

Ewaste- word of mouth (EW-WOM) generation: A fuzzy set Qualitative Comparative Analysis (fs/QCA)

Abstract

Purpose –This study aims to examine the asymmetrical relationships among information-sharing desire, moral attitudes, lack of concern, relative advantage, market maven tendency, and complexity as the antecedents of Ewaste-word of mouth (EW-WOM) generation.

Design/methodology/approach – To obtain a holistic view and the interrelationships between conditions, the configural analysis was conducted to assess the asymmetrical relationships using Fuzzy Set Qualitative Comparative Analysis (fs/QCA). In addition, construct validity, reliability, and symmetrical relationships between antecedent conditions (i.e. exogenous constructs) and outcome conditions (i.e. endogenous constructs) are examined using VB-SEM technique.

Findings – Results imply that market maven tendency accounts for 86.8% of the sum of the memberships in EW-WOM generation. Eleven configurations show sufficiency in constructing EW-WOM generation. The configuration of $\text{relativeadvanta}^*\text{moralattitudes}^*\text{marketmaventend}$ shows the highest consistency value (0.939684) in producing EW-WOM generation (outcome condition). The $\sim\text{relativeadvanta}^*\text{moralattitudes}^*\text{complexity}^*\sim\text{lackfconcern}$ with raw coverage of 0.626757 and consistency value of 0.864088 show the most sufficient configuration path in producing the outcome.

Originality/value – Product review and recommendation are easily shared in various communication formats and consumers are prone to disseminate information and their experiences with other market segments. However, the role and phenomena of such viral communication in preventing environmental issues caused by electronic and electrical devices (i.e. Ewaste) are not well understood. This study is among a few attempts at understanding consumer's decision-making process to engage in Ewaste activities such as the reduction of garbage, recycling, composting, and the reuse of electronic or electrical devices.

Keywords: Ewaste- word of mouth (EW-WOM); Configurational Theory; fuzzy set Qualitative Comparative Analysis (fs/QCA)

Paper type Research paper

1. Introduction

Obtaining a favourable amount of word of mouth (WOM) from target markets is greater agenda for both non-profit and for-profit-organizations due to its perceived unbiased and effectiveness of such information. Because WOM is mainly generated and distributed via online platforms which comprise merchandise evaluation and firm's reputation (Lee *et al.*, 2013), the inclusion of electronic WOM has been given extensive attention and firms are on the verge to utilize it to achieve desired product recommendation and sales (Konuk *et al.*, 2015; Zhang *et al.*, 2018). Moreover, with consumers increasing reliance on online retailing and continued growth of social platforms, the importance of electronic WOM should not be underestimated (King *et al.*, 2014; Lee *et al.*, 2013; East *et al.*, 2014; Wen-Hai, 2019). An individual who has experience and extensive knowledge of merchandise and brands is more likely to participate, generate and disseminate product details to other market segments (Chen and Liu, 2019). Product reviews and recommendations are easily shared on the Internet platforms such as microblog, and virtual chat app (Gupta and Harris, 2010; Hornik *et al.*, 2015; Markowitz-Elfassi *et al.*, 2019) and customers are inclined to listen and guided by making reference to the experience provided by the maven. While market maven tends to share market information and they have a desire to help others (Mazzarol *et al.*, 2007), however, there is little empirical research dedicated to understanding mavens' motives or their other psychological characteristics.

Furthermore, the rapid growth of the electronic industry coupled with shorter product life cycle is causing the electronic devices being replaced by new-fangled models at a very fast pace (Widmer *et al.*, 2005; EcheGARAY, 2016). Electronic waste or often known as Ewaste refers to the variety of consumer and business electronic devices which reach the end of its useful life (Pérez-Belis *et al.*, 2015). Refer to Taylor and Todd (1995a) in defining waste management behaviour (p. 626), in this study Ewaste refer to the reduction of garbage, recycling, compositing, and the reuse of electronic or electrical devices. It includes devices such as computers, television or monitor screen, computing

peripheral devices, mobile phones etc. Abandoning of obsolete electrical devices can be hazardous to the environment due to the hazardous materials and components they contained (Khetriwal *et al.*, 2009). In addition, there is growing contemporary interest to unravel the influence of WOM on environmental issues (Wang *et al.*, 2018). However, there is a dearth of study in examining the role of mavens in promoting environmental problem caused by Ewaste. The technology attractiveness, emotion, cognition, and self-efficacy might be related to consumer's information sharing desire towards Ewaste activities. Thus, understanding consumer's moral attitudes, lack of concern, relative advantage, mavenism tendencies, and complexity as the antecedent condition towards EW-WOM generation.

Efforts have been made to boost up Ewaste awareness and sustainable consumption in different countries (Pariatamby and Victor, 2013; Minton *et al.*, 2018). In the case of Malaysia, waste disposal facilities and infrastructures are designated by the Government for waste generated by the industry only. While Ewaste recycling is enforced under the first schedule of Environment Quality Schedule Wastes Regulations, 2005, but, household Ewaste is not legitimately covered by this law. As such the waste and specially Ewaste produced by the household are processed by non-government entities through non-government organizations, charity bodies, door to door collectors and recycling individual buyers. In general, Malaysian household unawareness of Ewaste disposal remains a daunting task. The general public is not aware of the importance of handling and disposal of hazardous household Ewaste. As such local communities in Malaysia are utilizing Internet technology to educate the household about the waste. With more exposure to Ewaste, socially concerned people who believe they have gained the related information have the tendency to share the information with others. WOM serve as a driver in promoting public welfare such as public healthcare (Kitapci *et al.*, 2014), energy saving behaviour (Sweeney *et al.*, 2014) and city image (Doosti *et al.*, 2016). In promoting living and healthy lifestyle, Arvola *et al.* (2008) demonstrated the importance of WOM in the consumption of healthy organic food. Thus, understanding people who believe they possess more useful and practical information that is corroborated by the notion of Ewaste in the emerging economy such as Malaysia is important. However, the experiences and consumer engagement about Ewaste reduction and sharing information of recycling obsolete electronic device is dearth in the literature. Hence, the function of WOM to share information within society is essential to Ewaste management.

