage of society to adopt an innovation.

Use

Chen (2010) argued that if users do not perceive a technology's benefits, they may not use them. Thus, perceived usefulness and user satisfaction are important in motivation. Therefore, the perceived usefulness of **information technology** or computer technology is an extrinsic motivator of instrumental value (Lee, 2010; Venkatesh, 2000). The TAM also states that perceived usefulness has a direct effect on user's behavioral intention, and perceived ease of use affects behavioral intention indirectly through perceived usefulness (Davis, 1989).

Therefore, we wish to propose the following hypotheses which are also depicted in the conceptual model shown in Figure 1:

H1: Strategy has a positive impact on curiosity.

H2: Cognizance has a positive impact on curiosity.

H3: Curiosity has a positive impact on provisional trial.

H4: Curiosity has a positive impact on testing.

H5: Testing has a positive impact on provisional trial.

H6: Provisional trial has a positive impact on acceptance.

H7: Testing has a positive impact on acceptance.

H8: Acceptance has an effect on use.

Methods

Sample and Data Collection

Questionnaires were used to measure concept definition and practice of water ozonisation use within Thai industrial estates and in the eastern and central regions. For the study, Cronbach's alpha (Tavakol & Dennick, 2011) was used to evaluate the initial 50 samples which used a 5-point Likert (1972) type agreement scale survey. The values of alpha (α) that are considered acceptable ranges in value from 0 to 1, with higher better, with 0.70 or higher often quoted as being where acceptability begins. As the study's average value of the correlation coefficient was found to be 0.97, however, the results were deemed to be highly reliable.

Data collection was conducted between July and August 2014. The sample was drawn from a population of 7,006 companies located in 56 industrial estates. Using a 2-step method involving probability sampling and multi-stage sampling, the final population was determined to be 6,861 companies located in industrial estates in both the central region and on Thailand's eastern gulf seaboard (Table 1). This represented 98%
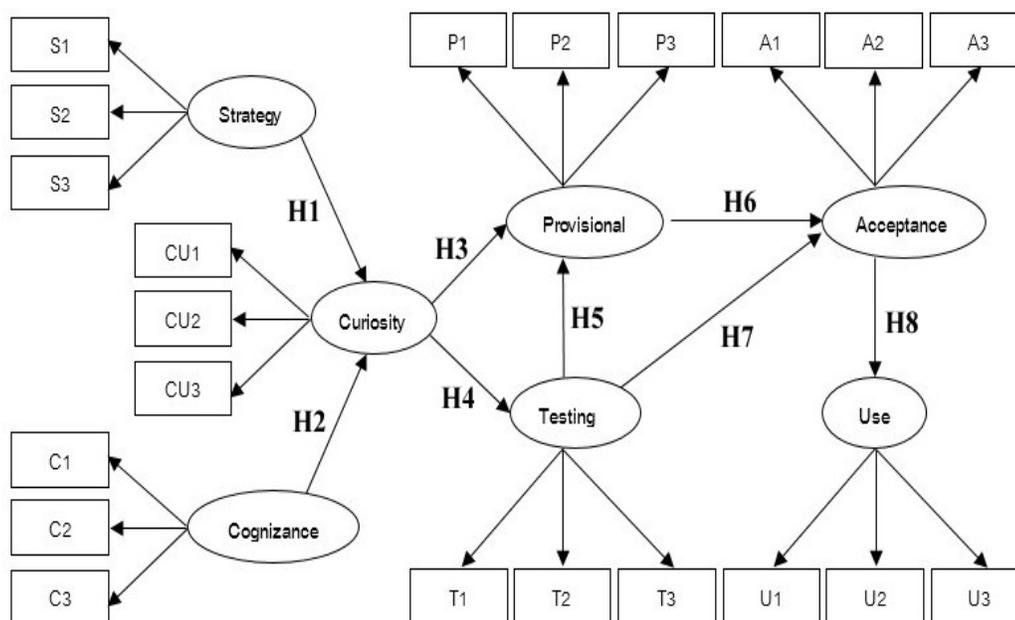
Figure 1. Conceptual model of ozonisation water treatment use.

of the total registered industrial estate companies in Thailand in 2014. The sample subsequently included the Bang Poo, Bangplee, and Lat Krabang Industrial Estates, as well as industrial facilities in Amata Nakorn, Amata City. Mataphut, and Laem Chabang Port.

