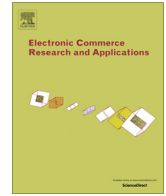




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## The effect of unexpected features on app users' continuance intention



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### ABSTRACT

This study incorporates unexpectedness, delight, and customer citizenship behaviors (CCB) into the cognitive, affective, and behavioral stages of traditional expectancy theories, which, in general, contain confirmation, satisfaction, and continuance intention in each stage, respectively. Data collected from 436 app users shows that, from the cognitive stage to the affective stage, satisfaction is affected more by confirmation, and delight is determined more by unexpectedness. In contrast, from the affective stage to the behavioral stage, satisfaction has a greater effect on continuance intention, and delight is more critical for customer citizenship behavior. This study contributes to traditional expectancy theories by highlighting the importance of unexpectedness in the forming of continuance intention, and by illustrating the relatively critical role that components of each stage play in subsequent stages.

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### 1. Introduction

Apps have received significant attention since the first iPhone was introduced in 2007. There are now over a million iOS apps available in the Apple Store, another million Android apps in Google Play, and 20,000 apps for the Windows platform.<sup>2</sup> Overall, global downloads number more than 100 billion.<sup>3</sup> A wide range of app developers hope to gain revenue by publishing their apps on an open platform. However, among the millions of apps, only a limited subset successfully catches consumers' attention. According to BBC news, the Adevon tracking service has indicated that more than two-thirds of the apps in the App Store are "zombies," i.e., apps that have rarely, if ever, been downloaded.<sup>4</sup> Furthermore, most developers garner little revenue. As the number of apps increases, tough competition forces developers to create better and more interesting apps that can entice mobile users and, thus, generate revenue. In this highly competitive environment, many developers have adopted the strategy of including more functions or features in the belief that more users can be attracted if the apps are feature rich. As an outcome, while target users expect certain functionality, some features may fall outside of users' expectations. Users who are

initially attracted by a particular function may find other unexpected functions to be useful and, therefore, be more satisfied. Such users are more likely to keep the app on their devices. However, whether functions or features which are unexpected actually generate the desired effects remains unclear.

Researchers seeking to understand continuance intention (e.g., the choice to keep using a specific app) frequently adopt expectancy theories, e.g., expectation-disconfirmation theory (EDT) or expectation confirmation theory (ECT) (Anderson and Sullivan 1993, Lee 2010, Limayem et al. 2007, Lin et al. 2005, Oliver 1980, Vatanasombut et al. 2008). According to EDT and ECT, customers are more likely to repurchase a product or service when they are satisfied with it (Zhou 2011), and this satisfaction is determined by the extent to which the performance of product or service meets customers' initial expectations. However, even though these two theories consider the condition of exceeding initial expectations, this research stream views the level of confirmation as a single dimension. For a given app, some functions or features are likely to be outside of customers' expectations while other functions or features align with their expectations but perform worse than expected. Asked to evaluate the level of confirmation, users may consider those unexpected functions or features as "more than expected" and consider those expected but low quality functions as "less than expected." This case highlights the difficulty in obtaining correct opinions from users with one simple construct. It also implies a need to separate unexpectedness from the level of confirmation.

We argue that the real meaning of the responses cannot be properly understood unless unexpectedness is separated from confirmation. Since unexpectedness may play a role in the

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<sup>2</sup> Wikipedia: List of mobile software distribution platforms, [http://en.wikipedia.org/wiki/List\\_of\\_mobile\\_software\\_distribution\\_platforms](http://en.wikipedia.org/wiki/List_of_mobile_software_distribution_platforms).

<sup>3</sup> <http://mashable.com/2013/09/19/App-downloads-100-billion/>.

<sup>4</sup> <http://www.bbc.com/news/technology-23240971>.

continuance decision-making process, the effect of those unexpected functions must be taken into consideration when researchers adopt EDT or ECT to understand the continuance intentions of app users. Most studies based on traditional expectancy theories focus on satisfaction alone, but recent studies have highlighted the need to delight customers since many customers who switch are, in fact, satisfied customers (Finn 2005, Verma 2003). Drawing on this issue, we also explore how confirmation and unexpectedness affect delight. While users can search for apps in the app store on their own, many still rely on others' recommendations to determine which app to download since there are simply too many similar apps in the store, and distinguishing and evaluating them all is time-consuming (Song et al. 2014). Thus, customer citizenship behaviors (CCB) cannot be ignored.

In light of these practical phenomena and the theoretical gap, this study intends to integrate unexpectedness, delight, and customer citizenship behaviors with the expectancy perspective. Specifically, we address the following research questions. First, *what effects can unexpected functions and features generate?* Second, *do users exhibit different behaviors when they are delighted vs. merely satisfied?* By answering these questions, this study contributes to both practitioners and academics. For practitioners, our exploration of impact of unexpectedness on affective outcomes illustrates the benefits of providing unexpected functions and features. Since developing additional functions and features is not without cost, knowing the direction and strength of the effect of unexpectedness allows practitioners to leverage their resources. For academics, we contribute to current theory by introducing the new concept of "unexpectedness." The original expectancy theories assume that each individual has implicit or explicit expectations regarding each product or service. However, it is reasonable that customers' expectations may be limited or that the functions provided may exceed or be outside of those expectations. Separating unexpectedness from exceeding initial expectations gives us a deeper understanding of the formation of satisfaction.

The rest of this paper is organized as follows. Next, we review theories and concepts. After constructing hypotheses, we introduce the method used to collect the required data. Hypothesis testing results are followed by our conclusion and implications.

## 2. Theoretical background

### 2.1. Expectation disconfirmation theory (EDT)

Expectation-disconfirmation theory (EDT) or expectation-confirmation theory (ECT) has been widely used to describe the impact of consumer satisfaction on repurchase decisions in post purchase contexts (Oliver 1980, Spreng and Page 2003, Yi 1990). These theories posit that satisfaction is a function of the disconfirmation/confirmation of initial expectations. Overall, they have been used to explain the pre-behavior (expectation) and post-behavior (perceived performance) variables, rather than solely post-behavior variables. According to EDT/ECT, expectations are consumers' pre-usage beliefs that are formed before the purchasing decision is made. Perceived performance is the perception of how the products/services actually performed during the usage period, based on the consumption experience. An evaluation is then made to compare the perceived performance with the initial expectation. The post-comparison discrepancy or gap between the initial expectation and the perceived performance is called "disconfirmation." Disconfirmation has three different conditions: equal (confirmation), positive and negative. If perceived performance is higher than expected, the disconfirmation is positive; if perceived performance is lower than expected, the disconfirmation is negative (Oliver 1980). The disconfirmation/confirmation of expectations influences consumers' satisfaction

with the products or services. When the positive disconfirmation is greater, consumers are more satisfied and pleased (Solomon 1996). As an outcome, satisfied consumers demonstrate higher repurchase intentions than do those who are dissatisfied.

As shown in Fig. 1, EDT/ECT-based studies generally contain at least three components in their model: cognitive, affective, and behavioral. Almost every study uses disconfirmation or confirmation as the *cognitive* component. Oliver (1980) applied cognitive dissonance theory (CDT) to understand how consumers form their initial pre-usage expectations (beliefs) about products/services, experience the usage period, and then form post-usage perceptions. Disconfirmation can be viewed as cognitive dissonance, regardless of whether the perceived performance is below or above initial expectations. Most studies include satisfaction in their model as an *affective* outcome of the disconfirmation/confirmation or expectation-performance gap (the cognitive component). Satisfaction is a pleasurable or positive emotional state (Locke 1976) resulting from the consumer's response to the fulfillment of expectations. In an app context, satisfaction is an important construct that represents the user's affective attitude or psychological state regarding the experience of using the system. Greater positive disconfirmation will lead to higher levels of satisfaction, and more negative disconfirmation will lead to lower levels of satisfaction. As for the *behavioral* outcome, most studies consider continuance intention to be a consequence of both cognitive and affective components (Bhattacharjee 2001b; Patterson and Spreng 1997, Spreng et al. 1996). In the IT context, Bhattacharjee (2001b) indicated that disconfirmation (cognitive) and satisfaction (affective) affect the online banking user's continuance intention.

