

'Use Engagement behaviour to brush off the dust on a mobile app'

A research on the effect of customer engagement behaviour on mobile app stickiness



MASTER THESIS

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December 2015



ABSTRACT

The present research seeks to extend the existing literature about mobile app stickiness. The present research is distinguished from earlier studies. Instead of the focus on the relationship between mobile app characteristics and mobile app stickiness, this study focuses on the relationship between customer engagement behaviour and mobile app stickiness. Customer engagement behaviours are different behavioural expressions of customers, other than purchases. In the present study the following behavioural expressions are considered: blogging behaviour, co-creation behaviour, WOM behaviour and loyalty behaviour.

A descriptive cross-sectional study (survey) is carried out, in order to investigate the effect of different customer engagement behaviours on mobile app stickiness. This survey is distributed online and it contains different propositions, which need to be answered on a 5-point Likert Scale.

A linear regression is performed in order to analyse the effect of the different variables on mobile app stickiness. Results showed that positive user experience has an effect on mobile app stickiness. Also, entertainment usefulness of a mobile app and being in control of a mobile app have an effect on mobile app stickiness. The main focus of this study lies on the different customer engagement behaviours and their effect on mobile app stickiness. Hearing Positive WOM and reading positive blogs have a positive effect on mobile app stickiness. Also, creating app loyalty has a positive effect on mobile app stickiness. In this research mobile app self-efficacy is a moderation variable. Problems with mobile self-efficacy moderate the effect of user experience on mobile app stickiness, of WOM on mobile app stickiness and of blogging on mobile app stickiness.

The findings of this study offer new insights into the understanding of the effect of customer engagement behaviour on mobile app stickiness. Based on these findings specific recommendations for app developers can be formulated.

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Chapter 1: Introduction

Mobile applications (Mobile apps) are software applications which are accessible on smartphones, tablets and other mobile devices. Mobile apps are downloaded through app stores. Popular app stores are Apple's App store, Google play, Windows Phone Store and Blackberry App World. Mobile apps are originally introduced as productivity and as information retrieval tools. Tools like calendars, e-mail access and weather information (Wang, Liao, & Yang, 2013). However due to the increase in the public demand of mobile apps, the increase in the usage of technology and the availability of more enhanced developer tools, the market of mobile apps is expanded. This growth of the mobile app market creates new mobile marketing opportunities. From a marketing perspective, opportunities like in-app advertisements (Kim, Yoon, & Han, 2014)

The usage of mobile apps is a popular aspect of the daily life. Users of smartphones spend almost 90% of their time on devices, using mobile apps. As shown in table 1, 131.7 billion mobile apps are downloaded in 2014. This amount of downloads will increase in the upcoming years, reaching a total amount of around 310 billion downloads in 2016 (Mobithinking, 2013).

Companies can benefit from the usage of mobile apps. Mobile apps offer companies the opportunity to stay in touch with the costumers. Besides, mobile apps can contribute to brand recognition and they can drive the sales of the company (Mobithinking, 2013).

The average cost to acquire a user who will download and who will install an app has grown from \$1.30 in 2012 to \$1.62 in 2013. Due to the law of demand and supply, this cost can rise further in the future. Therefore, the concept of app stickiness (retention) needs attention (Makkoulis, 2014).

	2011	2012	2013	2014	2015	2016
Free downloads	22.1 billion	40.6 billion	73.3 billion	119.9 billion	189 billion	287.9 billion
Paid downloads	2.9 billion	5.0 billion	8.1 billion	11.9 billion	16.4 billion	21.7 billion
Total downloads	25.0 billion	45.6 billion	81.4 billion	131.7 billion	205.4 billion	309.6 billion
% Free downloads	88.4%	89%	90%	91%	92%	93%

Table 1, Amount of total mobile app downloads, (Mobithinking, 2013).

App stickiness is defined as the ability of a mobile app to draw and maintain app users. The length of time consumers are spending with a mobile app, and the extent to which consumers repeat the usage of a mobile app, are two dimensions of app (Lin, 2008). It will become more costly to attract new customers. Therefore creating app stickiness needs more attention.

1. 1 Problem Definition

Many companies set the number of downloads as a success parameter of a mobile app. They are more concerned about the number of downloads, instead of the usage of a mobile app. The number of downloads as a success parameter can be misleading.

Consumers can download an app but if they never open the app or if they delete the app after a single use, a high download rate does not indicate a success. A study conducted by Localytics shows that consumers download an average of 65 apps on their smartphone, but only use a few daily. Nearly 22% of the apps are never used more than once (Leger, 2013).

Users are easily impressed by the promise of new apps, however sometimes the app experience does not meet the expectations of the users (Mobithinking, 2013). Also, as mentioned in the introduction, the average cost of acquiring a new user will grow in the future (Makkoulis, 2014). A study conducted by Nielsen shows that retention of app users is a challenge. The study showed that only 36% of all mobile apps are used frequently. 62% of the consumers delete an app within two weeks (Purcell, Entner, & Henderson, 2010).

Mobile app stickiness can be created by optimizing the characteristics of a mobile app. Some studies which focusses on app characteristics, in order to enhance app stickiness, has been done by Furner, Racherla and Babb. In these studies the effect of mobile app characteristics on mobile app stickiness is analysed (Furner, Racherla, & Babb, 2012). The present study will take some app characteristics into account, but the main focus lies on the effect of customer engagement behaviour (CEB) on mobile app stickiness. Customer engagement behaviour is a behavioural expression of consumers toward a product or brand, which goes beyond only purchases (van Doorn, et al., 2010). This paper focuses on the customer engagement behaviours: blogging, co-creation, loyalty and Word-of-Mouth (WOM). The main research question addressed in this study is:

How can app developers use customer engagement behaviour in order to increase mobile app stickiness?

Sub-research questions to be answered throughout the research include: (a) Does paid and informational mobile apps influence app stickiness? (b) Which characteristics of or factors related to mobile apps contribute to an increase of mobile app stickiness? (c) Which effect (amplified or weakened) does problems with mobile self-efficacy have on the relationship between user experience and mobile app stickiness, and on the relationship between customer engagement behaviours and mobile app stickiness? (d) Which effect does reading positive blogs have on mobile app stickiness? (e) Which effect does co-creation have on mobile app stickiness? (f) Which effect does creating app loyalty have on mobile app stickiness? (g) Which effect does positive WOM have on mobile app stickiness?

1.2 Research objective

This study is distinguished from studies which analyse the relationship between mobile app characteristics and mobile app stickiness. The focus of this study lies on the relationship between customer engagement behaviour and mobile app stickiness.

The objective of this study is creating insights about customer engagement behaviour related to the concept of mobile app stickiness. This study attempts to capture insights about mobile app stickiness based on customer engagement behaviours, instead of insights based on the characteristics of mobile apps. The customer engagement behaviours which will be studied are: blogging, co-creation, loyalty and WOM. Due to this present study, app developers will get insights about how these different customer engagement behaviours affect mobile app stickiness.

1.3 Academic relevance

Several studies have been conducted on customer engagement, on mobile apps and on mobile app stickiness.

A study written by Brodie, Hollebeek, Juric and Ilic mention that in today's business environment the role of customer engagement is important. The concept of customer engagement is examined and different themes are derived, which form the basis of the definition of customer engagement. According to Brodie, Hollebeek, Juric and Ilic, customer engagement is not the same as participation and involvement, but it reflects more interactive and creative experiences of customers (Brodie, Hollebeek, Juric, & Ilic, 2011).

A study conducted by Vivek described that customer engagement is the intensity of the participation and the connection of an individual with an organization. In this study Vivek showed that customer engagement directly affect the connection with the company and with the goodwill of the company. However, customer engagement does not affect the intention of the customer to do business with the organization. Customer engagement goes beyond doing purchases (Vivek, 2009).

The most used definition of customer engagement behaviour is formulated by van Doorn. According to van Doorn, customer engagement behaviour is a behavioural expression of a consumer toward a product or brand, which goes beyond only purchases. These behavioural expressions consist of motivational drivers like Word-of-Mouth (WOM), doing recommendations, helping other customers with their problems and writing blogs. Also, Van Doorn described antecedents and consequences of customer engagement behaviour, and how firms should manage customer engagement behaviour (van Doorn, et al., 2010).

Besides papers written about the definition of customer engagement, and the antecedents and consequences of customer engagement behaviour, there are also several papers about mobile app usage. A study performed by Böhmer and Krüger showed some results about the usage of mobile apps. An average session with a mobile app is about one minute. Böhmer and Krüger also showed that there is a relation between the usage of the type of mobile app and the time of the day. Mobile apps about news and weather are most used in the morning. Game apps are most popular at night. Communication apps are most used through most of the day, especially in the morning (Böhmer, Hecht, Schöning, Krüge, & Bauer, 2012).

A study performed Wang, Liao and Yang showed that there are different values: functional, social, emotional and epistemic, which affect the intention of using mobile apps.

The influence of emotional and epistemic values are stronger than the influence of functional and social values. Mobile apps which foster pleasure, fun and curiosity (games) are used more frequently (Wang, Liao, & Yang, 2013).

Another study related to app usage is constructed by Kim, Yoon and Han. There are six factors affecting the intention to use a mobile app. These factors are: informative usefulness, entertaining usefulness, social usefulness, ease of use, user review and cost effectiveness. Only Informative usefulness, entertainment usefulness, ease of use and user reviews are significant. These factors affect the intention to use a mobile app (Kim, Yoon, & Han, 2014)

Mobile apps are also used as tools in order to increase the performance of a firm. Kim and Adler explored the relationship between a mobile app and its effect on brand loyalty. Before brand loyalty starts customers should become aware of the product. A growth in the brand image will result in a higher chance of retaining the customer. According to this paper mobile apps will have a positive effect on brand loyalty (Kim & Adler, 2011).

The papers written by Racherla, Furner and Babb are most relevant for this study. These papers are about the concept of app stickiness. These papers discuss the relationship between app characteristics and app stickiness. In the first paper Racherla, Furner and Babb showed that mobile app features, such as content and speed, affect mobile app stickiness (Furner, Racherla, & Babb, 2012). In the other paper the relationship between app features and app stickiness is explained further. In that paper some additional app features affect the stickiness of mobile apps. These features are: user experience, dexterity and focus. Also, some effects are explained which affect the discovery and download stage of a mobile app. According to Racherla, Furner and Babb these effects are: ordering affects, number of downloads effects and network effects. Mobile apps are downloaded more often if they are highly ranked in app stores, if it is downloaded more frequently and if it is rated highly by other users (Furner, Racherla, & Babb, 2014)

1.4 Thesis structure

This Master thesis should provide insights about customer engagement behaviour, which enhances mobile app stickiness. In order to answer the research question and the sub-research questions, this study consists of six chapters. These six chapters are structured as followed: chapter one contains the introduction of the topic, the problem definition, the research objective and the academic relevance. In the second chapter the theoretical framework will be presented. Literature regarding customer engagement, mobile app stickiness and other related concepts will be outlined in this chapter. Based on the literature reviewed in chapter two, the conceptual framework and the relevant hypotheses will be presented and formulated in chapter three. In the fourth chapter the methodological approach will be presented. In this chapter the research design will be described. The data will be described and will be analysed in the fifth chapter. In this chapter several statistical tests will be executed in order to answer the hypotheses. In chapter six the research question and the sub-questions will be answered in a final conclusion. Besides a draw of the final conclusion, the sixth chapter also contains limitations of this research, possible implications and directions for future research.

Chapter 2: Theoretical Framework

In this chapter the theoretical framework of this thesis will be discussed. Central concepts related to the research question and relevant theory will be described. This study focuses on customer engagement of mobile apps. So this chapter starts with the theory related to customer engagement. Firstly, customer engagement will be described with relevant theory. Secondly, theory related to mobile apps will be described. Based on the literature review for the theoretical framework, different hypotheses will be postulated in chapter three.

2.1 Customer engagement

2.1.1 What is customer engagement

The aim of this paragraph is defining the concept of customer engagement. Customer engagement has several different meanings. Meanings like to employ, to hire, to hold fast and to bind customers by a contract (Bijmolt, et al., 2010). Customer engagement focuses on the behavioural aspects in a customer to a firm relationship. Customer engagement goes beyond transactions. It is specifically defined as behavioural expressions of customers, besides only purchases. Customers contribute to the firm in many other ways (behavioural expressions), besides solely transactions. These behavioural expressions can be either positive (writing positive blogs) or negative (Negative WOM) (van Doorn, et al., 2010). Customer engagement also relates to customer co-creation. For firms it is important to recognize the need to build relationships with customers. These interactions between customers and firms, transactional or non-transactional, can be defined as customer engagement. Also, engagement refers to a deep and meaningful connection between the customer and the firm, which endures over time (Kumar, et al., 2010).

Customers are important for firms, therefore the perspective about customers is changed. In the classical perspective the customer was exogenous to the firm and had a passive role in the value creation process of the firm. However with the new perspective, customers became endogenous to the value creation process of a firm. Customers can co-create value, co-create competitive strategy and collaborate in the firm's innovation process (Bijmolt, et al., 2010). With the new perspective the concept of customer engagement plays an important role. Customer engagement can be defined as a behavioural expression from a customer toward a brand or a firm which is more than only the purchase behaviour of the customer (Bijmolt, et al., 2010). Important behavioural expressions of customers are co-creation, WOM, blogging and loyalty. These behavioural expressions are affecting the firm in ways other than purchases. They have an indirect impact on the performance of the firm, however their influence on the firm performance should not be neglected. Ignoring these behavioural expressions can lead to a highly biased perception of the contribution of the customer to a firm. One example, which illustrates the effect of ignoring behavioural expressions, is related to WOM.