Table 1
Thai Industrial Estates in 2014

Region	Locations	Companies
Central	17	2,310
Eastern Seaboard	29	4,551
Western	1	-
Northern	5	116
Southern	2	29
Northeast (Isan)	2	-
Total	56	7,006

Various means were used to inform each estate's management offices of a free seminar which was to discuss ozone water treatment technologies. These offices and their staff, along with university students, followed up with emails, letters, and phone calls, that eventually led to a total of 840 seminar attendees on multiple days and times. This represented an initial response rate of 22%. The seminar attendees represented decision and policymakers, purchasing agents, executives, managers, engineers, and technicians. Of the 840 attendees, after collection and audit of the 80-item survey, 500 were deemed usable for use within the study on ozone water treatment technologies. This represented a final response rate of 7.29%.

Sample Size

From the sample size determined by Schumacker and Lomax (2010), we used the 10–20 sample size suggested for each variable. Using 20 as the optimum number and with the research consisting of 21 variables (Table 2), 420 samples were deemed reliable from the 500 we obtained.

Measurement

The organization or grouping of the items was confirmed by use of LISREL 8.72 to conduct a confirmatory factor analysis (CFA) (Jöreskog & Sörbom, 2015) and the goodness of fit index (GFI) statistics. For this research, validity was analyzed using convergent validity (AVE), construct validity (GFI, CFI, RMSEA, Chisquare/df), and discriminant validity (square root of the AVE). Established criteria

for these was determined as statistical significance of $p > 0.05$, the $\chi^2 / df < 2.00$, RMSEA (root mean square error of approximation) < 0.05, GFI (goodness of fit) > 0.90 (Jöreskog & Sörbom, 2015), AGFI [adjusted goodness of fit] > 0.90 (Tabachnick & Fidell, 2007; Tanaka & Huba, 1989), and SRMR (standardized root mean square residual) < 0.05. Furthermore, SRMR ranges from zero to 1.0 with well-fitting models obtaining values less than .05 (Byrne, 1998). An SRMR of 0 indicates perfect fit but it must be noted that SRMR will be lower when there is a high number of parameters in the model and in models based on large sample sizes.

Results

Respondents' Characteristics

Table 3 shows the general characteristics of the survey's 500 respondents, which included entrepreneurs, decision makers, policymakers, corporate executives, and procurement personnel from industrial firms in central and eastern Thailand. As anticipated, most were male (73.2%) and under 30 years of age (36.4%). It was also interesting to note that all respondents had obtained a university degree, with 59% having an undergraduate degree, with the remaining 41% having obtained a graduate degree. Monthly salary responses showed that 59.8% had an income of less than 40,000 baht, while 17.2% had monthly incomes higher than 70,000 baht. Additionally, survey data showed that 70.6% indicated they were in management or executive positions. It must also be remembered that in Thailand the minimum wage per day is 300 baht ($US9.52), with starting salaries for university graduates often quoted as 15,000 baht per month ($US453.00). Finally, it was interesting to note that 59.2% had some prior experience/knowledge of ozone water treatment technologies.

Table 2
Summary of Latent Variables and Observed Variables along with Relevant Theory

Latent Variables	Observed variables (21 items)	Theory
Strategy	modern (S1) organizational development (S2) corporate social responsibility (S3)	Chotipanich & Lertariyanun, 2011; Hagen et al., 2003; Harrison, 1995; Kalafatis et al., 2000; Kananurak, 2011; Persson, 2012
Curiosity	working principles (CU1) work methods (CU2) beneficial curiosity (CU3)	Gayle, 2007; Lu et al., 2005
Cognizance	learning/training (C1) competitor recognition (C2) media perception (C3)	Alamro & Rowley, 2011; Islam & Gronlund, 2011; Lionberger, 1968; Sudhir et al., 2012
Provisional Trial	quality control testing (P1) systems compliance (P2) testing impact (P3)	Bhattacherjee, 2001; Franke, Keinz, & Steger, 2009; González et al., 2009; Marsden & Justin, 2006
Testing	quality control (T1) compliance verification (T2) testing impact (T3)	National Research Council, 2004
Acceptance	standard quality acceptance (A1) performance recognition service (A2) quality acceptance (A3)	Davis, 1998; Kotler & Keller, 2016: Lu et al., 2005; *Michman & Mazze, 2001;* Suki, 2013; Venkatesh, Morris, Davis, & Davis, 2003
Use	testing (U1) business use (U2) corporate social responsibility (U3)	Chen, 2010; Davis, 1989; Huijts, Molin, & Steg, 2012; Lee, 2010; Rogers, 1995; Venkatesh, 2000; Wisdom, Chor, Hoagwood, & Horwitz, 2014; Wood & Moreau, 2006