Therefore, the purpose of this study is to examine the asymmetrical relationships among information-sharing desire, market maven tendency, moral attitudes, lack of concern, relative advantage, complexity, and EW-WOM generation. In addition, symmetrical relationships between exogenous constructs and endogenous constructs are examined. This research is organized in the following sections. The introduction part discussed the vital roles of understanding consumers and market maven in preventing environment issues caused by electronic waste and related concerns. The next section (The second section) discusses the theoretical background of the study. The third section, “configural analysis” and associated method to assess the asymmetrical relationships between antecedent conditions and outcome condition are presented. In addition, symmetrical relationships between variables are examined. Lastly, the practical and theoretical implications are discussed.

2. Theoretical background

The shift from offline to online environment increases the need to develop a theoretical and empirical research to unravel online customer's behaviour (Toufaily *et al.*, 2012). Drawing from literature, there is a lack of studies on psychological characteristics and motives which lead to the development of individuals mavenism (Clark and Goldsmith, 2005; Rezaei, 2017). As such, a series of concepts, theories and models are proposed to explain consumer attitude and behavioural intention such as Theory of Reasoned Action (Fishbein and Ajzen, 1975), and Motivation Model (Davis *et al.*, 1992). WOM contains large amounts of information in the form of recommendations and personal experiences to be shared and learned by others (Chevalier and Mayzlin, 2006; Paridon *et al.*, 2006). This would be more effective if the person who disseminate the WOM is regarded as the expert in the related field. Tan *et al.* (2017) concluded that personal environmental knowledge was an important determinant in melding the attitude towards E-waste recycling intentions. Furthermore, market mavens are long been regarded as influential in their followers' purchase decision (Feick and Price, 1987) and raises the awareness of public social responsibility such as the public health sector. While market maven is considered as one key determinant in the information sharing perspective of WOM (Geissler and Edison, 2005; Atkinson, 2013), however, the current models and theories seldom consider market maven tendency as the source

of EW-WOM generation. Figure 1 depicts antecedent conditions and outcome condition in determining EW-WOM generation.

Figure 1. Conceptual illustration of antecedent conditions and outcome condition (Insert here)

2.1 Lack of concern

In general, the public reaction towards the concept of waste management might be related to their lack of concern about the environment (Stefan *et al.*, 2013), but people would feel guilty when they are behaving in a wasteful manner (Bolton and Alba, 2012). According to Echegaray (2016), there is a relationship between consumer perceived product durability and environmental concerns in emerging markets. Many people are unfamiliar with EW-WOM due to lack of information on legislation and disposal methods. In addition, consumers are largely unaware of the harmful and negative consequences on their health and environment caused by dumping obsolete electronic devices. Market maven enjoys introducing a new product to friends; they are helpful to provide information because they tend to get recognition as knowledgeable and expert in the market. Previous study (Zhang *et al.*, 2018) hypothesises that higher green concern leads to a more negative impact on green purchasing intentions of the greenwashing perception. Similarly, Ewaste can only be effective with the continued cooperation of various stakeholders, i.e. government, producers and the public concern. It is often accomplished by a group of people with common interest engaged in social community activities. For instance, active involvement of consumers leads to the success of the informal recycling campaign in China (Chi *et al.*, 2011). They only took part after they realized the negative consequences and serious damages caused to the environment. Alexandrov *et al.* (2013) investigated the importance of personal and social motive behind WOM on 494 respondents in the United States. The result indicated that positive WOM satisfied the social need more when compared to negative WOM. This demonstrated that social motives could lead to the generation of WOM. Consequently, market maven is anticipated to fill in the role to disseminate the required information needed with regards to EW-WOM. Thus, we suggest the following:

H1. Lack of concern is associated with moral attitude (H1a), market maven tendency (H1b) and E-WOM generation (H1c).

2.2 Relative advantage

Theoretically, Rogers (2002) regarded the relative advantage of innovation far more superior than the idea it might replace which includes both the benefits and costs derived from using or implement the new idea and innovation. Diffusion is “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2002p. 34). Choudhury and Karahanna (2008) found that consumers might engage in online activities if they perceived the relative advantages. According to Wang *et al.* (2018) commitment to the environmental issues lead to extra values to firms green services and the fairer decision of the service and products. Accordingly, WOM has been regarded as the major source of information for online users due to its relative useful features such as convenience and information quality (Huang *et al.*, 2011; Gupta and Harris, 2010). Litvin *et al.* (2008) found that hotel customers’ decisions are not influenced much by the print media such as newspapers and magazine. They relied on the suggestions and recommendations of friends communicated to them personally. Chen *et al.* (2014) related the influence of WOM on the green product in Taiwan and stressed that product quality and user satisfaction served as a factor to link the green consumption and WOM. Hence, online users’ salient beliefs in the relative advantage gained in exploring Ewaste products can be the antecedents in shaping the moral attitude, market maven tendency, and EW-WOM generation. Thus, we propose the following:

H2. Relative advantage is associated with moral attitude (H2a), market maven tendency (H2b) and E-WOM generation (H2c).