If WOM is not taken into consideration, if the customer lifetime value (CLV) is calculated, the calculation could underestimate the CLV by up to 40%.

So it is essential to take the behavioural expressions, besides the purchases, into consideration (Wangenheim & Bayón, 2007).

CLV is calculated as the sum of the discounted net contribution margins over time of the customer. The net contribution margin is the revenue provided to the company, by a customer, less the cost associated with maintaining a relationship with that customer (Kumar, et al., 2010).

2.1.2 Relationship between firm and customer

With customer engagement the relationship between the company and the customers has become closer. It became so close that the term intimacy is used. However not all customers appreciate that intimacy. Many firms strive to create relationships with customers, however not all customers are equally motivated to build close and intimate relationship with firms (Mende, Bolton, & Bitner, 2013)

Attachment theory plays an role in analysing relationships between customers and firms. The attachment theory consists of two attachment styles. Attachment anxiety is the extent to which a person worries that the relationship partner might not be available in times of need. People with the attachment style anxiety have an excessive need for approval and fear rejection and abandonment. Attachment avoidance is the extent to which a person has an excessive need for self-reliance. People with the attachment style avoidance fear depending on others and distrusts relationship partners (Mende, Bolton, & Bitner, 2013).

The attachment styles of customers affect their preferences for a close relationship with the firm. Furthermore, both preference for closeness and customer attachment styles influence loyalty. The attachment style anxiety is positively related to customer preference for closeness, and the attachment style avoidance is negatively related to customer preference for closeness. Customer attachment style anxiety and customer attachment style avoidance were negatively related to loyalty. The effect of attachment anxiety on loyalty was smaller than the effect of avoidance (Mende, Bolton, & Bitner, 2013). These insights help marketers identify customers who seek closeness in relationships.

Attachment theory can play an important role in building close relationships between customers and firms. Attachment styles help firms identify which customers prefer high or low levels of closeness. Anxious customers welcome more frequent contacts and a variety of touch points with the firm. Managers should understand that anxious customers are more sensitive to relational cues. Anxious customers are more likely to respond positively to being recognized by a loyalty program (Mende, Bolton, & Bitner, 2013). Understanding customer attachment styles and preferences for closeness can also help with new customer acquisition. Many firms strive to attract new customers by promising closeness. Such acquisition approaches presume that all customers desire closeness. However avoidant people don't desire closeness (Mende, Bolton, & Bitner, 2013). Firms need to tailor marketing efforts in order to match customer relational preferences.

2.2 Dimensions of Customer Engagement

In this paragraph the dimensions of customer engagement will be outlined. These dimensions reflect ways in which consumers may choose to engage with the firm or with the product. There are five dimensions which will be analysed. The five dimensions of customer engagement are:

1. Valence
2. Form and modality
3. Scope
4. Nature of the impact
5. Goals of the customer

2.2.1 Valence

Customer engagement can be divided into positive customer engagement and negative customer engagement, depending on the valence (pleasantness or unpleasantness) of the content. Positive customer engagement refers to actions, e.g. WOM and blogging, which in the short and the long run lead to positive consequences for the firm (van Doorn, et al., 2010).

2.2.2 Form and modality

The form and modality refers to the type of resources, e.g. time and money which are utilized by the customers, if they express customer engagement behaviour (van Doorn, et al., 2010).

2.2.3 Scope

Customer engagement can be classified as temporally momentary or ongoing. If the actions of customers are ongoing, firms need to develop specific processes in order to monitor and address customer engagement. If the actions of customers are momentary, firms need to assess the likely firm level outcomes, and act on that. Scope of customer engagement explains whether customer engagement is local or global. Local engagement can be triggered by WOM referrals. Global engagement can be triggered by posting and writing blogs on a global website. Messages posted on a popular website have a higher geographic impact and spread compared to a WOM referral to another person (van Doorn, et al., 2010).

2.2.4 Nature of the impact

The nature of the impact of customer engagement behaviour can be classified in terms of: the immediacy of the impact, the intensity of the impact, the breadth of the impact and the longevity of the impact. The immediacy of the impact refers to how quick customer engagement behaviour affects the target audience. For example immediacy of customer engagement behaviour on the internet may be faster compared to writing a letter to a company. The intensity of the impact refers to the level of change affected within the target audience (van Doorn, et al., 2010).

The breadth of the impact refers to the reach of the impact, the number of people in the target group which are affected. The longevity of the impact reflects the period of time customer engagement behaviour is available. For instance posting an online review will have more longevity than a WOM referral to another person. The online review is more likely to be on the website for a long period of time, and the WOM referral may be forgotten after a while. Consumers can engage through multiple channels with each other, they can interact in person, via internet, via phone, via mail et cetera. the choice of the channel will influence the overall impact of customer engagement behaviour (van Doorn, et al., 2010).

2.2.5 Customer goals

If the goals of the customers are aligned with the goals of the firm, then customer engagement behaviour should have a positive impact on the firm. If the goals of the customers are not aligned with the goals of the firm, then customer engagement behaviour have negative consequences for the firm (van Doorn, et al., 2010).

2.3. The Building blocks of Customer Engagement

In order to get a correct view of the concept customer engagement, the building blocks of customer engagement need to be distinguished and need to be analysed:

- Customer acquisition
- Customer retention
- Customer development

In the traditional view these building blocks focus on purchase related objectives such as estimating the amount of purchases of a customer. However with customer engagement becoming more important for companies, the traditional view changed (Bijmolt, et al., 2010). In this paragraph the traditional concepts and the changes of these concepts due to consideration of customer engagement will be described.

2.3.1 Customer acquisition

The first step is selecting the right prospects for the business. The right prospect reflects someone with maximum response likelihood, maximum purchase probability and maximum purchase quantity. In other words someone with a high expected customer lifetime value (Bijmolt, et al., 2010). After selecting the right customer, the next step should be allocating resources among marketing activities in order to acquire the prospects. Firms can engage in various marketing activities to acquire new customers. These marketing activities have different communication channels through which the new customer is attracted. Also, the message used to attract new customers can differ between the different communication channels. Firms can acquire prospects directly through e.g. personal selling, internet and mass media (Television). Firms can acquire prospects indirectly through e.g. referrals (Bijmolt, et al., 2010).

The traditional view of customer acquisition, selecting customers on the basis of their response likelihood or purchase quantity, is changed.

These purchase related objectives are replaced by behavioural manifestations (WOM, Co-creation. Instead of predicting future purchase levels of customers, companies focus more on e.g. predicting the number of WOM referrals. They target customers with a high propensity to WOM referrals (Bijmolt, et al., 2010). Companies are more interested in selection criteria's beyond only purchase related criteria's.

2.3.2 Customer development

In the development stage customer lifetime value is stimulated. This can be done by varies marketing activities like cross-selling. With cross-selling customers can acquire additional related services or products (Bijmolt, et al., 2010).

Companies encourage customers who have already bought a product to buy another, mostly a related, product. The traditional view relies on customer transactions in order to optimize the CLV (Knott, Hayes, & Neslin, 2002).

However if the company accounts for customer engagement, they need to understand how the behavioural manifestations like WOM, Co-creation and Complaining behaviour, impact the CLV. Especially negative WOM should be considered. The effect of negative WOM on the Net Present Value of the firm is substantial, also if there are not many dissatisfied customers. The impact of co-creation on the CLV depends on the trade-off between the costs associated with stimulation and motivation of customer participation, and the benefits received from customer co-creation. The costs are the financial rewards customers get for their participation. The benefits of co-creation are the minimization of the high failure rate of new products, and the minimization of the high development costs. This trade-off needs to be accounted for if co-creation is incorporated into the customer lifetime value (Bijmolt, et al., 2010).

Customer complaints are another manifestation of customer engagement. Complaints affect the CLV. Analysing customer complaints is an opportunity for companies to solve product related or service related problems more effectively (Bijmolt, et al., 2010). Dealing effectively with customer complaints can motivate customers to do repurchase. Also, dealing effectively with customers complaints can limit the spread of negative WOM. This all contributes positively to the CLV (Bitner, Booms, & Tetreault, 1990).

2.3.3 Customer retention

Customer retention focuses on retaining customers for the company. It prevents customers terminating contractual or non-contractual relationships with the company. In a contractual setting, customer attrition is defined as the extinction of the contract between the customer and the company. In the non-contractual setting, no contract between the customer and the company, it is more challenging to infer if the customer has terminated the 'contract' with the company. Companies have to infer whether the customer is still active or not (Bijmolt, et al., 2010).

Management of customer retention is important, because the CLV of the company directly depends on the duration of the relationship between the customer and the company. There are many tools for companies which can improve customer retention. Loyalty programs for example are a tool which reduces attrition of customers (Bijmolt, et al., 2010).

In the traditional view customer retention focused more on predicting which customers are more likely to terminate their contract with the company. If companies identified these customers they take action in order to retain these customers. It is important to incorporate the potential interactions between customers (social network of the customer) if decisions concerning customer retention are made. CLV also depends on indirect network effects, where customers influence each other. If one customer terminates the contract with the firm, another customer can also terminate the contract with the firm. This can be induced by WOM. Customers who terminate their contract with the firm are more likely to spread bad publicity to their family and friends (Bijmolt, et al., 2010).

2.4 Customer engagement value

In this paragraph customer engagement value will be described. This metric assesses the value of the customer beyond transactions. A good valuation of the customer engagement value is crucial in order to avoid undervaluation and overvaluation of customers. The measurement and the management of customer value traditionally focused on customer acquisition, customer retention, and customer development. Value creation of firms depends not only on the purchases of the customers, but also on the behavioural expressions (e.g. WOM) (Kumar, et al., 2010). Customer engagement value is comprised of 4 dimensions:

1. **Customer Lifetime value (CLV):** This value reflects the purchasing behaviour (repeat purchases and cross-buying purchases) of the customer.
2. **Customer referral value (CRV):** This value reflects the referral behaviour of the customer.
3. **Customer influencer value (CIV):** This value refers to the influencer behaviour of current customers (WOM) on new acquired customers and prospects.
4. **Customer knowledge value (CKV):** This value refers to the knowledge behaviour of the customer. The customer can provide feedback and ideas to the firm.

2.4.1 What is Customer life value (CLV)

Customer lifetime value is defined as the present value of future profits of a customer, over the lifetime of the customer with the firm. In order to calculate the CLV, the total financial contribution of transactions (revenues minus costs) of the entire lifetime of the customer with the firm is taken into consideration. CLV is a forward looking metric, therefore marketing activities in the present can be determined in order to increase future profitability (Kumar, et al., 2010).

2.4.2 What is Customer referral value (CRV)

Referrals have the potential to reduce acquisition costs for the firm and therefore create higher future revenue. The customer referral value reflects how much of the current customer's value stems from the customer's referral to new customers and prospects. CRV includes a measure which estimates the average number of successful referrals of the customer. Firms can introduce referral programs in which current customers can participate. With these programs (with and without rewards) firms can encourage current customers to make recommendations to new customers and prospects (Kumar, et al., 2010).

2.4.3 What is Customer influencer value (CIV)

CIV is almost the same as CRV. CIV is based on intrinsic motivation of the customer. The customer voluntarily generates WOM about the products of the firm and about the firm. CRV is based on extrinsic motivation. Current customers are more likely to engage in WOM if they are rewarded for the successful referrals. CRV focuses specifically on turning prospects into customers through a formal incentivized referral program. CIV can be positive (positive WOM), negative (Negative WOM), or zero (no WOM). CRV can either be positive (successful referral) or zero (no referral) CIV will increase each time if the current customer generates positive WOM. CIV will decrease if the current customer generates negative WOM (Kumar, et al., 2010).

2.4.4 What is Customer knowledge value

Customers can contribute to the value of the firm. They can help firms understand customer preferences and they can participate in the knowledge development process. The possibility to involve informed, networked and active consumers in the value creation process can lead to more personalized customer experiences. This can influence the service quality provided by the firm. CKV is the contribution of the customer to the value creation process of the firm. Brand communities can play an important role in recruiting active and informed customers. Brand community members who have a strong interest in the product or in the brand usually have extensive product knowledge. These members are pro-active in supporting others, solving problems and generating new product ideas (Kumar, et al., 2010).

The failure rate of new products is between 40% and 75%. The costs associated with the new product development are high. Interacting with active customers can minimize the high failure rate and it can decrease the high development costs. Besides, considering feedback of customers has the potential to make the entire firm offering more attractive, for existing and potential customers. Also, it can improve firm process efficiencies, e.g. reduced complaint management and high quality service (Kumar, et al., 2010).

2.4.5 How to maximize CEV

The customer engagement value is maximized if each of the four components (CLV, CRV, CIV, and CKV) is maximized separately.

CLV can be increased by motivating consumers to do more purchases over the customer life time (e.g. Cross-selling). CRV can be increased by doing more successful referrals to new customers and prospects. Increasing and enhancing customer satisfaction and creating more incentives for current customers can drive more referrals (Kumar, et al., 2010).

Encouraging and strengthening WOM is crucial to build CIV. In order to effectively execute customer influence, the customer must have access to and be a part of a social network. The more connections a customer has with others, the more influential the customer will be. Therefore, firms should invest in encouraging social networks. Firms can develop a virtual community. Customers can communicate with each other and they can influence each other. Also, viral Internet campaigns of firms can help to generate buzz. Buzz can trigger customers to share their opinions with each other (Kumar, et al., 2010).