Table 3
Respondents' General Information

General Information	Number of Respondents	%	Level/ Rank
Gender			
Male	366	73.2	1
Female	134	26.8	2
Total	500	100	-
Age			
under 30 years old	182	36.4	1
between 30-35 years old	149	29.8	2
between 36-40 years old	70	14.0	3
between 41-45 years old	57	11.4	4
over 45 years old	42	8.4	5
Total	500	100	-
Education Level			
Bachelor degree	295	59.0	1
Graduate degree	205	41.0	2
Total	500	100	-
Income			
<40,000 Baht per month*	299	59.8	1
between 40,001-50,000 baht per month*	42	8.4	3
between 50,001-60,000 baht per month*	37	7.4	4
between 60,001-70,000 baht per month*	36	7.2	5
> 70,000 baht per month*	86	17.2	2
Total	500	100	-
Position in organization			
Executive	198	39.6	1
Manager	155	31.0	2
Engineer	97	19.4	3
Technician	50	10.0	4
Total	500	100	-
Company registered capital			
no more than 50 million baht	267	53.4	1
between 50-200 million	82	16.4	3
more than 200 million	151	30.2	2
Total	500	100	-
Company business experience			
- up to 10 years	321	64.2	1
- more than 10 years	179	35.8	2
Total	500	100	-
The experience of using the company's ozone generator			
Prior experience	296	59.2	1
Never	204	40.8	2
Total	500	100	-

Note: *On October 28, 2017, the exchange rate was 10,000 Baht = $US302.00

Structural Equation Model (SEM) Analysis

A SEM, along with the associated variables, that affect industrial estate manger's use of water treatment technologies using ozone is presented in Figure 2. The analysis of variables that affect water ozonisation use (after adjustment of the model) is found to be consistent with empirical evidence as shown in Figure 2. The statistical data of the SEM model for water ozonisation use was χ^2 (Chi-square) = 62.09, df =65, p = 0. 0.58, GFI = 0. 99, AGFI=0.96, SRMR=0.02, and RMSEA =0.00. Results and goodness-of-fit criteria is also presented in Table 4.

The research found that the variables that influence use the most are acceptance, followed by curiosity, provisional trial, testing, curiosity, and strategy (Figure 2; Tables 5 and Table 6).   All causal variables in the model have a positive influence on the use of ozone water treatment technology within Thai industrial estates. The final structural model was verified to achieve a good fit with the empirical data at 65% because of the decision to use new products in ozone water treatment technology. The product acceptance and use process is a mental process in which the individual goes through a process from first hearing about a new product until final acceptance (Kotler & Armstrong, 2013).

Table 4

Criteria and Theory of the Values of Goodness-of-Fit Appraisal

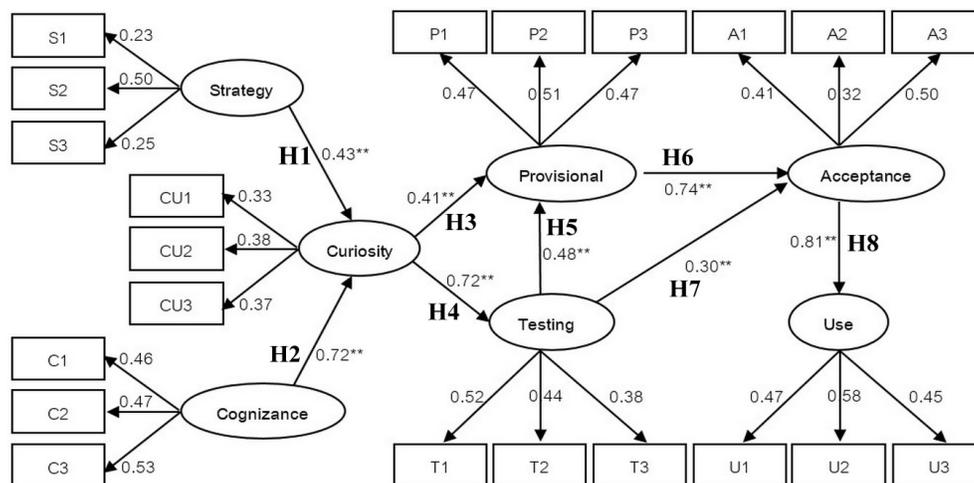| Criteria Index	Criteria	Values	Results	Supporting theory
Chi-square: χ^2	$p >0.05$	62.09	passed	Jöreskog & Sörbom, 2015
Relative Chi-square χ^2/df	≤ 2.00	1.35	passed	Steiger, 1990
Goodness of Fit Index (GFI)	≥ 0.90	0.99	passed	Jöreskog & Sörbom, 2015
Adjusted Goodness of Fit Index (AGFI)	≥ 0.90	0.96	passed	Tabachnick & Fidell, 2007
Root Mean Square Error of Approximation (RMSEA)	≤ 0.06	0.000	passed	Hu & Bentler, 1999
Standardized Root Mean Square Residual (SRMR)	<0.05	0.02	passed	Byrne, 1998; Hu & Bentler, 1999
Cronbach's Alpha	≥ 0.70	0.97	passed	Tavakol & Dennick, 2011