2.3 Complexity

Complexity is a dimension of diffusion theory applied in this study. According to the theory, it refers to the degree of difficulty associated with apprehend and adopts the innovation (Rogers, 2002). The complexity influences the rate of adoption inversely and an innovated product would be adopted swiftly if it is not difficult to understand and easy to be used. Complexity also arises when consumers need to

be brief with how to dispose of waste materials of different categories. Furthermore, different types of obsolete devices are undergoing a different form of disposal methods and have to reach different disposal centres (Khetriwal *et al.*, 2009). Therefore, this is certainly a challenge for consumers to understand it clearly. As Ewaste encompasses a wide variety of different obsolete electronic devices, the consumers need to be equipped with a fundamental understanding of where to dispose of them. Both market maven and opinion leader are potential crowd-puller in most situations, but market mavens are people who have gained more market exposure and expertise (Brancaleone and Gountas, 2007). In general, as market mavens are early adopters of new products (Goldsmith *et al.*, 2006), it is anticipated that maven tendency has a direct relationship with the complexity involved in EW-WOM. Thus, we suggest the following:

H3. Complexity is associated with moral attitude (H3a), market maven tendency (H3b) and E-WOM generation (H3c).

2.4 Information sharing desire

Theoretically, mavens have a decent attitude and response towards retails or brands due to the fact that they viewed both quality and price as important in the decision-making process (Martínez and Montaner, 2008). They are knowledgeable in shopping activities and enthusiastic to share their information, knowledge, and idea with other shoppers and target groups (Goldsmith *et al.*, 2006; Rezaei, 2017). Market mavens are the source of general as well as non-specific marketplace information (Brancaleone and Gountas, 2007; Atkinson, 2013) and they are more likely to advise others about several ranges of products. Due to their high involvement in the marketplace, mavens are expected to experience a concrete connection in decisions making process (Smith and Bristor, 1994). Nevertheless, good quality information such as relevancy, accuracy, and details that emerged from credible sources are infrequent and maven are more likely to access third-party owned “infomediaries” like product review and product rating.

WOM is undoubtedly regarded as the reliable source for obtaining information within the electronic platform (King *et al.*, 2014; Wen-Hai, 2019). Stefan *et al.* (2013) established that WOM is

one of a trusted source of accessing reliable and useful information in order to propagate the benefits of food waste. Following a previous study (Zhang *et al.*, 2018, p. 742) this study defines the WOM as the “verbal communication between consumers and other people or parties, such as channels, product or service producers, experts, friends and relatives” which may result in both positive WOM and negative WOM. Mazzarol *et al.* (2007)’s work shows that market mavens basic personal motives includes marketplace involvement because this market segment attends to advertising, use coupons, and enjoy shopping more frequently (Feick and Price, 1987; Rezaei, 2017). Market mavens are expected to adopt innovative products as the primary step to increase or maintain their status among other consumers as knowledgeable consumers for social distinctiveness (Hoffmann and Broekhuizen, 2010). The main source of impartial and valuable information needed can be obtained via WOM. Consequently, consumers would search for an unbiased opinion and Ewaste product information shared by experienced shoppers. Thus, we suggest the following:

H4. Information sharing desire is associated with (H4a) moral attitude, (H4b) market maven tendency and E-WOM generation (H4c).

2.5 Moral attitude

Moral attitude is derived from the sense of human duty in believing the consequences of the rational or logical action taken (Sunderer and Rössel, 2012). This corroborates with what was aptly described by Ajzen and Fishbein (1980) expectancy-value theory. It is referred to as one person’s assessment of the values or benefits gained from the behaviour conducted in response to a situation. Hence, moral attitude refers to what a person thinks or feels that is right or wrong. A study conducted by Stefan *et al.* (2013) on 244 Romanians on food waste behaviour, revealed that moral attitude stimulated a good habit of not wasting food. Sunderer and Rössel (2012) argue that moral motives and economic influences are essential elements for predicting the buying fair trade groceries. This notion is consistent with Olsen *et al.* (2010) work on the vital role played by moral attitudes. It validates that guilt feeling derived from doing something harmful to the natural environment (Minton *et al.*, 2018). In most situations, attribute leads to the recurring of conducting a specific behaviour when a person has prior experience. Thøgersen and Ölander (2006) have validated that morality exerts more influence on the choice of organic red

wine over non-organic red wine stronger when the consumer has tasted the organic red wine previously. In contrast, members of the virtual community are more obliged and motivated to help other members in social media platform (Brodie *et al.*, 2013). They tended to contribute and share good practice. Likewise, as a market segment, the market mavens are individual more likely to engage in knowledge sharing (Feick and Price, 1987). Market mavens often have the market information, they conveyed voluntarily it to consumers, thus, the benefits of Ewaste in protecting, and conserving the environment should be promoted by sharing with others. Thus, we propose the following:

H5. Moral attitude is associated with (H5a) market maven tendency and E-WOM generation (H5b).

H6: Market maven tendency is associated with E-WOM generation.

3. Data, analysis and results

With the aim to ascertain the empirical indicators based on underpinning theory, measurement items are adopted from previous studies with the use of indicator approach as the dominant approach. Appendix A depicts the measurement items and sources of antecedent and outcome conditions. In particular, four items were adapted from Moldovan *et al.* (2011) to measure EW-WOM generation. Moldovan *et al.* (2011) used two different dependent variables including the amount of WOM and the valence of WOM. This study uses the amount of WOM to measure the EW-WOM generation. This is consistent with the common indicator model which encompasses a list of indicators based on psychometric theory (Ragin, 2007b). Accordingly, non-probability sampling technique is performed to collect data from several private and public university students in Malaysia.