### 2.2. Unexpectedness as a cognitive outcome

Though the concept of expectation-perception has been widely adopted in the past, one important issue is that the performance of unexpected features has long been excluded from studies based on expectancy theory. According to (Oliver 1989), two situations may elicit arousal: novelty and surprise. *Novelty*, also called "unexpectedness," refers to a new experience in which expectations are undefined. *Surprise* refers to the situation that product performance is beyond/below the desired/undesired level. While both entail arousal, studies in this stream largely embrace surprise, and solely consider the effect of the users' surprise at the disconfirmation of their expectations regarding the performance of *expected* functions or features (Oliver et al. 1997, Oliver and Winer 1987, Woodruff et al. 1983). In this study, we argue the need to explore the effect of *unexpected* features or functions.

In an app context, *unexpectedness* refers to the presence of features or functions that are not expected by users. Some have argued that users are surprised and, hopefully, delighted by seeing those features. For example, users of a PDF reading app in general expect to see functions viewing, sharing, and notation after downloading the app. However, some additional functions provided by the app, such as being able to scanning objects with embedded camera and then crop scanned impact, adjust exposure, add filtering effects, and convert it into PDF file, may not be expected by most app users. However, merely presenting these unexpected features or functions may not guarantee a positive outcome. A positive affect may not be aroused when an unexpected feature or function which is of extremely low quality is encountered. Shani and Gunawardana (2011) proposed the concept of serendipity to describe users' positive emotional response to an unexpected item. Adamopoulos and Tuzhilin (2014) adopted this concept and suggested that, in addition to the presence of unexpected features (unexpectedness), the quality of those unexpected features should also be taken into consideration to understand the real consequence of unexpectedness. Based on the idea of serendipity, they

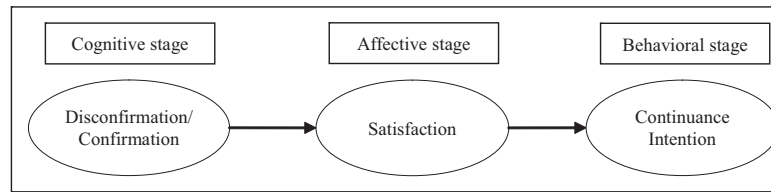


Fig. 1. Conceptual model.

developed a “utility” concept, which includes both “the part not expected by user” (unexpectedness) and quality of that part, to capture the real effect of unexpected features.

In alignment with Adamopoulos and Tuzhilin (2014) utility concept, we suggest that the performance of unexpected functions or features should be included in the cognitive stage because the concept of disconfirmation may contain two or more meanings. In the best scenario, users are surprised to discover some unexpected features (or functions), or are surprised by the outstanding performance of expected features. However, it is also likely that customers see that the unexpected features perform well while the expected features perform poorly. It is also possible that unexpected features perform poorly while the expected features perform surprisingly well. The worst scenario is when both the unexpected features and the expected features perform poorly. Customers tend to show greater levels of positive disconfirmation for the best scenario, and a stronger negative disconfirmation for the worst scenario. However, customers may have difficulty evaluating their perceptions when the performance of unexpected features is high and the performance of expected features is low, or vice versa. That is, while one aspect results in a positive outcome, the other leads to a negative outcome. This suggests the need to separate the performance of the unexpected features from the performance of the expected parts.

In this study, we consider the performance of unexpected features or functions to be similar to the delivery of attractiveness (attributes), as proposed by Kano et al. (1984). *Attractiveness* refers to features which go beyond established current needs and are not expected by customers. The successful delivery of attractive features, in general, leads to a disproportionate level of satisfaction. Unexpectedness and attractiveness share the following characteristics: (1) prior to use, customers do not expect to see such functions or features, and (2) customers are surprised to see them during usage. We predict that, similar to how delivering attractiveness impacts affective outcomes (delight), a positive affect is elicited when customers find that those unexpected functions also perform well. In addition to the confirmation of the expected aspects of the app, this study further incorporates the performance of the unexpected aspects of the app into the research model.

### 2.3. Delight as an affective outcome

Customer and user satisfaction has been broadly studied in marketing and information systems research, and the literature supports the assertion that satisfaction is a critical factor related to behaviors such as continuance intention (Bhattacharjee 2001b, Thong et al. 2006), repurchase intention (Fang et al. 2011, Tsai and Huang 2007, Yen and Lu 2008), and loyalty (Cyr 2008). Satisfaction refers to overall contentment with the utilization of a service or product, or with the system usage experience (Cyr 2008). Since satisfied customers are considered to be loyal customers who may purchase repeatedly (Lin et al. 2012, Oliver 1980), academics and practitioners have spent considerable effort measuring and analyzing satisfaction and how it might be facilitated (Au et al. 2002, Oliver 1980).

A meta-analysis by Szymanski and Henard (2001) found that satisfaction explains less than 25% of the variance in repeat purchasing. In fact, satisfied customers may still switch to other competitors (Keiningham and Vavra 2001, Reichheld 1993). While satisfaction is found to be insufficient, the concept of delight—as opposed to mere satisfaction—is gaining attention from practitioners and academics as a new competitive strategy (Blackwell et al. 2006, Keiningham and Vavra 2001, Schlossberg 1990). Reichheld (1994) indicated that loyal customers are those who are completely satisfied: the so-called “delighted customers.” Delighted customers are those who have a “profoundly positive emotional experience resulting from having [their] expectation exceeded to a surprising degree” (Oliver et al. 1997, Rust and Oliver 2000). Moreover, Finn (2005) viewed customer delight as an emotional response to surprisingly positive levels of performance. Practitioners have pointed out that customer delight is the key to survival in today’s markets (Whittaker 1991).

Though satisfaction and delight are both positive emotions, there are certain differences between them (Plutchik 1980, Russell 1980). Delight is generally regarded as either a combination of pleasure with high activation (Russell 1980, Watson and Tellegen 1985), or joy and surprise (Oliver et al. 1997, Plutchik 1980). In other words, delight results from positive surprise or arousal when customers have a positive experience. Oliver et al. (1997) adopted this concept and treated delight as an important affective outcome triggered by seeing surprising positive results, a condition which occurs when the quality of the provided attributes is significantly better than the customers expected. According to Chandler (1989), delight is fundamentally different from satisfaction since the element of surprise—i.e., satisfaction *which is unanticipated*—is necessary for delight. Finn (2005) further provided empirical evidence which distinguished delight and satisfaction as different constructs. Chitturi et al. (2008) also found a relationship between arousal and delight.

In summary, while satisfaction is an affective reaction to the cognitive evaluation of the difference between performance and expectation, delight contains a higher level of joy and surprise. Delight is not only an emotion which is more intense than satisfaction, it is also an outcome of the initial experience of positive surprise. Meeting expectations results in satisfaction, and exceeding expectations may lead to delight. A delighted customer is more likely to become a loyal customer and perform good citizenship behavior, e.g., word of mouth (Finn 2005). Therefore, different from past expectancy based studies which generally consider satisfaction alone, we incorporate delight as another possible affective outcome of the cognitive stage variables.