Internet can also help to increase CKV. Internet can connect customers with firms. Firms need to make sure that a customer is given the opportunity to easily contact the firm in order to share ideas or provide feedback. Ease of communication is crucial for customers in order to increase their willingness to share ideas and provide feedback. Firms should also take into account the motivations of the customers for providing feedback. Some customers are reward seeking and some customers are attention seeking. Customers who are reward seeking are extrinsically motivated and they want compensation for their input (ideas, feedback). Attention seeking customers are intrinsically motivated and they are more interested in recognition. They just want fame. Firms can motivate these customers by naming new products after them, or post pictures of the customer on the firm's website (Kumar, et al., 2010).

2.5 Antecedents and consequences of Customer Engagement Behaviour

In this paragraph some antecedents and consequences of customer engagement behaviour will be outlined. The antecedents which affect customer engagement are: customer-based antecedents, firm-based antecedents, and context-based antecedents (van Doorn, et al., 2010).

2.5.1 Customer-based antecedents

There are some important factors which affects customer engagement behaviour. These factors are customer satisfaction, brand commitment, trust, brand attachment and brand performance perceptions (van Doorn, et al., 2010).

Customer satisfaction is a post-purchase evaluation of the product quality compared to the pre-purchase expectations. If the post-purchase evaluation exceeds the pre-purchase expectations, customer satisfaction will increase. Brand commitment is essential for prolonging successful long-term relationship with the company. Commitment is defined as a continual desire to maintain a valued relationship with the brand (Garbarino & Johnson, 1999). Trust is also important in order to maintain a successful relationship with the company. Trust can be defined as a perception of confidence in the exchange partner's reliability and integrity (Garbarino & Johnson, 1999). Brand attachment reflects the strong connection between a brand and the self-concept of the customer. It focuses on the brand instead of the physical product (Lee & Workman, 2015). Brand attachment represents a psychological state of mind in which a strong cognitive and affective bond connects the brand with the self- concept of the customer. The self-concept includes the characteristics and traits that cognitively represent an individual in memory (Park, MacInnis, & Priester, 2008). Brand perception is defined as the associations customers connect in the memory to the brand name (Subramaniam, Mohre, & Kawde, 2014).

The levels, whether high or low, of the previous mentioned factors can influence customer engagement positively and negatively. The traits of the customers and the affective states of the customers can also affect the likelihood and level of customer engagement. For instance, customers who are high on self-enhancement or desire recognition by others have been shown to engage in higher WOM behaviour. These customers are more likely willing to help others (van Doorn, et al., 2010).

The affective states of customers like regret or anger toward the brand can also affect customer engagement. For instance, the affective state anger can be a result of a bad experience with the company or product. Angry customers are more willing to engage in negative WOM. Besides, having bad experiences can lead to customers engaging in negative customer engagement behaviour. Customers can search for information about alternative brands or products. In contrast, positive experiences can motivate customers to engage more with the company. They are more willing to participate in a brand community or engage in positive WOM (van Doorn, et al., 2010).

Finally, the resources of the consumer (time, effort, and money) can also affect their level of customer engagement behaviour (form and modality). Consumers evaluate the costs and benefits of engaging in specific behaviours, and based on that they decide whether they will execute customer engagement behaviour (van Doorn, et al., 2010).

2.5.2 Firm-based antecedents

Characteristics of a brand are one of the most crucial firm-based factors which affects customer engagement behaviour. Brands which have a good reputation and a high level of brand equity have higher levels of customer engagement (van Doorn, et al., 2010). Brand equity is defined as a set of assets and liabilities of a brand, the name and the symbol of the brand. Brands with high levels of brand equity also engender strong brand commitment and strong brand attachment. This increases the likelihood of customers who execute customer engagement behaviour, like participating in brand communities (Chirani, Taleghani, & Moghadam, 2012).

However it is not always positive to have high brand reputation or to have high brand equity. If a brand with a relative high brand reputation or a relative high brand equity fails, it can lead to higher levels of disappointment (van Doorn, et al., 2010).

Customer engagement behaviour can be influenced by firms. For instance, firms can develop and provide platforms for customers where they can support specific customer actions. Companies can facilitate customer-to-customer engagement by organizing events and online chats. These platforms enable customers to share ideas with each other (van Doorn, et al., 2010).

Firms can also influence customer engagement behaviour by providing incentives and rewards to the customers. Firms can e.g. reward customers who are doing successful referrals. These rewards don't have to be financial, they can also be non-financial. Non-financial rewards may include social recognition of the customers (van Doorn, et al., 2010).

2.5.3 Context-based antecedents

The environment of companies can affect customer engagement behaviour. The environment consists of: the political environment, the social environment, the technological environment and the economic environment.

The political environment can encourage companies to provide a good information flow to the customers. For example, laws can require companies to provide additional information, such as energy efficiency information.

This can affect customer engagement, because the customer can tell his social environment about the energy efficiency of the product (WOM). The social and technological environment can also affect customer behaviour engagement. The access of free internet (technological environment) enables customers to reach a lot of people and to spread the word faster. Customers can share their experiences and they can learn from others in a short period of time (social environment) (van Doorn, et al., 2010).

Media attention about a specific product/brand or company can also initiate customer engagement behaviour. Media can create buzz, which can result in customers talking more about the product/brand or the company (van Doorn, et al., 2010).

Finally, competitive actions can also initiate customer engagement behaviour. Advertisements can create buzz, which can result in people talking about it. Satisfied customers display more positive engagement behaviour. Competitors can emphasize the performance of their products. If the customers realize that the products of the competition are superior than the products they are currently using, their satisfaction can drop. This can result in negative WOM (van Doorn, et al., 2010).

Customer engagement behaviour has consequences for the customers, the firm, and other stakeholders.

2.5.4 Consequences for the customer

Customer engagement depends on the customer engagement behaviour efforts. If these efforts are successful, customers will engage more frequently and more intensively in customer engagement actions. Successful efforts of customers can also expand customer engagement actions. For instance, after joining a brand community, customers can decide to contribute content in the communities more actively (van Doorn, et al., 2010).

Customers can derive financial benefits by e.g. WOM referrals. Participation in such reward-based referral programs not only contributes the firm, but also the customer. Customers can also derive emotional benefits by participation in events related to the firm or to the brand. Participating in such events can provide enjoyment for the customers (van Doorn, et al., 2010).

Customer engagement activities also reinforce the social identity of the customer. For instance, if someone really likes bikes he can reinforce his identity as biker by consuming the product and participating in brand communities about bikes (van Doorn, et al., 2010).

2.5.5 Consequences for the firm

Customer engagement behaviour also has consequences for the firm. These consequences are financial and reputational. Financial consequences refer to the purchase behaviour of customers and prospects.

The purchase behaviour can be stimulated by WOM, and other ways which stimulate the spread of ideas. Reputational consequences relates to the reputation of the firm. Engaged customers contribute to the long-term reputation and recognition of the brand. They contribute by participation in brand communities and supporting events.

They share positive experiences of the brand on these communities which can increase the reputation of the brand. Besides, positive engagement behaviour like positive WOM can help firms attracting and retaining new customers for the long run (van Doorn, et al., 2010).

Customers with high positive engagement behaviour are a source of knowledge for companies. These customers can help firms with a variety of activities. Activities like sharing ideas for the design and the development of new products and suggestions for modification of existing products (van Doorn, et al., 2010).

2.5.6 Overall consequences of customer engagement behaviour

Beyond the impact on the customer and on the firm, customer engagement has a broader impact. Suggestions of the customers can result in a more efficient organization of firm activities. This can lead to lower prices and higher customer satisfaction, resulting in increased customer welfare (van Doorn, et al., 2010).

2.6 managing Customer Engagement Behaviour

Managing customer engagement behaviour is crucial for firms in order to maintain relationships with the customers. In this paragraph a framework will be described which allows companies to manage customer engagement behaviour. This framework consists of the following steps:

- Identify the key customer engagement behaviours.
- Evaluate the key customer engagement behaviours.
- React to the key customer engagement behaviours.

2.6.1 Identify the key customer engagement behaviours

Identifying customer engagement behaviour is the key challenge for firms. They need to identify the different forms of customer engagement behaviour, the different actors, the content of customer engagement behaviour and the potential impact of it. The process of identification begins with identifying the different channels and locations where customer engagement behaviour begins. Customer engagement behaviour can begin online (blogging) or offline (WOM). After the firm identified which channel causes the manifestation of engagement behaviour, the firm need to evaluate which channel is directed toward the firm, the customers or the public. By evaluating the different channels, the firm is able to understand the impact of those channels on the firm. Firms need to develop an understanding about the customer engagement behaviour and about the customers (van Doorn, et al., 2010).

2.6.2 Evaluate the key customer engagement behaviours

Firms should evaluate the different customer engagement behaviours. These behaviours have consequences for both the short-term and the long-term objectives of the firm. Customer engagement behaviour can be evaluated on different ways.

It can be evaluated based on the valence, on the quantity, on the different channels where engagement behaviour can manifest and on the short term and the long term effects of customer engagement behaviour. Some customer engagement behaviours are visible to the firm (direct effects), however there are also some behaviours which are not visible to the firm. Some forms of these behaviours can motivate other customer engagement behaviours (indirect effects). Firms need to develop a framework in order to monitor and evaluate the different customer engagement behaviours (van Doorn, et al., 2010).

2.6.3 React to the key customer engagement behaviours

After developing capabilities allowing the identification and the evaluation of the different customer engagement behaviours, firms need to develop capabilities and resources in order to react on the different customer engagement behaviours. Firms need to set up effective information systems and processes. With these systems the content of engagement behaviour like suggestions can be made available to the right person inside the firm. The firm can use these suggestions/information in order to develop product improvements or new product ideas (van Doorn, et al., 2010).

Firms should also stimulate and motivate customers to trigger positive engagement behaviour. They need to give customers a site or a platform where they can spread their ideas, opinions and experiences. Firms can also enhance positive engagement behaviour by introducing an incentive and reward program. With these rewards and incentives they can encourage customers to recommend products to others. However the incentives do not have to be financial, they can also be social. Social incentives can also trigger customer engagement. For instance, firms can offer customers the possibility to attach their name to a new product (van Doorn, et al., 2010).

Not only customers need to engage with the firm. Firms themselves also need to engage with the customers. Firms can do this by establishing and contributing to customer communities and listening to customer feedback. It is crucial that negative customer engagement behaviour (negative WOM) is managed properly, in order to turn it into positive engagement behaviour. Negative engagement behaviours require visible actions and reactions from the firm. Actions such as refunds and apologies can be critical in dissuading negative customer engagement behaviour (van Doorn, et al., 2010).

2.7 Mobile apps download and discovery

This paragraph will describe two important effects which influence the discovery and download of mobile apps. Mobile apps have low opportunity cost. Mobile apps are low priced or offered for free. Consumers want to find the best mobile app, without investing a lot of time, effort and money. If a mobile app satisfies the requirements and the expectations of the consumer, the consumer will stick longer to that app (Furner, Racherla, & Babb, 2012). The effects which influence the discovery and the download of mobile apps are: top-lists and ordering effects and WOM effects.

2.7.1 Mobile applications

Mobile apps are software applications which can be run on mobile devices. Mobile devices such as smartphones, tablets and iPods. Mobile apps can be downloaded from mobile app platforms or through the internet. These platforms are normally operated by the owner of the mobile operating system like Apple, the App store, Google play, the Windows phone store and blackberry App World (Wang, Liao, & Yang, 2013).

2.7.2 Top-list and ordering effects

In today's online environment listings are important. Analysing listings lead to consumers acquiring faster and better information, and being more confident about their decisions. Consumers usually use mobile apps which are on the top of a list. The position of mobile apps is determined by e.g. the number of downloads, the relevance of the app and the active usage of the app. Mobile apps which have a high position attract more views, downloads and trials (Furner, Racherla, & Babb, 2012).

2.7.3 WOM effects

Word-of-mouth effects and network-effects are both also responsible for affecting the choices of consumers of mobile apps. Word-of-mouth can happen online and offline, and enhances the efficiency of the discovery of a mobile app. Online WOM refers to the ratings of the customers attached to a mobile app. These ratings typically have a 1-5 Likert star rating scale. This star rating scale can be used as a heuristic to narrow down choices and quickly read the user reviews, before downloading a mobile app. The more stars a mobile app has, the more attractive this mobile app is (Furner, Racherla, & Babb, 2012).

Compared to online word-of-mouth, offline word-of-mouth has a bigger effect on the discovery of a mobile app. Consumers can download mobile apps that their friends or family are using. The social environment of the consumer can convince consumers to download a mobile app (Furner, Racherla, & Babb, 2012).

2.8 Mobile application use

This paragraph will describe the theory of consumption values and its dimensions. These values can help by analysing the behavioural intention of mobile app usage. In this paragraph different values are described which affect the purchase choice of the consumer. The consumption value dimensions are: the functional value, the emotional value, the social value, and the epistemic value (Wang, Liao, & Yang, 2013).

2.8.1 Theory of consumption values

The question why we buy what we buy is a fundamental issue in consumer behaviour. In order to answer this question, the theory of consumptions value plays an important role. This theory integrates components of different consumer behaviour models. The theory of consumptions values assumes that customer choice is a function of consumption values. This theory is important in order to analyse informed, intrinsically and extrinsically motivated consumption decisions (Turel, Serenko, & Bontis, 2010).