Common method bias or variance (CMV) might exist in a single survey method (Podsakoff *et al.*, 2003), thus, to ensure that CMV is not an issue, this research addresses the potential threat following the guideline recommended by Podsakoff *et al.* (2003). Using fs/QCA software (Ragin and Davey, 2014), the frequency of sample characteristics were analysed based on age, education, and income. The sample include 459 valid response from respondents (Male=45.5, Female=54.5) across different ethnic groups (Malay=38.6; Chinese=44.2; Indian=13.1; other ethnicities=4.1). While methodological research requires response rate to be as high as 50%, QCA does not draw causal inferences based on

the sample size (Ragin, 2007a).

Construct validity and reliability are assessed with the use of structural equation modelling (SEM) technique. SEM examines the inter-relationship among the indicators from a single concept in deriving the multiple concepts. Accordingly, to assess the measurement and structural relationship for exogenous and endogenous constructs, partial least squares (PLS) path modelling approach and methodology (Lohmöller, 1989), a family of SEM technique, was taken. The SEM technique for parameter assessment and hypothesis testing is advantageous (Henseler *et al.*, 2009; Hair *et al.*, 2011; Hair *et al.*, 2012) compared to the first generation technique of data analysis (Chin, 1998; Hoyle, 1995; Valaei and Rezaei, 2016) because SEM combines several methodological procedure and processes in a “holistic fashion” (Chin, 2000). As shown in Appendix B, Dijkstra-Henseler's rho (ρ_A), Jöreskog's rho (ρ_c), Cronbach's alpha(α) values show that the measurement items are statistically valid and reliable. Thus, once the assessment of measurement validity and reliability were assessed and results show acceptable values, then, the study proceed with the assessment of asymmetrical relationships.

3.1 Fuzzy-set/Qualitative Comparative Analysis (fs/QCA)

In this study, fs/QCA is performed to obtain a holistic view of the interrelationships and assess the asymmetrical relationships between antecedent conditions and outcome conditions. QCA (Ragin, 1987, 2000, 2008) was initially designed to analyse the crisp set membership, especially Boolean sets and cases which are closely matched are compared to determine the causal conditions. This technique and research stream mainly focus on the investigation of the combinations of conditions which it differs from conventional quantitative approaches, including regression and multivariate analysis as it does not provide “single correct answer” (Ragin, 2007a). The focus is pairs of cases which can be differentiated with one single causal condition (Ragin and Sonnett, 2005). Comparative and similar case-oriented approaches are rooted on the intersectional basis, hence, the lack of rigor has weakened the statistical power as well as the degree of freedom (Ragin and Sonnett, 2005). However, cases are matched based on their hypothetical relationships and distinguished by their arrangements of causal factors (Ragin and Sonnett, 2005; Valaei *et al.*, 2017). It is served as the midpoint for the case-oriented and variable-oriented approaches. In fact, the synthetic strategy would coordinate the case-oriented approach with

the most suitable characteristics of the variable-oriented approach (Fiss *et al.*, 2013). Thus, the setup system of QCA provides an accommodating aide for the counterfactuals design in social science studies with respect to the threshold values for the frequency and consistency (Ragin, 2007a).

Moreover, the Configurational Theory has arguably been held back by a mismatch between theory and methods. The underlying theoretical assumption of configurational theory emphasizes the need for synergistic and equifinalistic outcomes (Valaei *et al.*, 2017). The dependency on econometric approaches leads to the importance of linearity, unifinality and additive effects (Fiss *et al.*, 2013). Regularity theory identifies a necessary condition for describing causation. It fails basically because the association is not causation and there is no reason why purely logical restrictions on law-like statements should be sufficient to characterize the causal relationships (Brady, 2002). However, the majority of social sciences theories lack rigor with regards to indicating how causal conditions are consolidated to deliver the results. Hence, hypothetical points of view were derived from a list of potential causal elements (Ragin and Sonnett, 2005). It is optimal to use set-theoretic logic to unravel the various situations which distinctive from the fuzzy set (Ragin, 2006). It can be applied to many areas of social science. Fuzzy set strongly connects to crisp-set theory as displayed in the comparative method and are particularly capable in light of the fact that they enable researchers to partially calibrate the membership in sets (Ragin, 2003). This is accomplished via the use of values ranging from 0 to 1, including the relationship of the subset (Ragin, 2007a; Valaei *et al.*, 2017). Good causal inference should satisfy the requirements of causality theories such as counterfactual theory, neo-human regularity theory and manipulation theory for mechanisms and capacities (Brady, 2002). While the reconstruction of set relations in formulating hypothesis is a popular practice in social science studies, uncertainties arose for its lack of rigor (Ragin, 2006). In quantitative studies, statistically, the sample population should be large (Ragin and Sonnett, 2005) to provide the causal explanation for the regression coefficients supporting the underlying theoretical assumptions (Fearon, 1991). Therefore, the theoretical linkage of fuzzy set QCA provides another way for social science studies beyond the correlational relationship (Ragin, 2007b; Valaei *et al.*, 2017).

3.2 Necessary Conditions and Truth Table Analysis

Using fs/QCA software 2.0 (Ragin and Davey, 2014), data were altered by calibrating the cases in sets (0.0 to 1.0) in order to measure the degree of membership. This calibration step produces the required fuzzy variables from the corresponding conventional variables (Ragin *et al.*, 2008). Table 1 depicts the analysis of necessity condition. For the presence of E-WOM generation, consistency values range between 0.550415-0.888799, for both the presence and negation of the causal conditions. The results imply that none of causal conditions exceeds 0.9 threshold, thus, they cannot be considered necessary condition. According, proceed with the fuzzy set analysis to identify sufficient combinations of causal conditions that explain EWOM generation. Hence, the list of causal conditions attained the consistency needed.