### 2.4. Customer citizenship behaviors (CCB) as behavioral outcomes

“Customer citizenship behaviors” (CCB) is extended from the conceptualization of organizational citizenship behavior (OCB) (Groth 2005). CCB is also labeled as “customer voluntary performance” (Bettencourt 1997) and “customer extra-role behaviors” (Keh and Teo 2001). CCB has been discussed extensively in the marketing literature (e.g., Bove et al. 2009, Groth 2005, Yi and Gong 2008). While many continuance studies use continuance

intention as the dependent variable, some loyalty-based studies treat customer citizenship behaviors as one critical dependent variable (Groth 2005, Yi and Gong 2008). CCB often refers to customers' voluntary behaviors that can benefit either the organization (Bove et al. 2009) or other customers. CCB, like OCB, has been conceptualized to comprise multiple forms of voluntary behaviors. For example, Groth (2005) identified three dimension of CCB: making recommendations, providing feedback, and helping other customers.

Our study adopted Groth (2005) concept to define CCB in an app context. The *first* type is “helping others,” which refers to users providing help and assistance to other users of the app. This type of customer citizenship behavior can benefit other app users by directly solving their problems, and can reduce the amount of effort app developers spend on serving customers. The *second* type is “word of mouth,” which refers to the act of promoting the app to others. In service quality literature, consumers are viewed as “partial employees.” Positive word of mouth and recommendations from some customers can indirectly raise service quality perceived by other customers. In an app context, users can also be viewed as “partial employees.” Given the overwhelming number of apps on the market, it is difficult for users to simply rely on the app store's search mechanism to pick the appropriate app. In this situation, social influence plays a critical role. New users either check out the most popular apps or browse articles posted on a blog or online forum. Therefore, users' word of mouth behavior is critical for an app to be seen. The *third* type, “providing feedback,” includes suggestions for service improvements, policing of other customers, voicing of opinions, benevolent acts of service facilitation, displays of relationship affiliation, flexibility, and participation in the firm's activities (Bove et al. 2009). The increasing popularity of open innovation means that app developers must interact with users to obtain requirements before the initial design, and then rely on user feedback in order to correct errors and enhance their apps with newly desired functions and features.

In summary, given the importance of customer citizenship behaviors in helping to promote the product, we believe that the emerging expectancy theory research stream should include CCB along with continuance intention as a behavioral outcome.

### 3. Hypothesis development

Our research model is based on the literature review. As shown in Fig. 2, each stage has two components. In the sections that follow, we define and argue the relationships between each pair of consecutive stages. Specifically, we develop four hypotheses (H1c, H2c, H3c, and H4c) regarding the relative importance of the two antecedents for each variable in the affective and behavioral stages.

#### 3.1. From cognitive to affective stages

##### 3.1.1. Satisfaction

According to expectancy theories, the level of satisfaction is high when the perceived performance of the target product or service is equal to or higher than the initial expectation. Previous empirical studies based on corresponding theories have also reached the same conclusion (e.g., He and Wei 2009, Hong et al. 2006, Lee and Kwon 2011, Limayem and Cheung 2008, Lin et al. 2005, McKinney et al. 2002, Recker 2010, Thong et al. 2006). Therefore, it is reasonable to presume that users tend to be more satisfied when they find that the required functions are embedded in the app. Knowing that the app contains the expected features in an expected manner, individuals feel a sense of having made the right decision. We also hypothesize that, like confirmation, unexpectedness also has an effect on satisfaction. Oliver et al. (1997)

proposed that, in addition to confirmation, the satisfaction response is a function of positive emotions. Users are more likely to feel satisfied when using the app leads to a positive emotion. Since discovering unexpected features can also generate positive emotions, we can reasonably argue that satisfaction is a function of unexpectedness. Therefore, we hypothesize the following.

**H1a.** Confirmation has a positive effect on satisfaction.

**H1b.** Unexpectedness has a positive effect on satisfaction.

In addition to viewing satisfaction as a function of both confirmation and unexpectedness, we also argue that satisfaction is associated more with confirmation than with unexpectedness. According to expectancy theories, users have certain expectations before downloading an app. They expect the app to have the functions or features they need to accomplish their intended tasks efficiently or effectively. Therefore, users are satisfied with a downloaded app when they find that it has these necessary functions or features. Needs fulfillment is a critical antecedent of satisfaction. Based on the equity concept proposed by Adams (1965), and needs theories proposed by Alderfer (1969), Au et al. (2008) argued that satisfaction is determined by the extent to which needs are fulfilled equitably. Understandably, needs generate expectations. Users expect that the app can help them accomplish tasks because they need to get those tasks done. We can reasonably assume, then, that needs are fulfilled when users find that the app meets their expectations.

However, though unexpectedness also leads to satisfaction by generating a positive affect, we argue that the effect of unexpectedness is limited when confirmation is also taken into consideration. Even though users are surprised to see unexpected functions or features, such features may not help users to reach their goals (or to reach them in a more efficient or effective way). As an outcome, users are not completely contented by discovering those unexpected elements. Therefore, based on the concepts of goal achievement and needs fulfillment, we hypothesize that satisfaction is affected more by the extent to which the app has the required functions or features than by the existence of additional functions or features that may not be necessary at this stage.

**H1c.** Confirmation has a greater effect on satisfaction than does unexpectedness.

##### 3.1.2. Delight

Exceeding initial expectations may lead not only to satisfaction but also to delight (Anderson and Sullivan 1993, Finn 2005, Oliver 1980, Oliver et al. 1997, Rust and Oliver 2000). Arousal is almost a required condition for delight. For example, delight occurs when a customer is pleasantly surprised in response to an experience that is much better than expected (Oliver 1981). Finn (2005) also mentioned that customer delight results from surprising and positive levels of performance. Arousal is the state of being awake. In our context, stimuli leading to this state can be classified into two types. The first stimulus type is the presence of unexpected features. Those unexpected features are not anticipatable by users. For example, users may have limited experience and, therefore, be unable to imagine the functions or features. The second type is the presence of some anticipatable features or extremely high performance which the users' personal experience suggests to be highly unlikely. This condition is the so-called “surprising performance” or “extremely positive disconfirmation,” according to Oliver et al. (1997); that is, the performance level exceeds initial expectations, in the extreme, even though it is predictable.



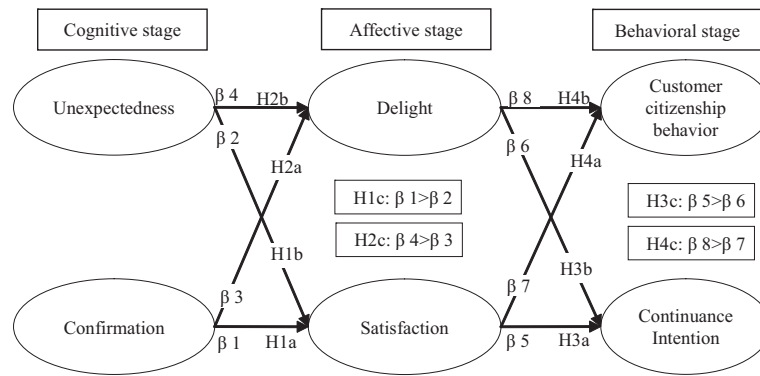


Fig. 2. Research model.