The consumption values are: the functional values, the emotional values, the social values, and the epistemic values. These values influence customer purchase choice and are considered when the behavioural intentions of customers are explored. They are used as base upon which consumers develop their choice behaviour (Wang, Liao, & Yang, 2013). Customer value is derived from the experience of a consumer with the product and the service. It is derived from the interaction of the consumer with the product and the service (Turel, Serenko, & Bontis, 2010).

There are two dimensions which play a role in the evaluations of a purchase experience. These are the utilitarian dimension and the hedonic dimension. The utilitarian dimension relates to the effectiveness and the efficiency of the usage of a product or a service. The use of the product is mostly seen as a tool of accomplishing a task (Wang, Liao, & Yang, 2013). The hedonic dimension is more about the experience and the affective states (emotions) of using a product. Compared to the utilitarian dimensions, hedonic dimensions are more subjective and personal (Byoungsoo & Ingoo, 2011).

There are some principles which should be considered in order to enhance the utilitarian performance of a mobile app (Oinas-Kukkonen & Kurkela, 2003):

- **Mobility:** The mobile app should provide information that users need when they are on the move.
- **Usefulness:** The mobile app should make the life of the user easier.
- **Relevance:** The mobile app should include only relevant information.
- **Ease of use:** The usage of a mobile app should be simple and easy.
- **Fluency of navigation:** The most important information should be accessible easy.
- **Personalization:** The mobile app has the possibility to be adapted according every user's preferences.

2.8.2 The Functional value

The functional value refers to the utilitarian dimensions of the product. The attributes of the product are considered. Attributes such as the quality and the feature of a product. Functional value relates to the functional, utilitarian or physical purpose of the product. The functional value of the product and the service positively influence the behavioural intention of the consumer, when mobile services such as mobile apps are used (Wang, Liao, & Yang, 2013).

2.8.3 The Emotional value

The emotional value of a product and service depends on the ability of the product and service to arouse feelings or affective states toward consumers. This value is an important factor which affects the usage intention of a product. Enjoyment, playfulness, fun and pleasure are related to the social value of the product and the service. The emotional value of a product and service positively influence the behavioural intention of the consumer when mobile services such as mobile apps are used. Users who enjoy the usage of mobile apps are more likely to have a higher usage intention (Wang, Liao, & Yang, 2013).

2.8.4 The Social value

Social value relates to the social approvals and the self-image enhancement of the consumer among other consumers. Social value usually drives choices involving highly visible products. Products such as clothes. Also goods and services shared with others, like gifts, are often driven by social value. Hence, social value refers to the motive of buying and using products which depends on how a consumer wants to be seen by other consumers. The purchase and the usage of the product is a tool by which the consumer wants to express his self-image to others. The social value of a product and a service positively influence the behavioural intention of the consumer when mobile services such as mobile apps are used (Wang, Liao, & Yang, 2013).

2.8.4 The Epistemic values

The epistemic value of a product arises when a product arouses curiosity, provides novelty and satisfies the desire of knowledge (learning new ways of doing something). This value can be triggered when there is a desire to satisfy curiosity. The epistemic value of a product and service positively influence the behavioural intention of the consumer when mobile services such as mobile apps are used (Wang, Liao, & Yang, 2013).

2.9 App stickiness

This paragraph will describe app stickiness and the characteristics of mobiles apps which influence app stickiness. Also, some outcomes of app stickiness will be described.

2.9.1 Stickiness and App stickiness

Stickiness plays an important role in order to create value for a company. Stickiness is defined as the ability of a website to draw and retain customers. It usually consists of two dimensions: the length of time consumers spend on a website and the extent to which consumers return to the website (Furner, Racherla, & Babb, 2014).

There are a few effective ways which enables companies to create stickiness: introducing loyalty programmes, personalization and customization, virtual communities and enhancing trust. Introducing loyalty programs is a way to stimulate repeat purchases/usage. The customers are rewarded when they make a purchase at the company. In return for the rewards, the company can collect information about the preferences and about the purchasing patterns of the customers. This can help the company to serve the customers better in the future. The rewards, which are given to the customers when they did a purchase, can be redeemed for e.g. discounts or free products (Zott, Amit, & Donlevy, 2000). The personalization of the product or the customisation of the service is another way to retain customers. The company can tailor the products and the services to fit the particular tastes of the customers (Zott, Amit, & Donlevy, 2000). Creating virtual communities can also contribute in order to keep customers for the company. On these virtual communities consumers are able to share ideas, experiences and opinions with other consumers. Creating virtual communities are not only beneficial for customers. The company can also benefit from the information shared on the virtual communities.

With that information the company can target their offerings better to specific customers segments (Zott, Amit, & Donlevy, 2000).

Trust is also important to maintain customers. Mistrust can be a result of the lack of physical representation of the company. The customers can not touch and feel the products on a website. Companies can increase trust by e.g. confirming a purchase, made by the customer, through e-mail (Zott, Amit, & Donlevy, 2000).

App stickiness can be defined as the time consumers spend interacting with specific mobile apps and how often they return to a specific mobile app. There are some characteristics of the mobile app which can influence mobile app stickiness. Characteristics such as control, communication and responsiveness. These characteristics can increase the utilitarian and hedonic value of the mobile app, which in turn can lead to higher app stickiness (Furner, Racherla, & Babb, 2014).

The perception of increased sense of control can influence app stickiness. Easy navigation of the mobile app and a clear content of the mobile app can positively affect the evaluation of the hedonic and utilitarian values, of the mobile app. An increase of being in control can result in consumers sticking to a mobile app. Communication can also contribute to mobile app stickiness. The development of virtual communities can positively influence stickiness. The ability to foster communication effectively, between the consumer and the company, can influence the return of consumers to a mobile app. Also the ability to foster communication effectively, can influence the time spend on a mobile app (Furner, Racherla, & Babb, 2014).

Responsiveness refers to the frustrations consumers experience when a website is not responsive. Consumers can also face frustrations if they use non-responsive mobile apps. If they experience that feeling, they are more likely to stop using a mobile app (Furner, Racherla, & Babb, 2014).

2.9.2 Outcomes of app stickiness

App stickiness can lead to several positive consequences. These consequences can vary across consumers, due to heterogeneity in the characteristics of the customer, and it can vary across mobile apps with different functionalities. Consequences such as increased trust in the app provider, increased purchase intention of mobile apps and increased advertising effectiveness (Furner, Racherla, & Babb, 2012).

Trust is important both as an antecedent of mobile app stickiness, but also as a consequence of mobile app stickiness. The more the consumer sticks to a mobile app, the more the trust between the consumer and the mobile app provider will be. In a mobile environment trust plays a crucial factor, more crucial than in the traditional e-commerce environment. The unique nature of the data in the mobile environment is the main cause of that. For example, mobile devices and mobile applications are able to record and are able to use consumer's location information. Also, a mobile device contains more information like information of contacts (phone numbers) and personal photos and videos. It is important for a mobile app provider to encourage and foster trust. If the consumer loses the trust in an app provider, caused by a negative experience with the app or a negative new story about the app provider, he or she can decide to delete all mobile apps developed by that provider.

This can result in a loss of future purchases, advertisement revenue and positive word-of-mouth Stickiness can lead to greater trust, which can lead to a greater intention to conduct purchases in a mobile app (Furner, Racherla, & Babb, 2012).

Marketing messages of advertisements can be more persuasive due to an increase in mobile app stickiness. Consumers who stay longer with a mobile app have higher levels of interaction with that mobile app. Higher levels of interaction with a mobile app can lead to longer and deeper processing of marketing messages. This enhances the effectiveness of advertisements (Furner, Racherla, & Babb, 2012).

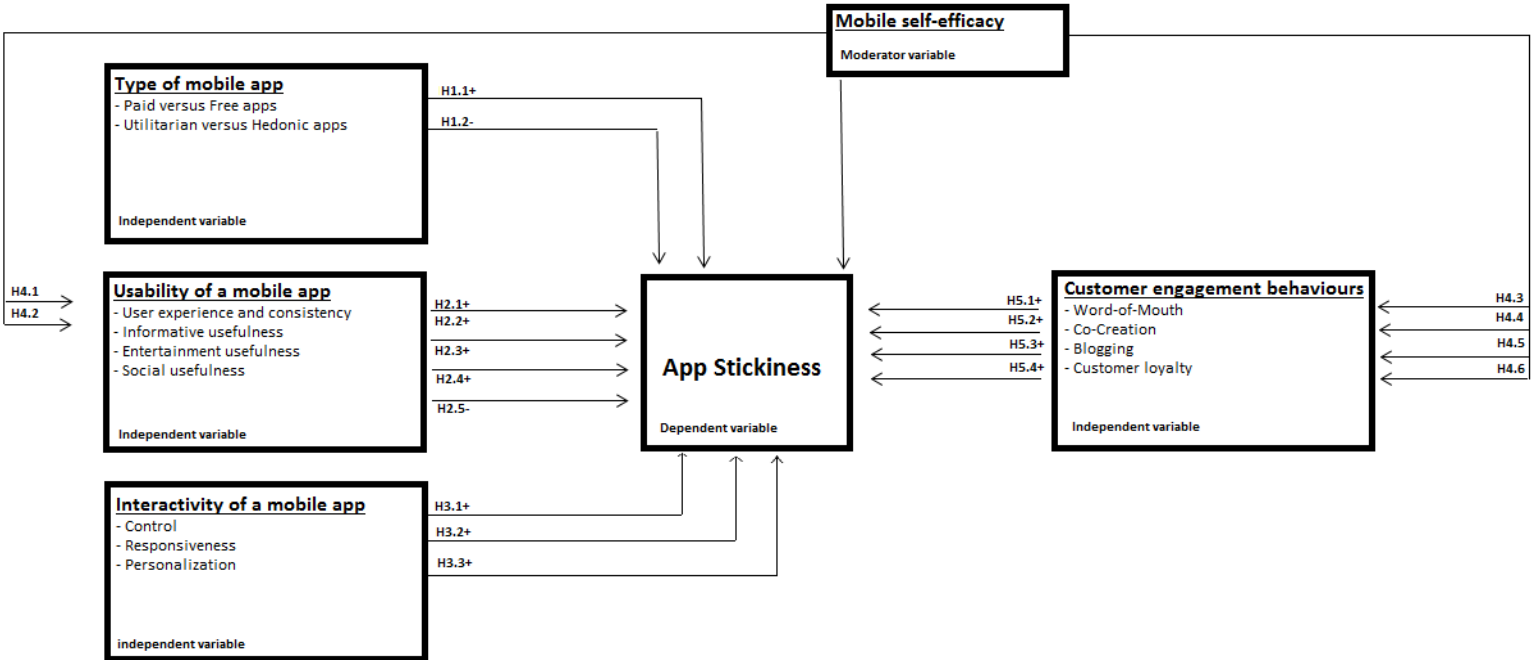
Chapter 3: Conceptual framework and hypotheses

In the previous chapter the relevant literature concerning this research has been outlined. This chapter will focus on the relevant literature discussed in chapter two. Based on the literature, different hypotheses are postulated. Firstly, in paragraph 3.1 the conceptual framework of this research will be presented. Secondly, in paragraph 3.2 the hypotheses based on the earlier discussed literature will be postulated.

3.1 The conceptual framework

Based on the literature discussed in chapter 2, the conceptual model presented in figure 1 has been designed. As can be derived from the conceptual model it has been expected that the items of the type of a mobile app, of the usability of a mobile app, of the interactivity of a mobile app and of the customer engagement behaviours will have an effect on mobile app stickiness. The type of a mobile app, the usability of a mobile app, the interactivity of a mobile app and the customer engagement behaviours are the independent variables. Mobile app stickiness is the dependent variable. It is also expected that mobile self-efficacy moderates the effect of user experience (consistency) and customer engagement behaviours on app stickiness.

Figure 1, The conceptual framework.



3.2 The hypotheses

On the basis of the literature discussed in chapter 2, some of the findings found will be further outlined in this paragraph. Based on these findings and these literature, the hypotheses, which are outlined in the conceptual framework in paragraph 3.1, will be postulated.

3.2.1 Type of mobile app

Mobile apps can be divided in paid mobile apps and free mobile apps. Due to the existence of free mobile apps, consumers are more hesitant about downloading paid apps. Based on the article written by Kim, Yoon, and Han, free mobile apps can be divided in free apps with paid items and in free samples of paid apps. In both types in-app advertisement is included. This means that a free app is an incentive for viewing advertisements. In order to avoid payments for mobile apps, consumers have to accept the advertisements (Kim, Yoon, & Han, 2014).

Besides the distinction between free apps and paid apps, mobile apps can also be divided in hedonic apps and utilitarian apps. This distinction depends on the nature of the task, which can be hedonic or utilitarian (Furner, Racherla, & Babb, 2012). The contrast between hedonic and utilitarian behaviour is an important topic in consumer behaviour. Utilitarian motives are more structured and they are aimed at achieving a specific task or purpose. Hedonic motives are relatively unstructured and more experiential (Furner, Racherla, & Babb, 2012). Utilitarian values are task-related and rational. Hedonic values are more subjective and personal. Fun, entertainment, and playfulness are more important than task completion (Babin, Darden, & Griffin, 1994).