Table 1: Analysis of Necessary Conditions

The list of combinations of the causal conditions, as well as the outcome related to each combination, can be obtained from the Truth Table (Ragin and Sonnett, 2005). In addition, the coverage for the combinations of the causal conditions in this study was able to cover the instances caused by the outcome conditions. Depicted by the Truth Table analysis in Table 2, the standard analysis procedure was selected in order to perform the Truth Table Analysis. All values obtained are greater than 0.80 and indicated that substantial consistency existed among the eleven configurations. Eleven configurations of antecedent conditions occur with acceptable consistency indices (≥ 0.80). Ragin's (2008) emphasises the importance of causal paths with greater raw coverage. Depicted in Table 2, configurations 2 and 6 leads to higher membership in outcome. Thus, eleven configurations can be used to explain the E-WOM generation.

Both the complex and parsimonious solutions are analysed. "Standard Analyses" are required as it provided the solution and paths (Ragin *et al.*, 2008). Table 2 depicts the paths leading to the outcome condition. The intermediate Solution model (ew-womgeneratio) Algorithm using Quine-McCluskey shows the frequency cut off value of 1.00, consistency cutoff of 0.831588 with solution coverage 0.887705 and solution consistency of 0.736966. Furthermore, Parsimonious Solution (Model

2: ew-womgeneratio) indicate that lackfconcern raw coverage of 0.710820 with the consistency of 0.794909; marketmaventend raw coverage of 0.867597 with the consistency of 0.788377, Moralattitudes raw coverage of 0.859818 with the consistency of 0.838937; and Relativeadvanta raw coverage of 0.715948 with the consistency of 0.774591. Thus, the model 2 solution coverage is 0.972056 and solution consistency is 0.688078.

Table 2: Sufficient configurations of antecedent conditions (Insert here)

3.3 Sub/Super Solution

QCA offers more than the tools in explicating the complexity of the endpoints that might be examined. As such, the results from set coincidence in this study obtained and results show that coincidence=0.244497 (relativeadvanta, information-sha, moralattitudes, complexity, marketmaventend, ~lackfconcern). Furthermore, it is essential to discover the correct cause in the occurrence of the concerned outcome because the sufficient cases are needed for the outcome to occur from a theoretical perspective (Ragin *et al.*, 2008; Valaei *et al.*, 2017). However, causes are unnecessary when the underlying theoretical assumption is independent of other related causes. It can also be used to provide the intermediate solutions (Ragin *et al.*, 2008). In this study, EW-WOM is found to be the subsets of parsimonious nature in forming the intermediate solutions. Table 3 shows the Subset/Superset analysis.

Table 3: Subset/Superset analysis (Outcome: ew-womgeneratio) (Insert here)

4. Discussion and implications

4.1 Theoretical implications

Theory-driven assumptions are essentially important in validating the regression outcomes (Fearon, 1991), thus, the simple case-based analysis should be considered to estimate the causation outcomes from each of the variable or the treatment effect. In fact, counterfactuals are closely related to the existence of causal relationships (Brady, 2002). Methodologically, while regression models, *F*-test, and

t-tests are widely used to examine how influential are the variables in explaining the R^2 values and dependent variables, however, these tests are incapable in determining dependent conditions from a counterfactual perspective. This study provides a theoretical understanding of market maven tendency and EW-WOM generation using QCA. It reveals that the interrelationship among relative advantage, complexity, lack of concerns and moral attitude are critical in explaining the EW-WOM generation and behaviour. In order to encourage the user communities' involvement, the antecedent conditions were theorised and empirically tested. In addition, relative advantage and complexity derived from diffusion theory in linking up the assimilation involved are thus supported. The influential power of EW-WOM should not be underestimated as it is one way to draw attention to preserving the natural environment. The functionalities of WOM offer the opportunity to make it more acceptable by the market maven. As such, this study shows that mavens are an important market segment to adopt an innovative way for active participation and influence other users in generating EW-WOM.

Moreover, symmetrical relationships between exogenous and endogenous constructs are examined. Appendix C depicts the direct effect inference for structural relationships. Using PLS bootstrapping procedure, path coefficients and *t*-values between constructs are examined. We assessed the direct relationship between each of first level constructs and the endogenous construct, i.e. EW-WOM generation. Among them, relative advantages, complexity and information sharing desire exerted influences on EW-WOM generation, i.e. the path of relative advantages (path coefficient = 0.175, $t=4.733$, $p=0.00$), complexity (path coefficient=0.113, $t=4.866$, $p=0.00$) and information sharing desire (path coefficient =0.093, $t=3.490$, $p<0.05$). However, lack of concern path coefficient was insignificant (path coefficient=-0.074, $t=1.881$, $p>0.05$). People have demonstrated low consciousness towards the disposal of electronic products in the existing literature. This led to less concern about the implications caused by E-waste and perceived as not affecting the environment directly.

The structural relationships between EW-WOM generation, market maven tendency and moral attitudes are statistically significant with EW-WOM generation and moral attitude path (path coefficient =0.593, $t=15.113$, $p<0.05$), and market maven path (path coefficient =0.110, $t=2.382$, $p<0.05$) respectively. Among these two paths, moral attitude exerts stronger influence as expected because morally ethical individuals were motivated to generate environment related WOM. Market maven

tendency demonstrated weaker influence because market mavens are often not closely related or associated, like friends or relative with the consumer (Hayes *et al.*, 2016).