Since both of the above conditions lead to arousal, they are expected to be associated with delight. For example, Verma (2003) pointed out that while a high level of expectation fulfillment is required, the element of surprise is also involved in the formation of delight. Rust and Oliver (2000) claimed that the features capable of delighting customers are those that are pleasant in an unexpected or surprising manner, or offer additional product utility that exceeds prior expectations (positive disconfirmation). Thus, we hypothesize the following.

**H2a.** Confirmation has a positive effect on delight.

**H2b.** Unexpectedness has a positive effect on delight.

In addition to building the links from confirmation and unexpectedness to delight, we also argue that unexpectedness generates more of an effect on delight than does confirmation. It is important to note that delight results from arousal (Chang et al. 2013, Rust and Oliver 2000). Unexpectedness (i.e., the existence of functions or features far beyond consumers' expectations) generates arousal and is therefore believed to be strongly associated with delight. In contrast, confirmation focuses on the extent to which prior expectations are met. Oliver et al. (1997) indicated that arousal may be sensed when some features perform significantly better than expected or when some anticipatable—but highly unlikely—features are present; they distinctly pointed out that consumers believe the possibility is low because past experience tells them that those features are not likely to be present. According to Finn (2005), surprising and positive levels of performance can delight customers. Many researchers have provided evidence showing that consumers experience delight in response to unexpected and surprising experiences, and that satisfying consumers largely involves meeting their expectations (Barnes et al. 2011, Oliver et al. 1997). For example, users usually have expectations before using an app. If users perceive more functions or features than they expect, delight will arise, as opposed to mere satisfaction. Therefore, even though confirmation is also associated with delight, the degree of arousal that confirmation can generate should be lower than the degree of arousal generated by unexpectedness. Thus, we hypothesize the following.

**H2c.** Unexpectedness has a greater effect on delight confirmation.

### 3.2. From affective to behavioral outcomes

#### 3.2.1. Continuance Intention

According to traditional expectancy theories, satisfied customers or users have higher levels of behavioral outcomes such as repurchase intentions or the intention to continue using the product or service (Bhattacharjee 2001b; Limayem et al. 2007, Lin

et al. 2005, 2012). Research has shown similar effects with regards to consumers' satisfaction with a website (Szymanski and Henard 2001). Users' positive attitudes toward a website will lead to user retention and an increase in users' intention to continue to use the site. Previous studies also demonstrated the positive effect of delight on repurchase intentions (Chitturi et al. 2008, Oliver et al. 1997).

In addition to understanding satisfaction, understanding emotional factors—such as delight—has become more critical in determining how to foster customer loyalty (Finn 2005, Oliver et al. 1997, Schneider and Bowen 1999), which can decrease the likelihood of switching behavior (Keiningham and Vavra 2001, Torres and Kline 2006). The impact of delight on continuance intention has been examined by past studies. For example, based on the hedonic consumption concept proposed by Holbrook and Hirschman (1982), Oliver et al. (1997) argued that shopping or using a process generates joy and a rapturous form of "emotional arousal." Delight is an emotional arousal which creates a desire for further pleasure in the future and, therefore, also has an impact on intention. According to Torres and Kline (2006), delighting customers can increase customer retention, and it is necessary to create delight instead of merely satisfying customers. In other words, delighted customers might perceive a higher risk in switching than might merely satisfied customers, since switching would entail a greater loss for delighted customers (Torres and Kline 2006). Bartl et al. (2013) provided empirical evidence to demonstrate that delight influences customer's purchase intentions in an online environment. We follow this research stream and hypothesize that satisfaction has a positive impact on the intention to continue to use the app.

**H3a.** Satisfaction has a positive effect on continuance intention.

**H3b.** Delight has a positive effect on continuance intention.

In addition to hypothesizing the effect of delight and satisfaction on continuance intention, we further argue that continuance intention is affected more by satisfaction than by delight. Prior studies have also indicated that different levels of emotion lead to different behavioral outcomes (Chitturi et al. 2008, Finn 2005, Oliver et al. 1997). Even though several studies have been cited in previous sections to support that satisfaction may not have the same importance as delight, we still argue that satisfaction is more critical than delight for continuance intention, specifically. This study focuses on productivity apps, which are intended to help users to accomplish given tasks. We can reasonably assume that users will feel satisfied and have a greater intention to continue to use the app if it can help them accomplish given tasks. That is, since satisfaction is mainly affected by the confirmation that a task can be accomplished, we expect satisfaction to have a strong effect on continuance intention. In contrast, delight results

from encountering unexpected functions or features. However, McNeilly and Barr (2006) noticed that the core attributes of products or services should be at least acceptable in order to achieve delight. If users are delighted by the outstanding performance of expected functions or by the presence of unexpected functions, but the app can only achieve the user's goal in a limited way, this will lead to a low level of continuance intention. Furthermore, Oliver et al. (1997) and Finn (2005) empirically demonstrated that repurchase intention is affected more by satisfaction than by delight. Therefore, we hypothesize the following.

**H3c.** Satisfaction has a greater effect on continuance intention than does delight.

### 3.2.2. Customer citizenship behaviors (CCB)

Positive affect is one critical antecedent of customer citizenship behavior (Yi and Gong 2008). People experiencing a positive affect often exhibit helping tendencies and affiliated altruistic behaviors (Isen and Baron 1991). Organizational studies have pointed out that employees are more likely to perform citizenship behaviors when the amount of positive affect they are currently experiencing is higher (Williams and Shiao 1999). George (1991) also pointed out that an increased level of pro-social behaviors at work can be observed when employees are in a positive mood. People in a good mood tend to view their environment and their coworkers in a more positive light, and, since people tend to benefit those who are attractive to them, they are likely to perform pro-social behaviors under these conditions (George 1991). Positive affective states lead to increased social awareness, which leads to pro-social behavior. Interestingly, pro-social behavior is one means by which to prolong a positive emotional state (Isen and Baron 1991).

Since customer citizenship behavior (CCB) can be viewed as pro-social behavior, it should also be associated with a positive affect (Chitturi et al. 2008, Groth 2005, Yi and Gong 2008). We therefore expect that both satisfaction and delight are associated with CCB, since both of them are positive affects. In fact, the impact of satisfaction and delight on CCB has been discussed in the literature. For example, Groth (2005) noted that satisfaction leads to CCB, including word of mouth, feedback, and help. Chitturi et al. (2008) also empirically demonstrated that satisfaction leads to word of mouth. Yi and Gong (2008) showed that customer satisfaction is positively associated with customer citizenship behavior and negatively associated with customer dysfunctional behaviors.

CCB should also be affected by delight. Chitturi et al. (2008) determined that delighted customers also perform positive word of mouth. Berman (2005) pointed out that delighted customers willingly share their positive experiences with others and increase word of mouth promotion. While examining the relationship between positive affect and CCB, Yi and Gong (2008) used joy and delight to measure positive affect. The significant relationship they found implies that delight is positively associated with CCB.

**H4a.** Satisfaction has a positive effect on CCB.

**H4b.** Delight has a positive effect on CCB.

Satisfaction has long been considered a critical antecedent of citizenship behaviors in studies on organizations (Fassina et al. 2008, Organ 1988, Organ and Ryan 1995), marketing (e.g., Groth 2005, Yi and Gong 2008), and online communities (Yen et al. 2011). However, this conclusion has been drawn without also taking delight into consideration. In this study, we argue that delight is also a relatively important antecedent of CCB. As indicated, citizenship behaviors can be observed when the individual actor is experiencing a positive affect (George 1991, Isen and Baron 1991, Williams and Shiao 1999). Since delight represents a higher level

of positive affect (higher than satisfaction), it is reasonable to expect that delighted individuals are more likely to perform CCB than are those who are merely satisfied. Furthermore, delight can be viewed as a combination of joy and arousal. Memory is more vivid if arousal is experienced. Performing behaviors related to the memory allows individuals to experience a positive affect in a later stage (George 1991, Isen and Baron 1991, Williams and Shiao 1999). Therefore, compared with individuals who are merely satisfied, we expect that delighted individuals will tend to perform more pro-social behaviors.