Mobile apps typically support one of these values. A mobile app can be utilitarian or it can be hedonic. For example, mobile apps (informational) like banking apps supports utilitarian motives and mobile apps (entertainment) about games support hedonic motives. However there are also mobile apps which support both utilitarian and hedonic motives. An example of such a hybrid mobile app is the Amazon app. This app supports browsing the app for fun(hedonic), but it also supports goal-orientated actions such as price comparisons (Furner, Racherla, & Babb, 2012).

H1.1	Using Paid mobile apps have a positive effect on app stickiness.
H1.2	Using informational mobile apps have a negative effect on app stickiness.

3.2.2 Usability of mobile app

A survey performed by Salz showed that around 73% of the respondents have a lower opinion about a mobile app which offered a poor experience. Around 58% of the respondents said that poor experience of a mobile app results in switching to another mobile app. So the usability and the user experience of a mobile app is important. App developers should focus on these two dimensions in order to create an experience which delights the users (Salz, 2014).

User experience is an important factor which can determine if consumers continue to interact with a mobile app. User experience can be defined as a combination of perceptions and responses of users as a result of using a product or service. It also comprises the affective reactions of users such as their emotions, their perceptions, their preferences and their behaviours (Hassenzahl & Tractinsky, 2006). Based on the research performed by Racherla, Furner and Babb, improved user experience results in enjoying tasks on a mobile app. In this way users are experiencing less stress and they feel more productive. With improved user experience, users are more likely to feel connected to a mobile app (Furner, Racherla, & Babb, 2012).

Besides user experience, user experience consistency should also be considered in order to improve app usage. User experience consistency is the degree to which the design, the content and the interaction don't change. A consistent user experience enables users to feel familiar with the design, the content and the interaction of a mobile app. Racherla, Furner and Babb showed that consistency in user experience positively influences the perception of control of a mobile app. Less consistency in the user experience will have steeper learning curves. This results in less productivity and more frustration of the user (Furner, Racherla, & Babb, 2014).

The usability of a mobile app influences the attitude of the user toward using a mobile app. The intention of the user to use a mobile app can be effected by perceived usefulness and perceived ease of use. Perceived usefulness is the degree to which a user believes the usage of a specific app would enhance the performance of a mobile app. Perceived ease of use is the degree to which a user believes the app can be used without much effort (Kim, Yoon, & Han, 2014).

Kim, Yoon and Han showed in their research that higher perceived usefulness and higher perceived ease of use affects the attitude toward using a mobile app positively. Perceived usefulness can be divided into three antecedents: perceived informative usefulness, perceived entertaining usefulness and perceived social usefulness. These antecedents can be split into utilitarian and hedonic motives. Perceived informative usefulness is related to utilitarian motives, perceived entertainment usefulness and perceived sociality are related to hedonic motives (Kim, Yoon, & Han, 2014). Perceived informative usefulness relates to needs which strengthen information, knowledge and understanding. Perceived entertaining usefulness relates to needs which strengthen a pleasurable and an emotional experience. Perceived social usefulness relates to needs which strengthen contact with family, friends and the world (Bauer, Reichardt, Barnes, & Neumann, 2005).

A research conducted by Kim, Yoon and Han showed that perceived informative usefulness and perceived entertainment usefulness affected the attitude of the users toward mobile app usage positively. However perceived social usefulness did not affect the attitude of the users (Kim, Yoon, & Han, 2014).

H2.1	Positive user experience will have a positive effect on app stickiness.
H2.2	Consistent user experience will have a positive effect on app stickiness.
H2.3	Informative usefulness will have a positive effect on app stickiness.

H2.4	Entertainment usefulness will have a positive effect on app stickiness.
H2.5	Social usefulness will have a negative effect on app stickiness.

3.2.3 Interactivity of mobile apps

According to the paper written by Furner, Racherla and Babb, interactivity refers to the degree to which communication systems allow users to communicate with one or many others (Furner, Racherla, & Babb, 2014). Due to the online environment consumers are becoming more empowered and more active in consuming and transmitting information. Therefore, consumers expect more interactivity. Furner, Racherla and Babb also showed that some features of a mobile app affect the perceived interactivity. The level of that perceived interactivity affects the attitude of the user toward mobile app usage (Furner, Racherla, & Babb, 2014).

According to a paper written by Wu, perceived interactivity consists of three dimensions: perceived user control, perceived responsiveness and perceived personalisation. Perceived user control refers to the ability of the user of being in control over the navigation and the content. Perceived responsiveness refers to whether the user gets feedback and if the feedback is relevant to the action/problem of the user. Perceived personalisation refers to the possibility to adapt something accordingly to the preferences of the user (Wu, 2005).

Perceived interactivity should be improved in order to affect the attitude of the user, toward app stickiness. Dubelaar, Leong and Alpert showed in their research that interactivity evaluation is comprised of three factors: control, communication, and responsiveness. Offering a high degree of these factors will result in more app usage (Dubelaar, Leong, & Alpert, 2003).

Furner, Racherla and Babb have shown that an increased sense of control affects the attitude of the user toward mobile app usage positively. Fostering communication is particularly important for mobile apps which facilitate communication. Mobile apps like social network apps, messaging apps and e-mail apps. Responsiveness refers to response time and the responsiveness of handling an issue of a user. If the response time is high the users will experience frustration, they will stop using the mobile app (Furner, Racherla, & Babb, 2014).

H3.1	Being in control of a mobile app will positively influence app stickiness.
H3.2	Fast responsiveness of a mobile app will positively influence app stickiness.
H3.3	The option to personalize a mobile app will positively influence app stickiness.

3.2.4 Mobile app self-efficacy

The ability and motivations of consumers using a mobile app differ. This difference can be occurred due mobile app self-efficacy (Furner, Racherla, & Babb, 2012).

According to Furner, Racherla and Babb, Mobile self-efficacy is the perceived ability of an individual to effectively use and handle a smartphone or mobile app. It reflects the degree of anxiety of using a smartphone or using a mobile app. If the anxiety is too high (low mobile self-efficacy), users end up not using the mobile app (Furner, Racherla, & Babb, 2014).

Mobile self-efficacy has an impact on both user experience and user experience consistency. Furner, Racherla and Babb showed that an improvement in user experience would lead to less stress and less frustration.

This makes the usage more productive and more efficient. Due to mobile self-efficacy, Furner, Racherla and Babb showed that users with high level of mobile self-efficacy are less concerned about user experience and about user experience consistency (Furner, Racherla, & Babb, 2014). They have more user experience and therefore they are expected to being able to use low quality user experience. They do not experience as much frustration and stress as users with a low level of mobile self-efficacy. Individuals with high mobile self-efficacy are better in handling their smartphone or their mobile app. This reduces inconveniences like stress and frustration. Individuals with a low level of mobile self-efficacy are less familiar with using a smartphone or using a mobile app. they are more likely to experience more stress and frustrations (Furner, Racherla, & Babb, 2014).

Mobile self-efficacy also impacts the user experience consistency. If the user experience is consistent, the learning curve for mobile apps is shorter (due to not many and frequent changes). This allows users to become more productive faster. Furner, Racherla and Babb expect that individuals with a high level of mobile self-efficacy are more effective in using mobile apps (Furner, Racherla, & Babb, 2014).

H4.1	Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience and app stickiness.
H4.2	Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience consistency and app stickiness.
H4.3	Problems with mobile app self-efficacy have a moderating effect on the relationship between WOM and app stickiness.
H4.4	Problems with mobile app self-efficacy have a moderating effect on the relationship between blogging and app stickiness.
H4.5	Problems with mobile app self-efficacy have a moderating effect on the relationship between co-creation and app stickiness.
H4.6	Problems with mobile app self-efficacy have a moderating effect on the relationship between app loyalty and app stickiness.

3.2.5 Customer engagement behaviour of mobile apps

Customer engagement can lead to several positive behaviours. These behaviours can vary across consumers, due to heterogeneity in the characteristics of the customer, and it can

vary across mobile apps with different functionalities. Consequences such as positive word-of-mouth, co-creation and participation in brand communities, and increased loyalty.

WOM

For many years word-of-mouth has a major influence on what people know, feel and do. WOM can be characterized as oral, person to person communication. It is a communication between the receiver of the message and the communicator of the message. People can share brand experiences and product or service experiences with each other. However WOM does not necessarily focus on the brand, the product or the service. It can also focus on an organization (Buttle, 2011). WOM is more influential than other marketing sources. It is more important in creating awareness for products and for firms, compared to advertising. WOM is an example of free advertising. WOM can influence the awareness, expectations, perceptions, attitudes, behavioural intentions and behaviours of consumers.

Human interactions play an important role in the diffusion and the adaptation of products and services (Kumar, et al., 2010). WOM can have either positive influences on decisions or negative influences on decisions. Negative WOM has a more powerful impact than positive WOM. People are more willing to conduct in WOM if they have negative experiences with the product (Buttle, 2011).

Besides engaging in traditional WOM, consumers are also able to engage in online WOM (e-WOM). Due to the rise and development of the internet, consumers are able to share their opinions on, and experiences with goods and services. The Internet has created more options for consumers to gather more product information from other consumers (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004).

Traditional WOM and online WOM communication differs from each other. E-WOM can take place through different forms like blogs, review sites and email. People have a choice to exchange the information either publicly (blogs) or privately (emails). E-WOM enables consumers to reach a larger audience than traditional WOM. There are no geographic boundaries and there are no time constraints. This enables the communicators to spread the messages to the recipients globally and quickly (Chu, 2011).

Co-Creation and Brand communities (blogging)

Customer co-creation is the participation of a customer in the creation of the core offering. This can occur through co-design or shared inventiveness (Lusch & Vargo, 2006)

Due to the highly competitive environment and the change of the global marketplace, it makes perfect sense to develop a business strategy allowing certain customers to collaborate with firms (Fisher & Smith, 2011).

Co-creation is a source of competitive advantage. The value will be jointly created by the firm and the customer. Before the implementation of co-creation, the firm decides which products and services they will produce. The consumers had a little or no role in that value creation process. However, in the last decade firms are involving customers in the value creation process. A huge benefit of co-creation is that the customer is more willing to purchase the product which is developed jointly with the firm. Also, the customer is more

willing to write about those products on brand communities (Prahalad & Ramaswamy, 2014).

A research performed by Schau, Muniz and Arnould showed that if consumers have the opportunity to participate in brand communities (blogging), they will participate. Therefore, companies should develop brand communities (Schau, Albert, & Arnould, 2009).

According to Muniz and O’Guinn a brand community is a specialized, non-geographically bound community. This community is based on social relations between consumers who adore the brand. On these communities consumers can share their opinions and experiences about brands and about products which each other (Muniz & O’Guinn, 2011)

Customer Loyalty

Sometimes customer loyalty is defined as frequent repeat purchases or purchasing relative volume of the same brand. Loyal customers are customers who repurchase a brand, considering only that brand, and do not engage in brand information seeking behaviour for other brands (Oliver, 1999). However all these definitions do not cover the psychological meaning of loyalty. These definitions only cover the behavioural meaning of loyalty (repeat purchases). However looking at only repeat purchases is invalid because someone can also buy the same product because of inertia. Therefore, Loyalty is a deeply held commitment to repurchase a preferred product consistently in the future, despite situational influences and marketing efforts having the potential to cause switching behaviour (Oliver, 1999).

H5.1	Positive WOM will have a positive effect on app stickiness.
H5.2	Co-creation will have a positive effect on app stickiness.
H5.3	Positive blogs will have a positive effect on app stickiness.
H5.4	Creating app Loyalty will have a positive effect on app stickiness.

Chapter 4: Research methodology

This chapter will start with a short description of the concept customer engagement behaviour. Next the research design, the data collection and the operationalization will be discussed. The chapter will end with a composition of the dependent and independent variables. In this section there will be a description of how the different variables are measured.

4.1 Customer engagement behaviour

Customer engagement plays an important role in the relationship between the company and the customers. Nowadays companies do not focus solely on transactions. They also focus on the behavioural aspects of the customers. Customers can contribute to the company in more ways, besides transactions. Customer engagement takes the behavioural expressions of a customer into account. These expressions are e.g. writing a blog about the product or positive word-of-mouth referrals.

The hypotheses and the conceptual model designed in chapter 3 need to be tested. In order to test these hypotheses, an online survey will be conducted. The design of this online survey will be outlined in the next paragraph. The main focus of this study is analysing the effect of customer engagement behaviour on app stickiness. The behavioural expressions WOM, co-creation, writing blogs on brand communities and customer loyalty are considered.

4.2 Design of the survey

In this study a descriptive cross-sectional research will be conducted. A cross-sectional study observes a population at a certain point in time. It is distinguished from a longitudinal study which involves the collection and observation of data in different points in time.

This study is descriptive because the major purpose of this research is observing and describing. Descriptive studies relate to research questions of what, where, when, and how.

In this study an online survey will be designed. This survey will be analysed in SPSS. Primary data is used for this research. Data will be collected by means of a survey.

The survey will consist of different variables: the type of mobile apps, the usability of mobile apps, the interactivity of mobile apps, app stickiness, the mobile app self-efficacy and the customer engagement behaviours. Each variable consists of different survey questions (items) which will be explained in paragraph 4.4. Some scientific papers are collected which forms the basis for the different propositions in the survey.