Market maven tendency significantly influence relative advantages (path coefficient =0.122, $t=2.685$, $p<0.05$), and information sharing desire (path coefficient =0.131, $t=3.827$, $p<0.05$). However, complexity (path coefficient =0.047, $t=1.481$, $p>0.05$) and lack of concern (path coefficient =-0.031, $t=-0.643$, $p>0.05$) were not supported. E-waste awareness and information are considered as complicated and lower degree of impact as compared to other direct environmental issues, such as air pollution and green environment (Awasthi *et al.*, 2018). As for moral attitude, except for relative advantages (path coefficient =0.097, $t=1.421$, $p>0.05$), the results demonstrate a significant relationships between moral attitude construct with lack of concern (path coefficient =0.255, $t=4.036$, $p=0.00$), complexity (path coefficient =0.181, $t=5.311$, $p<0.05$) and information sharing desire (path coefficient =0.355, $t=8.570$, $p<0.05$). However, the non-supported of the relationship between relative advantages and moral attitude can be explained by the comparatively fewer information on the relative advantage of E-waste WOM generation. In general, people are more likely to search for information relating to their lifestyle rather than environmental protection related information.

4.2 Practical implications

To provide a clear path to understanding why and how some consumers differ from others, understanding market mavenism as a target market is important for both practitioners and academicians (Goldsmith *et al.*, 2012; Atkinson, 2013; Rezaei, 2017). Practically, market mavens have been profiled in terms of unique behavioural characteristics and psychological tendencies (Zhang and Lee, 2013). In the past decade, electronic WOM has since subsumed these traditional methods and became more common and much electronic commerce firms regarded it as the effective method of communication (King *et al.*, 2014). Consumers are very open to experiences and are interested in many different activities. For instance, they are intellectually curious and like to explore new and infrequent ideas (Atkinson, 2013). Using a sample of experienced shoppers from Australia, market mavenism tendency and age were found to be positively related to frugality (Bove *et al.*, 2009). Hence, online consumers regard market maven as a compelling guide in their buying choices. Smith and Bristor (1994) found

that the relationship between market maven role and purchase risk is minimal as opposed to purchasing involvement. In line with the finding of this study, Christou (2011) hypothesized that market mavens are positively influenced by (a) online information search for sales promotions of products and (b) assessments of sales promotion benefits. Therefore, it is noteworthy that consumers information sharing is of high important in sharpening their environmentally friendly choices.

The market mavens are interested and enthusiastic about aspects of shopping, stores, advertisements, and products (Goldsmith *et al.*, 2012), which suggest that market mavens are critically important influencers in the preventing environmental issues. Government, producers and the general public are sharing the responsibility of Ewaste operations. In developed countries, the responsibility is to carry out by the producers, as practised under Extended Producer Responsibility (ERP). EPR requires the producers to extend their responsibility to the entire product lifecycle and accountable for the end of life disposal process. Government and municipal authorities form another branch of studies on Ewaste management. Furthermore, there is also a dearth of studies exploring the attitude and responsibility of residents in preserving the environment from harmful acts caused by improper disposal of Ewaste (Sidique *et al.*, 2010; Wang *et al.*, 2011; Saphores *et al.*, 2012). In order to tackle this major environmental and health issue, policymakers and governments are providing guidelines for corporations to manage the disposal and recycling process effectively. For example, the European Union issued instructions to prohibit the inclusion of harmful elements in electrical and electronic devices (Khetriwal *et al.*, 2009). Effective management and public awareness of Ewaste are critically important because of its hazardous consequences to the environment (Konuk *et al.*, 2015). Furthermore, consumers might intend to share their shopping experience and co-produce the related contents online. Users are bombarded with tones of user-generated content in their virtual communities and subsequently influence their behaviours. Thus, highly available user-generated contents are changing the way online user's access to information and sharing EW-WOM process.

4.3 Limitations and future research directions

The results of this study should be interpreted with caution. The study sample was drawn from Malaysia that might limit the generalisability of finding. However, previous studies carried out in the developed

countries have been centered on assessing the users' acceptance and adoption. In fact, the importance of E-waste activities based on user experience should be considered in such developed countries. Therefore, future researchers can be undertaken in both developed and developing countries by relating the theoretical implication and finding of this study. Moreover, electronic WOM can be interpreted as either optimistic or pessimistic description (positive vs negative) by customers about the organization or the products distributed through the Internet. While this study examined several antecedent conditions in explaining EW-WOM generation, future studies should consider the positive and negative aspect of electronic WOM. Lastly, while the findings of this study are based on cross-sectional data collection approach, consumer attitudes and behaviour might change during the long period of time. Thus, the longitudinal data collection approach should be considered in order to uncover consumer attitudes and behaviours towards environmental concerns.

Appendix A: Measurement items and sources (Insert here)

Appendix B: Construct Reliability (Insert here)

Appendix C: Direct effect inference (Insert here)

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Appendix A: Measurement items and sources

Variable	Scale**	Sources
Information-sharing desire*	ISD1 I want to share e-waste*** information that enables transactions in the market to be sensible.	Lee <i>et al.</i> (2013)
	ISD2 I hope to share e-waste information about a product that I bought in the market.	
	ISD3 I wish to share the e-waste service information that I obtained in the market.	
	ISD4 I want to share e-waste information about a seller in the market.	
Moral attitudes	MAT1 Throwing away electronic and electrical devices do not bother me ®.	Stefan <i>et al.</i> (2013); Taylor and Todd (1995a); Arvola <i>et al.</i> (2008)
	MAT2 When I throw away electronic and electrical devices, I feel guilty.	
	MAT3 By purchasing environmentally friendly electronic or electrical device instead of conventional products would feel like the morally right thing.	
Lack of concern	LOC1 I do not really worry about the environmental impact of the electronic and electrical devices that I throw away.	Stefan <i>et al.</i> (2013)
	LOC2 I do not really worry about the impact of my electronic and electrical devices waste on the distribution of resources in the world.	
	LOC3 I do not really worry about the amount of electronic and electrical devices that I throw away.	
	LOC4 I do not really worry about the cost of the electronic and electrical devices that I throw away.	