**H4c.** Delight has a greater effect on CCB than does satisfaction.

## 4. Research methods

### 4.1. Subjects

In accordance with our research purpose, the target sample was individuals who have experience with mobile devices and downloading apps. In accordance with our goal, we focus exclusively on productivity apps, i.e., those which are dedicated to producing information such as documents, presentations, worksheets, etc. We argue that individuals download and use productivity apps to enhance and complete their tasks. Users thus expect that such apps should provide the necessary functions to help them accomplish their tasks.

### 4.2. Measurement development

To test the proposed hypotheses, we adopted multi-item scales from prior studies for the measurement of variables wherever possible. We also developed new measurements in order to remain close to our definition of constructs such as unexpectedness. All constructs were measured with 5-point Likert scales ranging from "strongly disagree" (1) to "strongly agree" (5). The operational definitions and measurements of each construct are as follows.

*Continuance intention* refers to respondents' intention to continue to use the app. Three items adapted from Bhattacharjee (2001b) were used to capture the extent to which users lean toward continuing to use the app. *Customer citizenship behavior* (CCB) is treated as a second order formative construct which contains three first order constructs: feedback, help, and word of mouth. This construct is treated as a second order formative construct because customers may not perform these three behaviors at the same time. For example, a customer may help others to solve problems regarding the use of the app, but may not provide feedback to developers, given that only few people perform such a behavior. Additionally, in our case, not all paired first order constructs are highly correlated (e.g., the correlation between word of mouth and feedback is 0.44). Thus, CCB is formed by these three components and should be treated as a second order formative construct. Three measurement items were used to capture the extent to which users recommend this app to others, four items were used to measure the extent to which users assist others to solve problems, and four items were used to evaluate how well the users offer feedback to app developers (Groth 2005). *Satisfaction* refers to users' feelings about the use of the app. Three items were adopted from Bhattacharjee (2001b) to measure the extent to which users are satisfied and contented with the app. *Delight* refers to a profoundly positive emotional experience resulting from arousal (Oliver et al. 1997, Rust and Oliver 2000). Three items based on Bartl et al. (2013) were used to measure the extent to which users are delighted by the app. *Confirmation* refers to users' perceptions of the congruence between their expectations of the app and its actual performance. Three items were adapted

from [Bhattacharjee \(2001b\)](#) to capture the extent to which those anticipated functions and features perform as well as expected. *Unexpectedness* refers to the extent to which the functions and features of the app not expected by users are of high quality ([Adamopoulos and Tuzhilin 2014](#), [Oliver 1989](#), [Oliver and Winer 1987](#)). Three items developed by the authors were used to capture the extent to which the provided functions or features were not anticipated by the users.

In addition to variables related to hypotheses developed, we also include perceived usefulness as one control variable. Perceived usefulness is included in original ECT studies to serve as an outcome of confirmation. While perceived usefulness has been confirmed broadly to have impact on behavioral intention in both expectancy theory model and technology acceptance model, theorists do not reach a consistent conclusion toward its relationship with satisfaction (e.g. [Bhattacharjee 2001a](#)). Therefore, we construct a link between perceived usefulness and continuance intention only. A total of 6 items adopted from [Davis \(1989\)](#) were used to capture the extent to which the app allows users to accomplish their tasks effectively and efficiently.

#### 4.3. Procedures

Since we conducted the survey in Taiwan, we first translated English-based items into Chinese. To ensure content validity, three professors with experience in this area evaluated both the translated and self-developed items. In addition, six MIS doctoral students were invited to perform a card sorting exercise. A number of suggestions were made concerning the wording of particular items and the overall structure of the questionnaire, and these suggestions were incorporated into the revised instrument. In order to gain additional feedback about the instrument, we conducted a pilot test involving 30 MBA students with app experience. Based on the feedback received after the pilot test, minor modifications were made to the wording of several items.

An online survey website was created. To increase the diversity of our sample, we posted a participation-invitation letter on several popular app online forums. Individuals were asked to answer all questions based on their experience with their most recently downloaded productivity app. Productivity app is chosen because users mainly utilize this type of app to solve problems or accomplish tasks in hand. Therefore, users in general have clear expectations (including functions and features needed to accomplish task) toward this type of apps. Given that the purpose of this study is to understand the impacts of the performance of unexpected functions and features, utilitarian style apps are then chosen. A recent study also shows that the confirmation of hedonic expectation has no significant effect on satisfaction, while the perceived hedonic performance strongly affects the level of satisfaction ([Hsu et al., 2014](#)). Differently, both the confirmation of utilitarian expectation and direct perception of utilitarian effects are significantly associated with satisfaction. To ensure that this condition was met, we provided a list of examples of productivity apps (e.g., Evernote, Gmail, Dropbox, PDF Reader, etc.) and the example of unexpected features in app. Specifically, the following example is offered. “A general PDF Reading App in general contains basic functions, such as viewing, sharing and annotation. However, some PDF Reading Apps may provide some additional functions that surprise users. For examples, users may be able to scan an object with embedded camera and then crop scanned image, adjust exposure, add filtering effects and convert it into PDF file.” Then we asked respondents to recall their most recent app-downloading experience that fit those examples. To ensure unqualified individuals were screened out, a question on the first page of our survey required the respondents to recall their most recent experience downloading a productivity app.

#### 4.4. Sample

Data collection ran from January to February, 2015. A total of 459 individuals took the online survey. After excluding 23 incomplete responses, the final valid sample was 436. The demographic data for our sample are shown in [Table 1](#).

#### 4.5. Reliability and validity

Partial least squares (PLS) is considered an appropriate statistical tool when the research model is in the exploratory stage and where content and variables have not been extensively tested ([Chin 2010](#), [Fang et al. 2011](#), [Hulland 1999](#)). The purpose of this study was to extend, rather than confirm, expectancy-based research. In this study, unexpectedness is considered to be a new variable that has not been broadly tested in expectancy-based studies. The items used to measure unexpectedness were created by the authors. In addition, CCB is treated here as a formative second order construct dependent variable. Based on the above reasons, PLS was used to test the measurements and proposed hypotheses. Specifically, SmartPLS 2.0 M3 was employed for the analysis. We analyzed our data using the two-step approach recommended by [Anderson and Gerbing \(1988\)](#). The first step analyzes the measurement model, and the second step tests the relationships among the constructs.

Reliability was examined using composite reliability (CR), Cronbach's alpha, and factor loadings. As shown in [Table 2](#), all the values were above 0.7, which is the commonly acceptable level for explanatory research. Convergent and discriminant validity should be tested when multiple indicators are used to measure one construct, and can be examined by factor loadings and average variance extracted by constructs (AVE) ([Fornell and Larcker 1981](#)). To have the required convergent validity, factor loadings should be greater than 0.70, and AVE should be greater than 0.50. For our model, all loadings were above 0.7, and AVE ranged from 0.86 to 0.93 (see [Table 2](#)). Thus, both conditions for convergent validity were met.