The survey consists of some open questions, but is mostly formed by closed questions. Before the respondent is able to start the survey, a short introduction is given about the concept customer engagement behaviour. The purpose of this research is not mentioned in the introduction. By not mentioning the purpose of this study, customers can't provide answers they think the researcher wants or expects. Before the distribution of the survey, a pre-test is conducted to ensure there is no misinterpretation of the different questions. This pre-test is done by 8 respondents. After they completed the survey, some questions are modified, replaced or removed. In total there are 35 questions. First the survey starts with some general questions and propositions. All the propositions need to be answered on a five-point Likert scale. The answer possibilities are:

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

4.3 Collection and operationalisation of the data

The website www.thesistools.nl is used in order to create the online survey. www.thesistools.nl is a web-based tool which enables the creation of the survey.

A benefit of using an online survey is that the respondents are able to fill in the survey when they want. They are able to fill it in 24/7. Besides, the data will be captured automatically which saves time and effort, compared to sending paper surveys.

In order to validate the reliability of the data, only respondents which have some affinity with smartphones and mobile apps are considered. Therefore, initially the link of the survey was placed on online panels, about smartphones and mobile apps. However the placement on online panels wasn't very effective. It did not result in a desirable amount of surveys. This necessitates a change in the strategy. After placing the link of the survey on online panels, the link of the survey was mailed to different respondents in order to get a desirable amount of surveys.

The survey begins with the question 'Do you have a smartphone'. Only surveys where the respondent answered 'yes' to this question were taken into account. In order to enhance the reliability of the data another reliability check is placed in the survey.

There are two similar propositions placed in the survey '*it is a challenge for me to use a smartphone and to work with mobile apps*', and *it is not a challenge for me to use a smartphone and to work with mobile apps*'. In order to collect reliable data, surveys which had the same answers to both these propositions were not taken into account. Only surveys where respondents who found it challenging to handle a smartphone and using mobile apps have given 'no' as answer to the proposition '*it is not a challenge for me to use a smartphone and to work with mobile apps*' are considered.

In total 238 respondents filled in the survey. However after checking the data on reliability, only 209 surveys were taken into account for further data analysis. The population considered for this research consists of users of smartphones. The sample size consists of users of smartphones who are switching between mobile apps regularly (mobile apps with the same purposes). For the study this group is interesting. Users who switch regularly between mobile apps can provide insights about why they switch, and under which conditions they will stick to a mobile app.

4.4 Measures and Operationalisation of the variables

In order to measure each variable of the survey, 6 subscales (independent and dependent variables) were developed and used. The independent variables are the type of mobile apps, the usability of mobile apps, the interactivity of mobile apps and the customer engagement behaviours (WOM, co-creation, blogging and customer loyalty). The dependent variable is app stickiness. Mobile app self-efficacy is the moderation variable. In this section there is an outline of the different variables. An overview of the research operationalization can be found in table 2. An example of the survey can be found in Appendix A, the survey.

4.4.1 Independent variable type of mobile apps

1	I use more informational apps (news, check public transportation times et cetera, apps which you use for a specific purpose) than experimental apps (games, music et cetera, apps which you use for fun).
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2	I am more willing to promote/write blogs about paid apps than about free apps.
3	I am more loyal to paid apps than to free apps.
4	I will do more in app-purchases for paid apps than for free apps.

The type of a mobile app is the first variable and subject of the survey. Based on the article written by Kim, Yoon and Han, the article of Racherla, Furner and Babb and the article of Babin, Darden and Griffin, the questions of the survey are formulated. Mobile apps can be distinguished in free apps and paid apps. The type of mobile apps is measured on a 5-point Likert scale. The respondents can indicate the degree of likelihood on a 5-point Likert scale. This variable consists of 4 items:

4.4.2 Independent variable usability of mobile apps

The usability of a mobile app is the second variable and subject of the survey. The questions in the survey are based on the content of the article written by Hassenzahl and Tractinsky, the article of Racherla, Furner and Babb, the article of Kim, Yoon and Han and the article of Bauer, Reichardt, Barnes and Neumann. The usability of mobile apps refers to the user experience, the user experience consistency and the perceived usefulness.

The article of Kim, Yoon and Han is also used for developing the scale of the questions concerning perceived informative usefulness, perceived entertaining usefulness and perceived social usefulness. The usability of a mobile app is measured on a 5-point Likert scale. This variable consists of 7 items:

1	I will use an app which delivers a good user experience (good design, good content, easy navigation) more frequently.
2	I will use an app which delivers a consistent experience (no regular changes in the app) more frequently.
3	I am more willing to promote/write blogs about apps with good user experience.
4	I prefer informational and entertainment apps more than social apps.
5	I will use mobile apps in order to seek information.
6	I will use mobile apps for fun.
7	I will use mobile apps for social relationships.

4.4.3 Independent variable interactivity of mobile apps

The interactivity of a mobile app is the third variable and subject of the survey. The questions in the survey are based on the content of the article written by Racherla, Furner and Babb and the article of Wu, Dubelaar, Leong and Alpert. Interactivity of a mobile app is measured on a 5-point Likert scale. This variable consists of 7 items:

1	I will use an app more frequently if I have a good control of the app (know how the app works).
2	I am more willing to promote/write blogs about apps which I can control.
3	I will get frustrated if I have an app which has a long response time (waiting long before my problems with the app are fixed by the app developer).
4	I will stop using the app if the app has a long response time.
5	I am more willing to promote/write blogs about apps which have a fast response time.
6	I will use an app with the option to personalize it(changing the design)more frequently.
7	I am more willing to promote/write blogs about apps which have the option to personalize it.

4.4.4 Moderator variable mobile app self-efficacy

Mobile app self-efficacy is the fourth variable and subject of the survey. For the questions used in the survey, related to mobile self-efficacy, the article of Racherla, Furner and Babb is used. Mobile app self-efficacy is measured on a 5-point Likert scale and consists of 4 items:

1	I need help with downloading and installing mobile apps.
2	It is a challenge for me to use a smartphone and to work with mobile apps.
3	It is not a challenge for me to use a smartphone and to work with mobile apps.
4	I am anxious when I use my smartphone

4.4.5 Dependent variable app stickiness

App stickiness is the fifth variable and subject of the survey. In the article written by Racherla, Furner and Babb, Stickiness is defined as the ability of a website to draw and retain customers. This article is also used in order to develop the survey questions. The respondents can indicate the degree of likelihood on a 5-point Likert scale. This variable consists of 2 items:

1	I switch regularly between different mobile apps, instead of sticking to one mobile app (mobile apps with the same purposes, switching between different news apps for example).
2	If I stick longer to a mobile app, I will do more than only in-app purchases, like telling others about the app

4.4.6 Independent variable customer engagement behaviour

Customer engagement is the sixth variable and subject of the survey. It consists of several customer engagement behaviours. Based on the article written by Racherla, Furner and Babb, the questions of the survey are formulated. Behaviours which will be analysed in this study are positive WOM, co-creation, writing positive blogs and loyalty. Customer engagement behaviour is measured on a 5-point Likert scale, and consists of 4 items.

1	When I hear good experiences about an app by others, I am willing to use the app more frequently.
2	When I read positive comments in blogs by others, I am willing to use the app more frequently.
3	When I am able to co-create or give feedback, in order to improve the mobile app, I am willing to use the app more frequently.
4	If an app creates more customer loyalty, I am willing to use the app more frequently.

	Variable	Questions	Method	Scale	Academic reference
1	Mobile app type	<ul style="list-style-type: none"> - I use more informational apps (news, check public transportation times et cetera, apps which you use for a specific purpose) than experimental apps(games, music et cetera, apps which you use for fun). - I am more willing to promote/write blogs about paid apps than about free apps. - I am more loyal to paid apps than to free apps. - I will do more in app-purchases for paid apps than for free apps. 	5 point Likert-scale	(1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	<ul style="list-style-type: none"> - (Kim, Yoon, & Han, 2014) - (Furner, Racherla, & Babb, 2012) - (Babin, Darden, & Griffin, 1994)
2	Mobile app usability	<ul style="list-style-type: none"> - I will use an app which delivers a good user experience(good design, good content, easy navigation)more frequently. - I will use an app which delivers a consistent experience(no regular changes in the app)more frequently. - I am more willing to promote/write blogs about apps with good user experience. - I prefer informational and entertainment apps 	5 point Likert-scale	1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	<ul style="list-style-type: none"> - (Hassenzahl & Tractinsky, 2006) - (Furner, Racherla, & Babb, 2014) - (Kim, Yoon, & Han, 2014) - (Bauer, Reichardt, Barnes, & Neumann, 2005)

		<ul style="list-style-type: none"> - more than social apps. - I will use mobile apps to seek information. - I will use mobile apps for fun. - I will use mobile apps for social relationships. 			
3	Mobile app interactivity	<ul style="list-style-type: none"> - I will use an app more frequently if I have a good control of the app (know how the app works). - I am more willing to promote/write blogs about apps which I can control. - I will get frustrated if I have an app which has a long response time (waiting long before my problems with the app are fixed by the app developer). - I will stop using the app if the app has a long response time. - I am more willing to promote/write blogs about apps which have a fast response time. - I will use an app with the option to personalize it(changing the design)more frequently. - I am more willing to promote/write blogs about apps which have the option to personalize it. 	5 point Likert-scale	<ul style="list-style-type: none"> (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree 	<ul style="list-style-type: none"> - (Furner, Racherla, & Babb, 2014) - (Dubelaar, Leong, & Alpert, 2003)
4	Mobile self-efficacy	<ul style="list-style-type: none"> - I need help with downloading and installing mobile apps. - It is a challenge for me to use a smartphone and to work with mobile apps. - I can't handle my smartphone and my mobile apps very well. - I am anxious when I use my smartphone 	5 point Likert-scale	<ul style="list-style-type: none"> (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree 	<ul style="list-style-type: none"> - (Furner, Racherla, & Babb, 2012) - (Furner, Racherla, & Babb, 2014)
5	App stickiness	<ul style="list-style-type: none"> - I switch regularly to different mobile apps, instead of sticking to one mobile app (mobile apps with the same purposes, switching between different news apps for example). - If I stick longer to a mobile app, I will do more than only in-app purchases, like telling others about the app. 	5 point Likert-scale	<ul style="list-style-type: none"> (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree 	<ul style="list-style-type: none"> - (Furner, Racherla, & Babb, 2012) - (Furner, Racherla, & Babb, 2014)
6	Customer engagement behaviours	<ul style="list-style-type: none"> - When I hear good experiences about an app by others, I am willing to use the app more frequently. - When I read positive 	5 point Likert-scale	<ul style="list-style-type: none"> (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree 	<ul style="list-style-type: none"> - (Furner, Racherla, & Babb, 2012) - (Furner, Racherla, & Babb, 2014)

		<p>comments in blogs by others, I am willing to use the app more frequently.</p> <ul style="list-style-type: none"> - When I am able to give feedback, in order to improve the mobile app, I am willing to use the app more frequently. - If an app creates more customer loyalty, I am willing to use the app more frequently 			
7	Demographics	<ul style="list-style-type: none"> - What is your gender? - What is your age? - Do you have a smartphone? - How many apps do you have on your smartphone? - How many of those apps are you using regularly? 	REGULAR QUESTIONS	(1)Male (2)Female (1)Yes (2)=No	

Table 2, Research Operationalisation.

Chapter 5: Data analysis and research results

By means of conducting a survey, information about customer engagement behaviour related to mobile apps is collected. The information received from the surveys is transformed in variables of numerical scores. The survey consists of several propositions which are answered on a 5 point Likert scale. The different answer options are labelled as followed:

- Totally disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Totally agree (5)

After retrieval of the data, a variety of different statistical analytical methods can be applied. These methods help making sense of the data. Statistical analysis has different steps in order to analyse the data set. The first step is the descriptive statistics.

This step provides frequencies and summarizes the data by means of a limited number of statistical indicators e.g. average scores. The second step is conducting univariate tests. In this step the observations of one variable is analysed across different groups of respondents. These groups can be distinguished by age for example. The last step is analysing variables jointly in order to explain or to predict which variables are related to other variables. In this step multivariate statistics, e.g. linear regression, are executed. Statistical validation plays an important role if inferences are made about the data results. It is important to assess how statistically meaningful or significant the results are (Janssens, Wijnen, De Pelsmacker, & Van Kenhove, 2008).

In this chapter the data will be analysed. The first paragraph is about cleaning the survey and about analysing the descriptive statistics, e.g. demographics of the sample size (frequencies)

and the means. In the second paragraph the data will be prepared for further analysis by performing a factor analysis and a reliability analysis. In the third paragraph different models will be constructed in order to answer the different hypotheses.

5.1 Descriptive statistics

5.1.1 Demographics

The data is collected by conducting online surveys. These surveys are built on the website www.thesistools.nl. By generating a survey through this website automatic information gathering is available.

After developing the survey and the distribution of the survey through email, 238 respondents were gathered. However some reliability checks as mentioned in chapter 4.3 were performed. 4 respondents did not have a smartphone. 19 respondents gave the same answer for the question *'it is a challenge for me to use a smartphone and to work with mobile apps'*, and *'it is not a challenge for me to use a smartphone and to work with mobile apps'*. 6 respondents did not fill in the survey completely.

After these checks, the data of 209 respondents are taken into account for further analysis. From these 209 respondents 106 respondents are male and 103 respondents are female (Appendix B, table 1). The sample size was nearly equally distributed between man (50.7 %) and woman (49.3%) (Figure 2).