Figure 2. Final model.

Table 5

Direct, Indirect and Total Effects of Influencing Variables on Affected Variables

Latent Variables	Affected Variables														
	Curiosity			Testing			Provisional			Acceptance			Use		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Strategy	0.39** (0.08)	-	0.39** (0.08)	-	0.28** (0.04)	0.28** (0.04)	-	0.29** (0.04)	0.29** (0.04)	-	0.30** (0.05)	0.30** (0.05)	-	0.24** (0.04)	0.24** (0.04)
Cognizance	0.72** (0.10)	-	0.72** (0.10)	-	0.52** (0.05)	0.52** (0.05)	-	0.54** (0.04)	0.54** (0.04)	-	0.55** (0.05)	0.55** (0.05)	-	0.45** (0.04)	0.45** (0.04)
Curiosity	-	-	-	0.72** (0.10)	-	0.72** (0.10)	0.41** (0.10)	0.34** (0.06)	0.75** (0.10)	-	0.77** (0.10)	0.77** (0.10)	-	0.62** (0.09)	0.62** (0.09)
Testing	-	-	-	-	-	-	0.48** (0.08)	-	0.48** (0.08)	0.30** (0.07)	0.35** (0.07)	0.65** (0.07)	-	0.52** (0.06)	0.52** (0.06)
Provisional	-	-	-	-	-	-	-	-	-	0.74** (0.07)	-	0.74** (0.07)	-	0.60** (0.06)	0.60** (0.06)
Acceptance	-	-	-	-	-	-	-	-	-	-	-	-	0.81** (0.05)		0.81** (0.05)
Structural Equation Fit R^2		79			52			67			97			65	

Note: **$p<0.01$, Chi-square=62.09, df=65, *p*-value=0.58, RMSEA=0.00 GFI=0.99, AGFI=0.96, SRMR=0.02, DE = Direct effects, IE = Indirect effects, TE = Total effects

Table 6

Hypotheses Testing Results

Hypotheses	Coef.	t-value	Findings
H1: Strategy has a positive impact on curiosity.	0.39	5.03*	Supported
H2: Cognizance has a positive impact on curiosity.	0.72	9.31*	Supported
H3: Curiosity has a positive impact on provisional trial.	0.41	3.97*	Supported
H4: Curiosity has a positive impact on testing.	0.72	7.50*	Supported
H5: Testing has a positive impact on provisional trial.	0.48	5.89*	Supported
H6: Provisional trial has a positive impact on acceptance.	0.74	10.01*	Supported
H7: Testing has a positive impact on acceptance.	0.30	4.11*	Supported
H8: Acceptance has a positive impact on use.	0.81	16.15*	Supported

Note: *Sig. < 0.05

Discussion

The information about the service is the first stage of the adoption process that will lead to awareness, interest, evaluation, trial, and innovation adoption (Wisdom et al., 2014). During the curiosity stage, need is stimulated and information is sought. During the testing stage, the individual weighs the advantages and disadvantages of the purchase. The provisional trial stage consists of the initial purchase to determine how well the purchase satisfies those unfilled needs.