To achieve adequate discriminant validity, the correlation between pairs of constructs should be less than 0.90, and the square root of AVE should be greater than the inter-construct correlation coefficients ([Fornell and Larcker 1981](#)). [Table 3](#) lists the correlations among the constructs, with the square root of the AVE on the diagonal slope. All the diagonal values exceeded the inter-construct correlations; hence, the test of discriminant validity was acceptable. Therefore, we conclude that the scales have sufficient construct validity.

#### 4.6. Model fit

[Tenenhaus et al. \(2005\)](#) suggested a method to calculate global fit for PLS. Goodness of Fit (GoF) is defined as the geometric mean of the average communality index and the average  $R^2$ . As noted by [Wetzels et al. \(2009\)](#), GoF can be calculated by using average AVE instead of average communality index because the communality index equals AVE in the PLS modeling approach.

The equation for calculating GoF is  $\sqrt{\text{average AVE} * \text{average } R^2}$ . Moreover, [Wetzels et al. \(2009\)](#) suggested  $\text{GoF}_{\text{small}} = 0.1$ ,  $\text{GoF}_{\text{medium}} = 0.25$ , and  $\text{GoF}_{\text{large}} = 0.36$  as baseline values for validating the PLS model globally, based on the AVE cut-off value of 0.5 ([Fornell and Larcker 1981](#)) and the effect size of  $R^2$  ([Cohen 2013](#)). The result for our research model was a GoF value of 0.635, which exceeds the cut-off value of 0.36 for the large effect size of  $R^2$ .

**Table 1**  
Demographic information (N = 436).

Measure	Categories	#	%	Measure	Categories	#	%
Gender	Male	234	53.67	Average amount of time in apps (h/day)	Less than 1	83	19.04
	Female	202	46.33		1–2	158	36.24
	Missing	0	0.00		3–4	117	26.83
Age (year)	<20	104	23.85		5–6	54	12.39
	21–30	202	46.33		7 and over	23	5.28
	>31	130	29.82		Missing	1	0.23
	Missing	0	0.00		Number of apps on mobile phone or tablet	Less than 10	184
	Education	High school	67	16.37		11–20	148
College		215	49.31	21–30		37	8.49
Master's		137	31.42	31 and over		66	15.14
Doctoral		16	3.67	Missing		1	0.23
Missing		1	0.23				

4.7. Common method variance

Since both independent and dependent variables were collected simultaneously from the same respondent, there is a potential for common method bias (CMV) in this study, so we performed statistical analyses to assess the possibility. First, we conducted a Harman’s single factor test. The results showed that eight factors were extracted, and the first factor explained 20.16% of the variance. Second, we followed the approach suggested by (Malhotra et al. 2006) to estimate the potential impact of CMV. We chose the second-smallest positive correlation between two manifest variables (0.13 between age and confirmation) as a conservative estimate. No significant difference was found between the original and adjusted correlation matrix. The results from the statistical analyses indicate that common method bias is not an issue in this study.

4.8. Non-response bias

We compared early and late respondents to assess potential sampling bias. We classified the first 100 people who responded to the survey as “early respondents” and compared them to the last 100 respondents, whom we classified as “late respondents.” The results showed no significant differences in the responses of the two groups. Thus, we found no evidence of non-response bias.

4.9. Hypothesis testing

In addition to all hypothesized links, we also controlled for the effect of continuance intention on CCB by building a direct link. Customer/user loyalty is a critical variable in the fields of marketing and information systems. Many studies measure loyalty with items related to both continuance intention and word of mouth (Li and Liu 2014). To align with the literature and to explore the real impacts of delight and satisfaction on CCB, we constructed a link between continuance intention and CCB.

The path analysis results are shown in Fig. 3. All direct links from confirmation and unexpectedness to satisfaction and delight are significant. Therefore, H1a, H1b, H2a, and H2b are supported. The link between unexpectedness and satisfaction is significant at the 0.01 level, and the remaining three paths are significant at the 0.01 level. In addition, a total of 47.5% of the variance of satisfaction and 48.9% of the variance of delight are explained by unexpectedness, confirmation, and their interaction.

We found all paths between affective variables and behavioral variables to be significant. Continuance intention is affected by both satisfaction ( $\beta = 0.50, p\text{-value} < 0.01$ ) and delight ( $\beta = 0.23, p\text{-value} < 0.01$ ). Customer citizenship behavior is affected by both satisfaction ( $\beta = 0.20, p\text{-value} < 0.01$ ) and delight ( $\beta = 0.61, p\text{-value} < 0.01$ ). Furthermore, delight and satisfaction jointly

explain 57.9% of the variance of continuance intention, and 55.7% of the variance of customer citizenship behavior. Therefore, H3a, H3b, H4a, and H4b are all supported.

In addition to the proposed causal relationships, this study also explored whether the dependent variables are affected more by one independent variable than another. We used two approaches to test H1c, H2c, H3c, and H4c. First, we adopted the approach used by Keil et al. (2013) to test whether paired independent variables of each dependent variable have different levels of effect.<sup>5</sup> As shown in Table 4, while both unexpectedness and confirmation affect both satisfaction and delight, satisfaction is affected more by confirmation than by unexpectedness, and delight is affected more by unexpectedness than by confirmation. Similar patterns can be found between affective and behavioral variables. While continuance intention is affected more by satisfaction than by delight, CCB is affected more by delight than by satisfaction. Therefore, H1c, H2c, H3c, and H4c are all supported.

Second, we used the Z-test<sup>6</sup> for comparing correlated correlation coefficients (Meng et al. 1992, Parboteeah et al. 2009). Based on the path coefficients and the Z-test, confirmation is a stronger predictor of satisfaction than is unexpectedness, providing support for H1c. Unexpectedness is a stronger predictor of delight than is satisfaction, providing support for H2c. Furthermore, the relationship between satisfaction and continuance intention is stronger than the relationship between delight and continuance intention, providing support for H3c. The relationship between delight and CCB is stronger than the relationship between satisfaction and CCB, providing support for H4c.

We also conducted two tests to clarify the mediating effects of satisfaction and delight. We first used the approach proposed by Baron and Kenny (1986) to test four possible roles played by each mediator. The eight test results indicate that delight and satisfaction partially mediate the effects of unexpectedness and confirmation on CCB and continuance intention. Second, to validate the significance level of the mediating effects, eight Sobel tests were performed, based on the results shown in Fig. 3. The results in Table 5 show that those eight mediating effects are all significant, while the mediating effect of satisfaction on the relationship between unexpectedness and CCB is significant at the 0.1 level. However, this is still considered acceptable given that delight, rather than satisfaction, is the major antecedent of CCB.

<sup>5</sup>  $t = \frac{\beta_i - \beta_j}{\sqrt{\frac{1 - R_{ij}^2}{n - k - 1} (r^{ij} + r^{ji} + 2r^{ij})}}$   $\beta_i$  is the path coefficient of IV  $i$ ,  $\beta_j$  is the path coefficient of DV  $j$ ,  $Y$  is the DV,  $n$  is sample size,  $k$  is the number of IV, and  $r^{ij}$  are the elements of the inverted correlation metrics.  
<sup>6</sup>  $Z = Z_{y,a} - Z_{y,b} \sqrt{\frac{N-3}{2(1-r_{ab})h}}$  where  $Z_{y,a}$  and  $Z_{y,b}$  are Fisher’s  $Z =$  transformation,  $N$  is the sample size,  $h = \frac{(1-f^2)^2}{(1-f^2)}$ ,  $f = \frac{1-r_{ab}}{2(1-r^2)}$ ,  $\bar{r}^2 = \frac{r_{ya}^2 + r_{yb}^2}{2}$ .