Relative advantage	<p>RAD1 I will help to protect the environment by recycling electronic and electrical devices.</p> <p>RAD2 Helping to protect the environment is an extremely important part of my decision to recycle electronic or electrical devices.</p> <p>RAD3 I will help to reduce our landfill waste by recycling electronic or electrical devices.</p> <p>RAD4 I will personally benefit from recycling electronic or electrical devices.</p>	Taylor and Todd (1995a); Taylor and Todd (1997)
Complexity	<p>COM1 E-waste activities are difficult.</p> <p>COM2 E-waste activities are easy®.</p> <p>COM3 Whether or not e-waste is difficult, it is an extremely important part of my decision to engage in this behavior.</p> <p>COM4 It is hard to lend an environmentally friendly electronic or electrical device since it is so complicated.</p>	Taylor and Todd (1995a); Taylor and Todd (1995b); Jansson (2011)
Market maven tendency	<p>MMT1 I like introducing new environmentally friendly electronic or electrical device brands and products to my friends.</p> <p>MMT2 I like helping people by providing them with information about many kinds of environmentally friendly electronic or electrical device.</p> <p>MMT3 People ask me for information about environmentally friendly electronic or electrical device, places to shop, or sales.</p> <p>MMT4 If someone asked where to get the best buy on several types of environmentally friendly electronic or electrical devices and products, I could tell him or her where to shop.</p> <p>MMT5 My friends think of me as a good source of information when it comes to new environmentally friendly electronic or electrical devices and sales.</p>	Chelminski and Coulter (2007)
EW-WOM generation	<p>EW-WOM1 I talk about e-waste.</p> <p>EW-WOM2 I tell many friends about e-waste.</p> <p>EW-WOM3 I talk about the e-waste on every occasion.</p> <p>EW-WOM4 I provide as many details as I can about the e-waste.</p>	Moldovan <i>et al.</i> (2011)

Note:

*Symmetrical evaluation was conducted through partial least squares structural equation modelling (PLS-SEM) technique to assess the construct validity and reliability.

**Scale: Five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5)

***At the beginning of questionnaire, participants were informed about the meaning of Ewaste. Refer to Taylor and Todd (1995a) in defining waste management behaviour (p. 626): in this study Ewaste (EW) refer to the reduction of garbage, recycling, and reuse of compositing of electronic or electrical devices.

Figure 1. Conceptual illustration of antecedent conditions and outcome condition

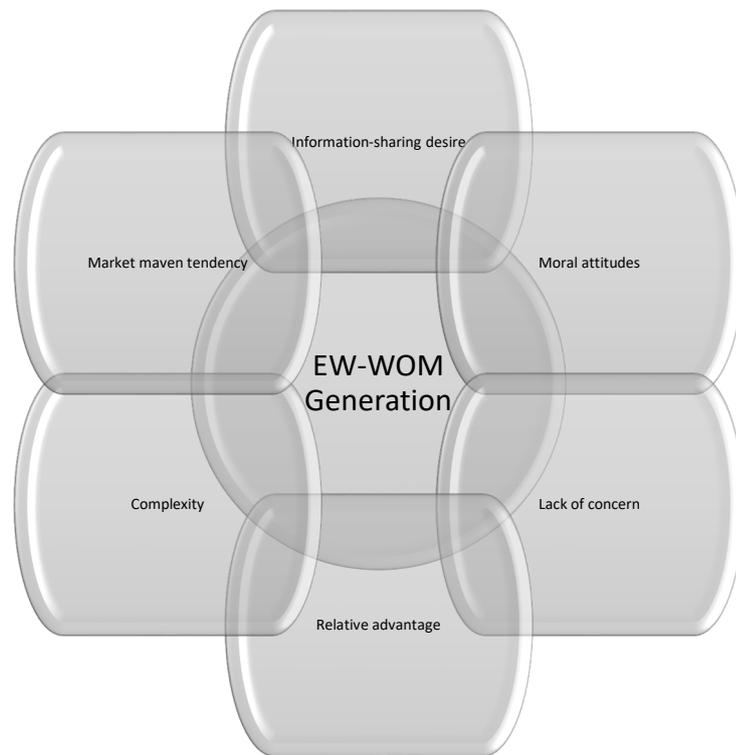


Table 1: Analysis of Necessary Conditions

Conditions tested*	Consistency	Coverage
relativeadvanta	0.715948	0.774592
~relativeadvanta	0.756395	0.439681
information-sha	0.804620	0.663263
~information-sha	0.704309	0.492010
moralattitudes	0.859817	0.838936
~moralattitudes	0.686794	0.424018
complexity	0.888799	0.523394
~complexity	0.550415	0.581543
marketmaventend	0.867596	0.788377
~marketmaventend	0.682934	0.442276
lackfconcern	0.710820	0.794910
~lackfconcern	0.795229	0.454312

* **Note:** ~ indicates the absence of a condition
Outcome variable: ew-womgeneratio