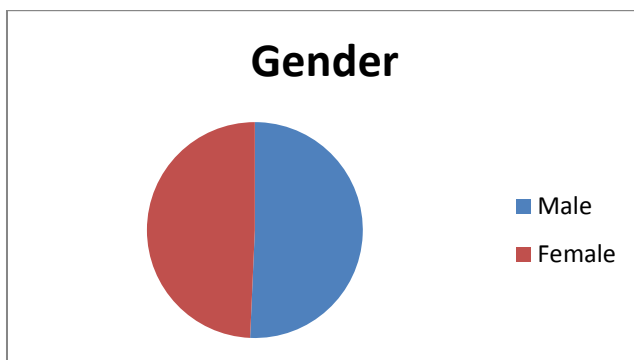


Figure 2, Gender distribution.

The age of these 209 respondents varied from a minimum of 18 years and a maximum of 65 years (Appendix B, table 2). The respondents have an average of around 31 mobile apps on their smartphone. The respondents use an average of around 11 mobile apps. The minimum amount of mobile apps on a smartphone is 4 and the maximum amount of mobile apps is 75 (Appendix B, Table 3).

5.1.2 Analysing the survey results by checking the mean value

By means of checking the mean value of the different variables, some interesting information can be retrieved. In table 3 the different variables with their corresponding means are summarized. With this statistic the answers of the survey can be analysed. In this paragraph some interesting findings, based on the answers of the questions of each subject will be discussed.

The findings will be based on the mean score of the answers, and not yet on statistical analysis. So these findings show how the respondents on average answered the survey questions, concerning the different variables. The answers are given on a 5-point Likert scale. Each answer possibility is coded.

The answer possibilities 1-3 (strongly disagree, disagree and neutral) show a more negative attitude of the respondents, concerning the propositions. The answer possibilities around 3 show a neutral attitude of the respondents. The answer possibilities 4 and 5 (agree, strongly agree) show a more positive attitude of the respondents.

Variable	Mean
Informational apps	3,2249
Paid versus free apps	2,1866
Paid versus free apps loyalty	2,1483
User experience	4,1244
Consistent user experience	3,5024
Fun apps	3,7847
Information seeking	3,7177
Social apps	2,4115
Control	4,0670
Promote control	3,1770
Frustration Response time	3,3876
Personalization	3,0431
Promote personalization	2,7225
Problems Mobile app self-efficacy	1,7321
Challenge	1,5359
App stickiness	2,4880
Switching between apps	2,7464
Experiences by others (WOM)	3,5311
Comments by others (Blogging)	3,2392
Provide Feedback (co-creation)	2,9713
App loyalty	4,4593

Table 3, The mean scores.

Mobile app type

The respondents have a more positive attitude toward the usage of informational mobile apps (mean=3,2249). They have a more negative attitude toward using paid mobile apps(mean=2,1866). They also show a more negative attitude to being loyal to free apps (mean=2,1483).

Mobile app usability

The respondents show a positive attitude toward using a mobile app more frequently, if it offers good user experience (mean=4,1244) and consistent user experience (mean=3,5024). They also show different attitudes toward using mobile apps for different purposes.

They show a more positive attitude toward using mobile apps for fun (mean=3,7847) than using mobile apps for retrieving information (3,7177). The respondents show a more negative attitude toward using mobile apps for social purposes (mean=2.4115).

Mobile app interactivity

The respondents show a positive attitude toward using a mobile app more frequently, if it offers good control (mean=4,0670). Also, they show a neutral attitude toward promoting mobile apps which have a good control (mean=3,1770).

The respondents show a neutral attitude toward getting frustrated, when a mobile app has a long response time (mean=3,3876). If a mobile app has the option to personalize it, the respondents show a neutral attitude toward using a mobile app more frequently (mean=3,0431). Besides, they show a neutral attitude towards promoting mobile apps which have the personalization option (mean=2,7225).

Mobile app self-efficacy

The respondents show a negative attitude toward problems with mobile app self-efficacy (mean=1,7321). Also, they have a negative attitude toward seeing the usage of a mobile phone and a mobile app as challenging (mean=1,5359).

App stickiness

The respondents show a negative attitude toward sticking to a mobile app (mean=2,4880). The respondents show a neutral attitude, toward switching between mobile apps (mean=2,7464).

6. Customer engagement behaviour

The respondents show a more positive attitude toward using a mobile app more frequently if they have heard good experiences about it (mean=3,5311). Also, if the respondents are able to read positive comments by others, they show a more neutral attitude toward using mobile apps more frequently (mean=3,2392). The respondents show a neutral attitude toward using mobile apps more often, if they are able to provide feedback or if they are involved in the creation process (mean=2,9713).

The respondents show a positive attitude toward using mobile apps more frequently, if a mobile app creates more customer loyalty (mean=4,4593).

5.1.3 Difference between male and female respondents

In this paragraph some differences between men and women, concerning a few variables, will be outlined. The customer engagement behaviours, between men and women, will be compared based on the means in table 4 and table 5.

Variable	Mean
App Stickiness	2,5849
Problems Mobile app Self-efficacy	1,6226
User experience	4,3396
App loyalty	4,6604
Experiences by others (WOM)	3,9151
Provide Feedback (co-creation)	3,7358
Comments by others (Blogging)	3,2170

Table 4, Mean scores man.

Variable	Mean
App Stickiness	2,3883
Problems app Mobile Self-efficacy	1,8447
User experience	3,9029
App loyalty	4,2524
Experiences by others (WOM)	3,8058
Provide Feedback (co-creation)	3,8447
Comments by others (Blogging)	3,3495

Table 5, Mean scores woman.

Men have a higher value of attitude toward app stickiness, compared to the value of attitude of women. Men have a neutral attitude (mean=2,5849), and women have a negative attitude(2,3883). Also, men tend to have a higher value of attitude toward using a mobile app more frequently, if it offers a good user experience (mean=4,3396), compared to woman(mean=3,9029). Both have a positive attitude toward user experience. Women have a higher value of attitude toward problems with mobile self-efficacy, compared to men. However, both have a negative attitude toward problems with mobile self-efficacy. Both do not have problems with handling a smartphone and handling a mobile app.

Men have a higher value of attitude toward customer loyalty and WOM, compared to women. Women have a higher value of attitude toward co-creation and blogging, compared to men. Both show a positive attitude toward loyalty, resulting in more app stickiness (mean men=4,6604 and mean women=4,2524), a positive attitude toward WOM, resulting in more app stickiness(mean men=3,9151 and mean women=3,8058) and a positive attitude toward co-creation, resulting in more app stickiness(mean men=3,7358 and mean women=3,8447). However, both show a neutral attitude toward blogging, resulting in more app stickiness (mean men=3,2170 and mean women=3,3495).

5.2 Data preparation

In order to perform analyses concerning the hypotheses, e.g. linear regression. A technique which reduces the amount of variables and checks the different subjects is factor analysis. Before the relevant variables can be used for a regression analysis, they need to be tested on reliability. A technique which accounts for that is Cronbach's Alpha.

5.2.1 Factor analysis

In general a factor analysis is a way of filtering, which reduces a lot of variables into fewer variables. This technique is used for identifying groups or clusters of variables. Correlations between the different variables play an important role. The existence of large correlation coefficients between subsets of variables suggests that those variables could be measuring aspects of the same underlying dimension. These dimensions are called factors. With factor analysis the data set is reduced from a group of highly correlated variables into a smaller group of factors (Field, 2009). This technique indicates if multiple item scales can be taken together in order to form one single variable. In order to test if the different scales used in this research are valid, and if they observe the underlying dimensions, a factor analysis will be performed.

The factor analysis can indicate which items can be taken together in order to represent one single variable. After performing the factor analysis in SPSS a few factors (subjects) are created (Field, 2009).

The first result of the factor analysis gives an overview of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity (Table 6). These two results can be used to determine reliability and adequacy of the sample. The value of KMO lies between 0 and 1. A value close to 1 shows more reliable and more distinctive factors. A KMO tests requires a minimum value of 0.5 in order to be acceptable. A value just above 0.5 is weakly accepted, a value between 0.5 and 0.7 is mediocre, a value between 0.7 and 0.8 is good, a value between 0.8 and 0.8 is great and values above 0.9 are superb (Field, 2009). The KMO test in this research resulted in 0.733 (table 6). This value lies between 0.7 and 0.8, therefore it can be labelled as a good value.

The Bartlett's test of sphericity (BTS) tests if there is a correlation between the different variables (questions). In order to test this, two hypotheses are formulated.

H₀= There is no correlation between the variables.

H_α= There is a correlation between the variables.

In order to create a factor, it is important that there is a correlation between the different variables. Variables are correlated with each other if the BTS output is significant ($p < 0.001$). If the value of p is smaller than the value of 0.001, the null hypothesis can be rejected (Field, 2009). In this research the BTS output resulted in 0,000 (table 6). This is lower than 0,001. The null hypothesis can be rejected, so there are correlations between the different variables. This finding validates the usage of a principal component factor analysis (PCA).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,733
Bartlett's Test of Sphericity	Approx. Chi-Square	2967,855
	df	435
	Sig.	,000

Table 6, KMO and Bartlett's test.

After the initial tests, the Kaiser-Meyer-Olkin and the Bartlett’s test of sphericity, regarding the reliability and adequacy of the sample, a principal component factor analysis can be performed. This factor analysis determines the quantity of factors by analysing the eigenvalues. Factors can only be used if they have an eigenvalue greater than the Kaiser criterion of 1. Table 4, Appendix C, Factor analysis, shows that the first 10 components have a higher eigenvalue than 1. This means that there are 10 factors which need to be considered for further analysis. These 10 factors explain 66,816% of the total variance.

Also, a scree plot can be used to determine the amount of factors. A scree plot is a graphical presentation of the eigenvalues in a graph. Eigen values above 1 are the factors. Figure 3 shows the scree plot. The scree plot also shows that there are 10 factors with an eigenvalue greater than 1.

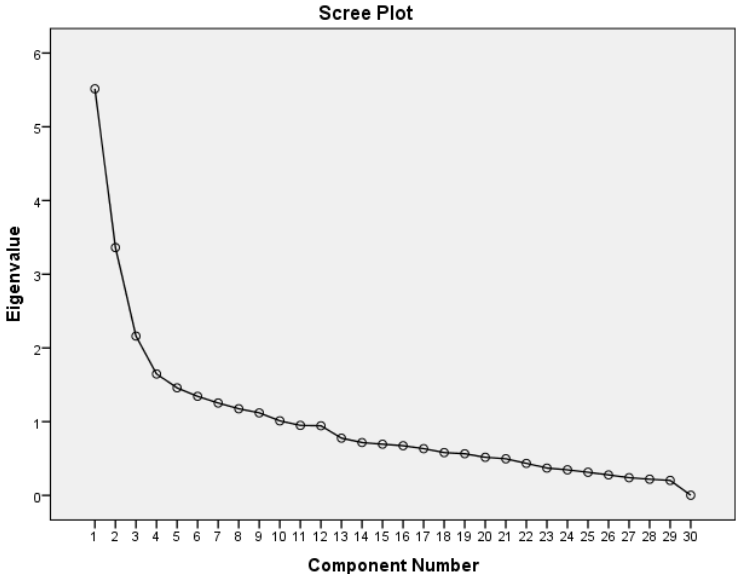


Figure 3, Scree plot.

The 10 factors consist of different items (questions). In order to see which items corresponds with which factor, the rotated component matrix (Table 7 and Appendix C, Factor analysis, table 5) should be taken into account.

Table 7, Rotated component matrix.

Variable	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Personalization	0.787									
Promoting Personalization	0.720									
Give Feedback	0.622									
App reviews	0.609									
Comments by Others	0.570							0.475		
Share Experience	0.524									
Experience by Others	0.506							0.459		

No Challenge		- 0.941								
Challenge		0.939								
Help		0.777								
Problems mobile self-efficacy		0.485								
Promoting Experience			0.827							
Promoting Control			0.820							
Promoting Fast Response			0.749							
PaidvsFree apps loyalty				0.841						
In-app purchases				0.826						
PaidvsFree apps				0.722						
Stop Long Response Time					0.816					
Frustrated Long Response time					0.742					
User Experience					0.571					
In-app messaging						0.748				
Push notifications						0.687				
Fun apps							0.741			
Control					0.448		0.496			
Informational apps							0.442			
User experience consistency										
Social apps								-0.752		
Seeking info									0.770	
App stickiness									0.578	
Switching between apps										0.810

Based on table 7, rotated component matrix, different components (factors) can be constructed which have different related items. The first component contains the following relevant items:

- I will use an app with the option to personalize it(changing the design)more frequently
- When I am able to give feedback, in order to improve the mobile app, I am willing to use the app more frequently
- I will use an app more frequently if I can read app reviews of other users
- When I read positive comments in blogs by others, I am willing to use the app more frequently

These questions belong to **factor 1** and will be labelled as **App Usage**.

The second component contains the following relevant items:

- It is a challenge for me to use a smartphone and to work with mobile apps
- I need help with downloading and installing mobile apps

These questions belong to **factor 2** and will be labelled as **Mobile self-efficacy**.

The third component contains the following relevant items:

- I am more willing to promote/write blogs about apps with good user experience
- I am more willing to promote/write blogs about apps which have a good control
- I am more willing to promote/write blogs about apps which have a fast response time

These questions belong to **factor 3** and will be labelled as **App interactivity**.

The fourth component contains the following relevant items:

- I am more loyal to paid apps than to free apps
- I will do more in-app purchases for paid apps than for free apps
- I am more willing to promote/write blogs about paid apps than about free apps

These questions belong to **factor 4** and will be labelled as **Paid versus Free apps**.