**Table 2**  
Measurement validity and reliability.

Constructs	Items	Factors loading
Unexpectedness CR = 0.98; Alpha = 0.98; AVE = 0.96	Functions and features beyond my expectation are of high quality	0.99
	Functions and features not anticipated are well designed	0.95
	Functions and features beyond my imagination perform well	0.99
Confirmation CR = 0.97; Alpha = 0.95; AVE = 0.91	Regarding the functions and features that I expected to be in the app, my experience was better than what I expected	0.95
	Regarding the functions and features that I expected to be in the app, the quality exceeds what I expected	0.96
	Regarding the functions and features that I expected to be in the app, most of them were present	0.95
Satisfaction CR = 0.95; Alpha = 0.92; AVE = 0.86	After using this app, I am very (dissatisfied, satisfied)	0.93
	After using this app, I am very (displeased, pleased)	0.94
	After using this app, I am very (frustrated, contented)	0.92
Delight CR = 0.97; Alpha = 0.96; AVE = 0.93	After using this app, I am delighted	0.96
	After using this app, I am elated	0.96
	After using this app, I am gleeful	0.96
Continuance intention CR = 0.97; Alpha = 0.96; AVE = 0.92	I intend to continue using this app	0.97
	The likelihood that I would use this app in the future is high	0.97
	In the future, I will keep using this app	0.94
CCB – WOM CR = 0.97; Alpha = 0.96; AVE = 0.93	Have you ever performed the following behaviors? ( <i>never... frequently</i> )	
	Recommended this app to my family	0.95
	Recommended the app to my peers	0.98
	Recommended the app to people interested in such apps	0.96
CCB – Feedback CR = 0.98; Alpha = 0.97; AVE = 0.93	Have you ever performed the following behaviors? ( <i>never... frequently</i> )	
	Filled out a user satisfaction survey	0.94
	Provided helpful feedback to app developers	0.97
	Provided information when surveyed by app developers	0.98
	Informed app developers about issues or suggestions	0.97
CCB – Help CR = 0.98; Alpha = 0.97; AVE = 0.93	Have you ever performed the following behaviors? ( <i>never... frequently</i> )	
	Assisted other users in finding the app	0.94
	Helped others with their app downloads	0.96
	Taught someone how to use the app correctly	0.98
	Explained to other users how to use the app correctly	0.98
Perceived usefulness CR = 0.97; Alpha = 0.97; AVE = 0.86	Using this app would enable me to accomplish tasks more quickly	0.93
	Using this app would enhance my effectiveness on the task	0.94
	Using this app would make it easier to do my work	0.93
	Using this app would improve my performance	0.94
	Using this app would increase my productivity	0.93
	I would find this app useful in the task	0.91

## 5. Discussion

As shown above, the empirical results support most of our hypotheses. First, we proposed that cognitive components have effects on affective components, and that the magnitude of the effects of different cognitive components depends on the dependent variables. The data analysis result aligns with our predictions

and shows that both confirmation and unexpectedness significantly affect satisfaction and delight. In addition, satisfaction is associated more with confirmation, and delight is more correlated with unexpectedness. It is noticeable that the coefficient-difference between confirmation and unexpectedness is high when satisfaction is the target (0.35), and is moderate when delight is the target (0.14). Aligning with our argument, expectations result from physical needs, which drive individuals to use the app. Therefore, satisfaction is mainly determined by the extent to which the app can meet the expectations raised by the physical needs ( $\beta = 0.56$ ). Even though seeing unexpected functions also leads to satisfaction, its effect is limited ( $\beta = 0.21$ ).

A lower (but still significant) degree of coefficient difference can be observed when delight is the dependent variable. This is caused by the moderate effect of unexpectedness ( $\beta = 0.47$ ) and the not-so-weak effect of confirmation ( $\beta = 0.33$ ). One possible explanation is that customers may be delighted when their expectations are highly confirmed or when the expected functions perform extremely well. For example, Oliver et al. (1997) used “extremely positive disconfirmation” to measure the level of “surprising performance.” Therefore, the effect of confirmation is moderate to low, and the difference between confirmation and unexpectedness is limited.

Second, in addition to our finding that all relationships between affective and behavioral variables are significant, the results confirm our expectation that satisfaction is the major driver of continuance intention ( $\beta = 0.50$ ), and that delight is more critical for CCB ( $\beta = 0.61$ ). Furthermore, the levels of coefficient difference are similar for both behavioral outcomes. Therefore, we can claim that satisfying customers is critical for customer retention because, in alignment with traditional wisdom, satisfied customers are more likely to continue use the software. On the other hand, delighted customers are more likely to perform citizenship behaviors, including providing feedback, performing word of mouth, and helping others to install and use the app.

Third, the combination of “cognitive to affective” and “affective to behavioral” results further indicates that providing high quality expected functions is critical for enhancing satisfaction, which is especially important since satisfied customers are more likely to continue use the app. However, satisfaction has relatively weak power in encouraging app users to perform CCB. Thus, app developers who wish to promote pro-social behaviors should delight their customers, rather than merely satisfy them. For example, since positive word of mouth is desired in the initial stages of the life cycle, app developers should do their best to delight early downloaders so that those early users will serve as free commercial channels. Furthermore, even though app users may be delighted by unexpected functions, simply encountering those functions may not completely satisfy app users.

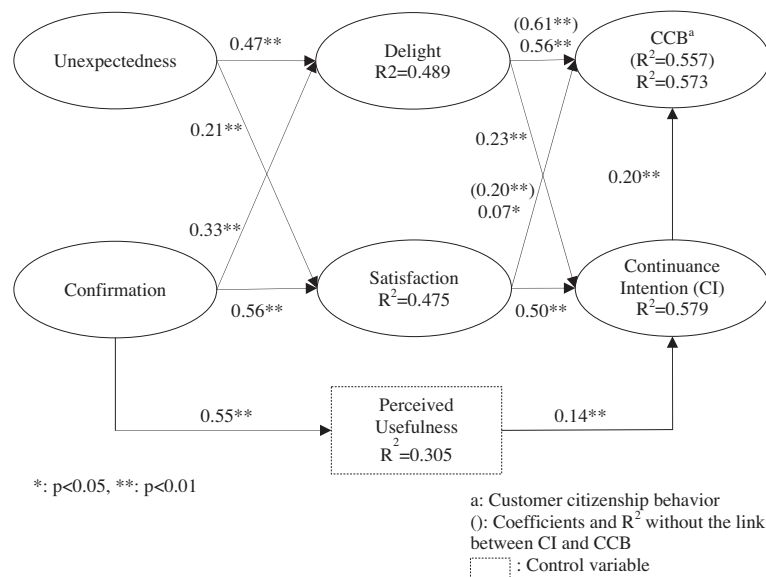
### 5.1. Implications for academia and future research

Our study also generates several critical implications for related studies. First, for expectancy-based theories, e.g., ECT and EDT, we have argued the need to separate unexpectedness from confirmation because customers may be surprised by the high performance of some functions or features and yet find that the expected functions or features perform below expectations (or vice versa). This leads to problems in evaluating the confirmation level of any given product or service. The inclusion of unexpectedness allows researchers to better represent the level of confirmation and understand the drivers of satisfaction. In addition to highlighting the need to study unexpectedness, we also illustrated its impact on delight and satisfaction. While the impact of unexpectedness on satisfaction is relatively weak compared to that of confirmation, unexpectedness is strongly associated with delight. Therefore,