Table 2: Sufficient configurations of antecedent conditions

Configuration	Antecedent conditions	Raw coverage	Unique coverage	Consistency
1	relativeadvanta*information-sha*complexity	0.569371	0.015787	0.904200
2	relativeadvanta*moralattitudes*marketmaventend	0.612180	0.037163	0.939684
3	relativeadvanta*~moralattitudes*~marketmaventend*~lackfconcern	0.468253	0.003688	0.847534
4	~relativeadvanta*~moralattitudes*marketmaventend*~lackfconcern	0.544192	0.005070	0.784925
5	~information-sha*~moralattitudes*~marketmaventend*lackfconcern	0.463183	0.009968	0.808834
6	~relativeadvanta*moralattitudes*complexity*~lackfconcern	0.626757	0.049205	0.864088
7	~relativeadvanta*~information-sha*moralattitudes*complexity*~marketmaventend	0.482427	0.001037	0.871461
8	relativeadvanta*~information-sha*~moralattitudes*~complexity	0.389548	0.000000	0.829468
9	~relativeadvanta*~information-sha*marketmaventend*~lackfconcern	0.544653	0.000000	0.815265
10	relativeadvanta*~information-sha*~complexity*marketmaventend	0.405220	0.000000	0.908891
11	~information-sha*moralattitudes*marketmaventend*~lackfconcern	0.539698	0.000000	0.900933

solution coverage: 0.892026
solution consistency: 0.734441
frequency cutoff: 1.000000
consistency cutoff: 0.831588

Table 3: Subset/Superset analysis (Outcome: ew-womgeneratio)

Terms	consistency	coverage	combined
~lackfconcern*marketmaventend*complexity*moralattitudes*information-sha*relativeadvanta	0.960	0.462	0.676
~lackfconcern*marketmaventend*moralattitudes*information-sha*relativeadvanta	0.958	0.474	0.685
marketmaventend*complexity*moralattitudes*information-sha*relativeadvanta	0.962	0.520	0.717
~lackfconcern*marketmaventend*complexity*information-sha*relativeadvanta	0.942	0.480	0.686
~lackfconcern*complexity*moralattitudes*information-sha*relativeadvanta	0.950	0.469	0.678
~lackfconcern*marketmaventend*complexity*moralattitudes*information-sha	0.933	0.577	0.752
~lackfconcern*marketmaventend*complexity*moralattitudes*relativeadvanta	0.951	0.492	0.694
marketmaventend*moralattitudes*information-sha*relativeadvanta	0.961	0.546	0.735
~lackfconcern*marketmaventend*information-sha*relativeadvanta	0.932	0.493	0.695
~lackfconcern*marketmaventend*moralattitudes*relativeadvanta	0.948	0.509	0.706
~lackfconcern*marketmaventend*moralattitudes*information-sha	0.927	0.598	0.762
~lackfconcern*moralattitudes*information-sha*relativeadvanta	0.949	0.482	0.688
marketmaventend*complexity*information-sha*relativeadvanta	0.940	0.545	0.731
complexity*moralattitudes*information-sha*relativeadvanta	0.951	0.533	0.723
marketmaventend*complexity*moralattitudes*information-sha	0.935	0.646	0.795
marketmaventend*complexity*moralattitudes*relativeadvanta	0.948	0.566	0.745
~lackfconcern*marketmaventend*complexity*relativeadvanta	0.928	0.514	0.706
~lackfconcern*marketmaventend*complexity*information-sha	0.874	0.614	0.756
~lackfconcern*complexity*information-sha*relativeadvanta	0.921	0.493	0.692
~lackfconcern*complexity*moralattitudes*relativeadvanta	0.939	0.505	0.704
~lackfconcern*complexity*moralattitudes*information-sha	0.901	0.601	0.760
~lackfconcern*marketmaventend*complexity*moralattitudes	0.909	0.634	0.780

Note: ~ indicates the absence of a condition

Appendix B: Construct Reliability

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_C)	Cronbach's alpha(α)
Relative advantage	0.865	0.893	0.842
Complexity	0.938	0.931	0.903
Moral attitudes	0.755	0.843	0.717
Market maven tendency	0.869	0.905	0.869
EW-WOM generation	0.787	0.857	0.766
Lack of concern	0.828	0.862	0.784
Information-sharing desire	0.892	0.925	0.891

Note: Symmetrical evaluation of exogenous and endogenous constructs

Appendix C: Direct effect inference

Effect	Path	Path coefficient	Standard bootstrap results			
			Standard error	t-value	p-value (2-sided)	p-value (1-sided)
Lack of concern -> Moral attitudes	H1a	-0.255	0.063	-4.036	0.000	0.000
Lack of concern -> Market maven tendency	H1b	-0.031	0.049	-0.643	0.520	0.260
Lack of concern -> EW-WOM generation	H1c	-0.074	0.039	-1.881	0.060	0.030
Relative advantage -> Moral attitudes	H2a	0.097	0.068	1.421	0.156	0.078
Relative advantage -> Market maven tendency	H2b	0.122	0.046	2.685	0.007	0.004
Relative advantage -> EW-WOM generation	H2c	0.175	0.037	4.733	0.000	0.000
Complexity -> Moral attitudes	H3a	0.181	0.034	5.311	0.000	0.000
Complexity -> Market maven tendency	H3b	0.047	0.032	1.481	0.139	0.069
Complexity -> EW-WOM generation	H3c	0.113	0.023	4.866	0.000	0.000
Information-sharing desire -> Moral attitudes	H4a	0.355	0.041	8.570	0.000	0.000
Information-sharing desire -> Market maven tendency	H4b	0.131	0.034	3.827	0.000	0.000
Information-sharing desire -> EW-WOM generation	H4c	0.093	0.027	3.490	0.001	0.000
Moral attitudes -> Market maven tendency	H5a	0.655	0.033	20.108	0.000	0.000
Moral attitudes -> EW-WOM generation	H5b	0.593	0.039	15.113	0.000	0.000
Market maven tendency -> EW-WOM generation	H6	0.110	0.046	2.382	0.017	0.009

Note: Symmetrical relationships between exogenous and endogenous constructs