Acceptance follows a satisfactory trail, and subsequently the product is used on a regular basis (*Michman & Mazze, 2001)*. This is consistent with the widely-cited Technology Acceptance Model (TAM) by Davis (1989), which proposed a model for the acceptance and design of technology. TAM predicts that user acceptance of any technology is determined by two factors: perceived usefulness and perceived ease of use.

Other scholars, such as Venkatesh et al. (2003), added that TAM argues that users' intent to use a

technology is influenced by their perceptions of its usefulness and ease-of-use, among other factors. Perceived usefulness is a user's belief in the ability of the device to make common tasks easier. Perceived enjoyment is derived from a user's perceptions of a device being "enjoyable" in its own right apart from any consequence of system usage (Venkatesh, 2000).

Rogers (1995) extended on this theory in stating that groups have the potential for change with diffusion occurring in a five-step decision-making process. Diffusion occurs through a series of communication channels over a period of time among the members of a similar social system. Rogers' five stages or steps which were integral to the theory included: awareness, interest, evaluation, trial, and adoption.

Wood and Moreau (2006) further qualified Roger's steps in which it was stated that innovation acceptance is rarely a short process for customers with research suggesting that acceptance is rarely a neutral process. Additionally, customers can experience strong and sizable feelings and emotions in the early stages of technology use but it is not always straightforward in the sense that "easier is better."

Huijts et al. (2012) found that problems related to environmental and societal energy use have spurred the development of sustainable energy technologies, with public acceptance of these technologies being very important for their successful utilization within society. This is supported by Malaysian research of Suki (2013) concerning the labellng and branding of environmentally friendly products. Results revealed that a consumer's perception of the quality of eco-product labeling was the strongest determinant of their actual purchase behavior of a green product.

Consumer product customization was studied as a component of corporate marketing strategies (Franke et al., 2009). In this study, a key assumption was researched in which customized products create higher benefits for customers than standard products because they deliver a closer preference fit. The hypotheses turned out to be accurate as it was discovered that products customized based on customer preferences bring about significantly higher benefits for customers in terms of willingness to pay, purchase intention, and product attitude over standard products.

Benefits gained are higher if customers have a

better insight into their own preferences, a better ability to express their preferences, and a higher involvement with the product (Pumim, Srinuan, & Panjakajornsak, 2017). The research further determined that customization has the potential to be a powerful marketing strategy if these conditions are met.

The main findings of this study are that in the process of technology implementation within an enterprise, there are variables that influence various levels of perceptions and evaluations of the technology utilization from those held in a wider society. Thais, however, no matter which social strata or group they belong to, do tend to follow the same psychological evaluation path of technology implementation within an enterprise, from the testing stage, through the implementation stage, and finally the use stage.

This is supported by all the causal variables in the model having a positive influence on ozone water treatment use which can be explained by the variability of ozonation water treatment use at 65%. The final structural model was verified to achieve a good fit with the empirical data.

The latent variables having a direct influence on the use of ozonation water treatment technology is accepted with the influence of 0.81, while the remaining five of the variants—strategy, cognizance, curiosity, testing, and provisional trial—have only an indirect influence on the use of ozonation water treatment technology.

This study's determinations are supported further by the fact that ozone is much more effective as a disinfectant than chlorine and is used extensively in Europe to purify water. Research has proven that ozonation technology, when used as the basis for the removal of persistent micropollutants contained in a municipal bio-treated wastewater effluent, is suitable to remove the major part of the organic micropollutants. Additionally, from the literature review, ozonation technology was shown to be effective in removing secondary urban micropollutants effluents regulated by European Directives (McArdell, 2015).

Considering the priority of the variables caused by the combined influence of the individual variables showed, variables that influence the use of ozonation water treatment technology most are: acceptance, curiosity, provisional trial, testing, cognizance, and strategy (0.81, 0.62, 0.60, 0.52, 0.45 and 0.24), respectively.

Conclusion

The water and waste management industry is gaining importance as growing environmental awareness drives the need to provide sustainable water solutions and deploy effective green waste management techniques. Water conservation, such as rainwater harvesting and water treatment technologies, are being developed to handle water management problems in big communities, commercial establishments, mining environments, and the like. Additionally, under Thailand's King Rama IX's philosophy of sustainability for survival, water conservation and sustainability have been given a high priority, and formalized as a framework within the national social and economic development plan (2012–2016; Poungsuk et al., 2016).

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