**Table 3**  
Correlation matrix.

Constructs	Mean	S.D.	Correlation matrix											
			1	2	3	4	5	6	7	8	9	10		
1. Unexpectedness	3.03	1.08	<b>0.98</b>											
2. Confirmation	3.57	0.78	0.49	<b>0.95</b>										
3. Satisfaction	3.53	0.81	0.48	0.66	<b>0.93</b>									
4. Delight	2.82	1.07	0.64	0.56	0.58	<b>0.96</b>								
5. Cont. intention	3.60	0.94	0.50	0.74	0.73	0.59	<b>0.96</b>							
6. WOM	2.90	1.17	0.46	0.55	0.58	0.71	0.58	<b>0.96</b>						
7. Feedback	2.04	1.11	0.44	0.27	0.30	0.53	0.34	0.45	<b>0.96</b>					
8. Help	2.62	1.25	0.46	0.50	0.51	0.62	0.55	0.73	0.63	<b>0.96</b>				
9. perceived usefulness	3.53	0.94	0.51	0.55	0.70	0.49	0.60	0.50	0.31	0.43	<b>0.93</b>			
10. Age	2.12	0.92	-0.13	-0.14	-0.15	-0.13	-0.20	-0.14	-0.04	-0.08	-0.13	<b>1.00</b>		

Note: The square root of the average variance extracted (AVE) values appears along the diagonal in boldface numbers.



**Fig. 3.** Path analysis.

**Table 4**  
Comparisons of different independent variables.

Dependent variables	Independent variables	Coefficients	Abs. Diff.	Z-test
Satisfaction (H1c)	Unexpectedness	0.21	0.35*	4.54*
	Confirmation	0.56	(t = 4.12)	
Delight (H2c)	Unexpectedness	0.47	0.14*	1.77*
	Confirmation	0.33	(t = 1.73)	
Continuance intention (H3c)	Delight	0.23	0.27*	4.35*
	Satisfaction	0.50	(t = 3.08)	
Customer citizenship behaviors (H4c)	Delight	0.61	0.41*	6.63*
	Satisfaction	0.20	(t = 4.59)	

\* p < 0.1.  
\* p < 0.01.

future studies should take unexpectedness into consideration when attempting to understand repurchase or continuance intention.

Second, while delight is relatively important to CCB, satisfaction is associated more with continuance intention. Since most past studies have considered the effect of satisfaction alone, the most common conclusion reached is that satisfaction is the major driver of customer citizenship behavior. In this study, we introduced delight into our research model and demonstrated that satisfaction has a relatively weak effect when delight is also taken into consideration.

**Table 5**  
The results of Sobel test.

Mediator	Relationship	Sobel test
Satisfaction	Unexpectedness → customer citizenship behavior	3.27*
	Confirmation → customer citizenship behavior	3.72*
	Unexpectedness → continuance intention	4.62*
Delight	Confirmation → continuance intention	6.39*
	Unexpectedness → customer citizenship behavior	8.21*
	Confirmation → customer citizenship behavior	7.12*
Continuance intention	Unexpectedness → continuance intention	3.96*
	Confirmation → continuance intention	3.50*

\* p < 0.01.

Though we explored the effect of unexpectedness, we consider ours to be an initial study, and we encourage future researchers to continue exploring the impact of unexpectedness. This study raises more questions than it answers. Below, we describe possible future research directions based on our results.

First, given the importance of unexpectedness, exploring its antecedents becomes interesting. For example, ECT indicates that experienced customers may have higher and more wide-ranging expectations. Under such conditions, there is little chance that all expectations will be met, and the possibility of providing unexpected features becomes less likely. Future research is encouraged to explore possible antecedents of both confirmation and unexpectedness. On the other hand, we based our study on expectancy

theories and explored the effect of unexpectedness on only satisfaction and delight. We suspect that unexpectedness may affect other variables, such as perceived usefulness. It is interesting to determine whether unexpectedness does affect other variables, since exploring its effect and knowing its positive and negative implications can inform researchers and practitioners regarding the best timing for offering unexpected functions.

Despite its contributions, this study has some limitations. First, it is a cross-sectional study. Similar to ECT-based studies with single wave data collection, we included confirmation only. Initial expectations are not included. Second, all variables are based on subjective evaluations. Future research may extend our study by utilizing the objective evaluation approach to measure variables such as actual usage behavior. Third, we consider only the positive side of unexpectedness. As indicated, unexpected functions that perform at an unacceptable level may cause negative affective reactions (negative surprise). A more extreme example is when the performance of unexpected elements is acceptable, but the performance of the expected parts is unacceptable in the extreme. This may also lead to a “negative surprise.” Future studies are encouraged to explore the consequences of offering low performance unexpected functions. Fourth, we focused exclusively on productivity apps. We argue that users of productivity apps possess clear and specific expectations before downloading and are therefore more suitable for confirming the proposed concept. However, unexpectedness may also play a critical role in the forming of satisfaction and continuance intention in the context of other types of apps. Therefore, future studies may wish to include other types of apps (e.g., game-based apps) to enhance the generalizability of our findings.

### 5.2. Implications for practitioners

Our study generates two major implications for app developers. First, even though unexpectedness has a positive impact on satisfaction, its importance is relatively minor in comparison to that of confirmation. This conveys the important message that while providing a plethora of features or functions may impress users, developers should first carefully position their apps. They should then clarify users' major expectations and try to fulfill those critical needs. This highlights how important it is for app developers to have a clear understanding of their own product and its intended users. The next step is to determine the must-have functions so app developers can design an app which fits the users' needs and expectations. Given the critical role of confirmation, app developers must ensure that the functions and features they develop can actually fulfill customers' needs.

Past studies have shown that satisfying customers is insufficient because satisfied users are not necessarily loyal customers and can still easily switch to other service providers (Arnold et al. 2005). Researchers argue that loyal customers are those who are extremely satisfied or delighted. However, some also argue that delighting customers may also result in a negative outcome. Although delighting customers can increase their loyalty, it also raises their level of expectation, making it more difficult to delight them in the future. However, developers are still encouraged to delight customers. Emphasizing the possibility of customer forgetfulness, Rust and Oliver (2000) encouraged firms to delight customers because when the customer forgets, the same delightful experience can be repeated again, with the same effect.

Second, delight boosts citizenship behaviors. This implies that, in the early stages of the product lifecycle, app developers attempting to take advantage of this phenomenon should delight their early adopters because delighted people tend to perform pro-social behaviors. Delighted early adopters may spread the word about the app, provide feedback and suggestions to

developers, and help other users to install or use the app. Note that even though satisfied users may also perform certain pro-social behaviors, delighted users tend to perform them more. Furthermore, in order to delight the app users, developers should provide unexpected features or functions in the app. As indicated above, developers should carefully position their product first and then identify the expectations of the target users. Once those expectations have been identified, developers should offer high quality expected functions and also offer some additional features or functions to surprise users. Once those early users are surprised, they tend to perform behaviors that are desired by developers.

## 6. Conclusion

The goal of this study was to understand how unexpected functions and features impact users' affective reactions and behavioral intentions toward an app. We first highlighted the problem of the potential measurement issue and distinguished unexpectedness from confirmation. Then, based on expectancy theories, we integrated one component into each of the cognition-affect-behavior stages: unexpectedness was included in cognition, delight was added to affect, and customer citizenship behavior was integrated as part of the behavioral component. We also examined the relative importance of variables in each stage to variables in subsequent stages. Data collected from 436 app users confirmed most of our hypotheses. All direct links were found to be significant. While satisfaction is mainly determined by confirmation, delight is affected more by unexpectedness. Satisfaction is a stronger predictor of continuance intention, and delight is more likely to result in citizenship behaviors.

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