The fifth component contains the following relevant items:

- I will stop using the app if the app has a long response time
- I will get frustrated if I have an app which has a long response time (waiting long before my problems with the app are fixed by the app developer)

These questions belong to **factor 5** and will be labelled as **App response time**.

The sixth component contains the following relevant items:

- I will use a mobile app for fun.

This question belongs to **factor 7** and will be labelled as **App purposes**.

The seventh component contains the following relevant items:

- When I read positive comments in blogs by others, I am willing to use the app more frequently
- When I hear good experiences about an app by others, I am willing to use the app more frequently

These questions belong to **factor 8** and will be labelled as **Customer engagement outcomes**.

Although, based on table 7 and the scree plot (Figure 3), 10 factors should be considered, however the sixth, the ninth and the tenth factor will not be considered for further analysis. A paper written by Costello and Osborne, mentions that factors fewer than three items should not be considered (Costello & Osborne, 2009). Therefore only factors with a minimum of 3 items will be considered.

In summary a principal component analysis is conducted on the 30 items, with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin resulted in 0.733, which is greater than the acceptable limit of 0.5.

The Bartlett's test of sphericity chi-square (435)=2967,855, $p < 0.001$, indicated that the correlations between the variables were sufficiently large in order to conduct a principal component analysis. With this analysis the eigenvalues for each component is obtained. With the Kaiser criterion of 1, 10 components had an eigenvalue over 1. These components together explained 66,816 % of the variance. Also the scree plot showed 10 factors. However the sixth factor and the last two factors (9 and 10) consist of only respectively 2, 2 and 1 item, therefore these factors will not be considered for further analysis.

The initial survey was composed of 6 subjects, with different items (paragraph 4.4, variables and measures): the type of mobile apps, the usability of mobile apps, app interactivity, mobile self-efficacy, app stickiness and the customer engagement behaviours. The factor analysis seems to reveal that the initial survey, in reality, is composed of 7 subjects, with only relevant items: app usage, mobile self-efficacy, app interactivity, paid versus free apps, app response time, app purposes and customer engagement outcomes.

5.2.2 Cronbach's alpha

The factor analysis is a way to validate a survey, after the validation it is useful to check the reliability of the scale. Reliability refers to a consistency in the answers of a respondent.

A respondent should answer a question of a survey in a same way if the respondent answers the question on different point in time, all other things being equal. A technique which determines the reliability is Cronbach's alpha. This technique is the most common measure in order to determine scale reliability (2). Cronbach's alpha tests the different items of the questionnaire on their reliability. These different items are perfect reliable if the results are equal or greater than a Cronbach's alpha outcome of 0.7. Cronbach's alpha values between 0.6 and 0.7 are good, on the contrary, Cronbach's alpha values which are substantially lower are an indication of an unreliable scale (2). Table 8 shows the Cronbach's alpha of the different factors and the overall Cronbach's alpha.

Factor	Cronbach's Alpha	Number of items	Result
App Usage	0.725	4	Good reliable factor

Mobile Self-efficacy	0.731	2	Good reliable factor
Paid versus free apps	0.774	3	Good reliable factor
App interactivity	0.822	3	More perfect reliable factor
App response time	0.679	2	Reliable factor
App Purposes	0.186	2	Poor reliable factor.
Customer engagement outcomes	0.829	2	More perfect reliable factor
Overall	0.784	18	Good reliable variables

Table 8, Cronbach's alpha.

5.3 Linear regression

In this paragraph variables will be jointly analysed in order to explain or predict which variables relates to other variables. A technique which can help is linear regression.

The essence of a regression model is fitting a model to the data, in order to predict the values of the dependent variable from one or more independent variables. It predicts the outcome variable beyond the collected data. A simple linear regression consists of one independent variable, with the following formula: $Y_i = (b_0 + b_1x_i) + \epsilon_i$. On the contrary a multiple linear regression consist of more than one independent variable, with the following formula: $Y_i = (b_0 + b_1x_i + b_2x_{i2} + \dots + b_nx_n) + \epsilon_i(2)$.

5.3.1 Assumptions Linear regression

After performing a linear regression, an equation can be produced, based on the linear regression outcomes. With this equation, conclusions can be drawn about the sample size. However it is more interesting if the conclusions are true for a wider population, besides the sample size. In order to generalize, the underlying assumptions of linear regressions should be met. Some important assumptions in order to draw generalized conclusions are (Field, 2009):

- **Variable types:** The dependent variable should be quantitative (interval), continuous and unbounded. The independent variables should be quantitative or categorical.
- **No perfect multicollinearity:** No perfect linear relationship between the independent variables should exist. The independent variables should not correlate too highly.
- **Homoscedasticity:** The residuals of the independent variables should have the same variance at each level.
- **Normally distributed errors:** The residuals in the model are random and normally distributed with a mean of 0.
- **Independence:** All values of the outcome variable are independent.

- **Linearity:** The relationship should be linear. If the relationship is non-linear then the generalization would be limited.

The next paragraph starts with checking the linearity assumption of the linear regression. If the model has a non-linear relationship, a simple linear regression limits the generalizability of the findings. If there is a non-linear relationship, a log linear regression should be used. After the validation of the linear assumption, a multiple (log) linear regression analysis will be executed (Field, 2009).

5.3.2 Checking the linearity assumption

Normality check with skewness

In order to check the linearity assumption, and therefore the validation of using a linear model, the skewness test with normality plot can be performed. This test and plot shows if the data is normally distributed. Tables 9, 10 and 11 show the skewness test-statistic (Appendix D, Normality test, Table 6) and the plot. The black line in the graph shows the optimal normal distribution. One characteristic of normal distribution is symmetry. Skewness is an indicator of symmetry. If the skewness test-statistic is +/-zero (Gender, 0,029), the distribution is normal. If the skewness test-statistic is negative, the distribution is asymmetrical with a negative skew (long tail to the left, On the contrary, the distribution is asymmetric with a positive skew, if the skewness test statistic is positive (long tail to the right, (Figure 4). Table 9,10 and 11 show that the histograms of the variables do not match the optimal normal distribution line. This means that the variables, besides gender, are not normally distributed.

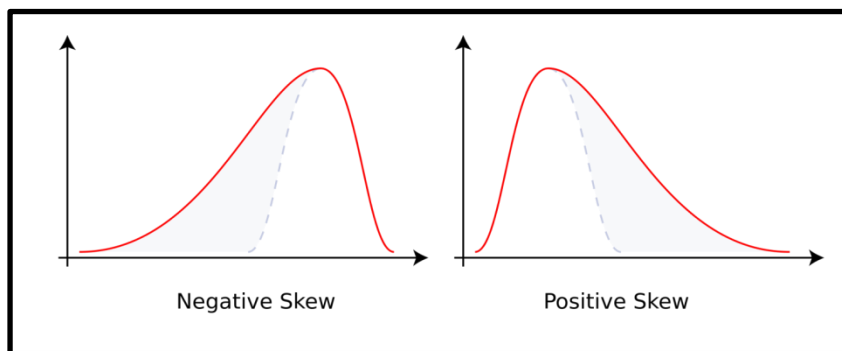


Figure 4, Left and right skew.

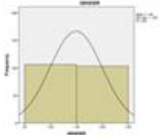
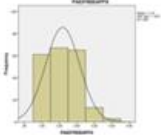
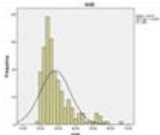
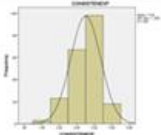
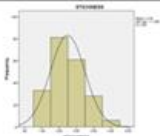
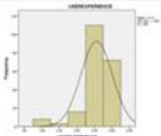
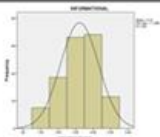
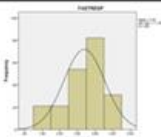
Gender	0,029		Paid versus Free apps	0,403	
Age	1,682		Consistent experience	-0,473	
Stickiness	0,391		User experience	-1,643	
Informational apps	-0,277		Fast response	-0,473	

Table 9, Skewness.

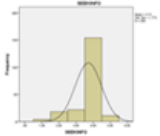
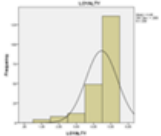
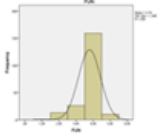
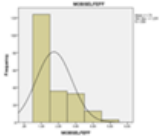
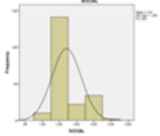
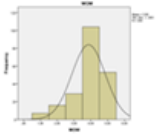
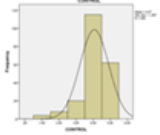
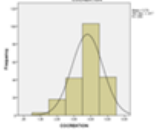
Seek info	-1,607		Loyalty	-1,970	
Fun	-1,580		Mobile self-efficacy	1,222	
Social	1,083		WOM	-1,028	
Control	-1,280		Co-creation	-0,704	

Table 10, Skewness.

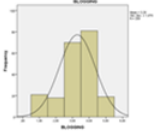
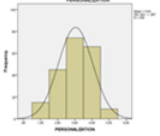
Blogging	-0,629	
Personalization	-0,263	

Table 11, Skewness.

Linearity check with Kolmogorov-Smirnov

Besides using the skewness test with graphs, a Kolmogorov-Smirnov test can also be executed. If the outcome of this test is not significant ($p > 0.05$), the distribution of the sample is not significantly different from a normal distribution. In other words there is probably a normal distribution (Field, 2009). In table 7, Appendix D, Normality test, the Kolmogorov-Smirnov test is executed to see if a distribution significantly differs from a normal distribution.

The following hypotheses can be formulated:

H_0 = The data is normally distributed.

H_a = The data is not normally distributed.

If the p-value, resulted from the Kolmogorov-Smirnov test, is lower than the significance level of 0.05 then the null hypothesis should be rejected. Looking at table 7, Appendix D, Normality test, all variables have a p-value of 0.00. These values are lower than 0.05 which means that for every variable the null hypothesis should be rejected. Therefore the data is not normally distributed.

One possible explanation causing a non-normal distribution is the existence of outliers. However the impact of these outliers can be reduced by transforming the data. The outliers tend to skew the distribution. In order to reduce this skew and the impact of the outliers, the data should be transformed. One transformation which can be used is the log transformation. By transforming all the variables into log variables, the distribution can be checked again. In table 8, Appendix D, Normality test, the variables are transformed in log variables, however the p-values still remain the same ($p = 0.00$). This means that after the transformation the data is still not normally distributed.

5.3.3 Log linear regression

If the assumption of linear regression is not met, then generalization of the findings beyond the sample size is not allowed. In paragraph 5.3.2 the assumption of linearity is checked. Based on the tests executed, the data does not have a normal distribution. The linearity assumption therefore is not valid. If there is no linearity, a log-linear regression should be used, instead of a normal linear regression.

In a log-linear regression the variables are logarithmically transformed in order to handle situations where a non-linear relationship exists between the independent and the dependent variables. The simple log linear regression has the following formula: $\log Y_i = \alpha + \beta \log X_i + \epsilon_i$ (Field, 2009).

Both the dependent and the independent variables are log transformed variables. This is important for the interpretation. The interpretation of this model is given as an expected percentage change in the dependent variable (Y) when the independent variable (X) is increased by some percentage. A relationship between a log dependent variable and a log independent variable is referred to elasticities in econometrics (Benoit, 2011).

After preparation of the data (factor and reliability analysis), and checking the linearity assumption of the linear regression, different models can be constructed, by using the log linear regression. The dependent variable in these models is app stickiness. Table 12 shows the different models. This table only contains the parameters (β) and indicates the significant variables. The full model is given in Appendix E, Regression, Table 9, 10 and 11.

The first model will contain the control variables gender, age, amount of apps and app usage. These are variables which should be considered in the analysis, but are not the main focus. If these variables aren't considered the results can be less accurate (2). In the second model the effect of all the independent variables will be tested on app stickiness. In the third model the moderation variables are added. After the models are constructed the hypotheses will be checked in the next paragraph.

	Model 1 β's (Control)	Model 2 β's (Independents)	Model 3 β's (Moderation)
(Constant)	0.315	0.016	0.058
Gender	-0.004	0.035	0.040
Age	0.058	0.125	0.112
Apps	0.005	-0.055	-0.061
App usage	-0.007	-0.005	-0.001
Informational apps		0.133	0.154
Paid vs Free apps		0.185*	0.203
User experience		0.028*	0.038
Consistent experience		-0.051	-0.092
Fast response time		-0.149	-0.152
Information seek		0.108	0.098
Fun apps		0.091*	0.083
Social apps		-0.022	-0.026
Controlling apps		0.237*	0.221
Problems Mobile self- efficacy		0.035	0.025

Personalization		-0.099	-0.082
Blogging		0.199*	0.195
Co-creation		0.107	0.122
Loyalty		0.266*	0.007
Word of mouth		0.272*	0.317
Moderator User experience			0.027*
Moderator User experience consistency			-0.013
Moderator Blogging			0.019*
Moderator Co-creation			0.006
Moderator Loyalty			0.007
Moderator Word of mouth			0.022*

*=Significant ($P < 0.05$) Table 12, The different models.

5.4 Testing the hypotheses

Based on the models developed in paragraph 5.3.3, the different hypotheses can be tested. The significance level plays an important role in order to determine if the hypotheses are accepted or rejected. A hypothesis is accepted if the probability of being right is higher than 95%, therefore the significance level is lower than 5%. With any p -value above 0.05 ($p > 0.05$), the hypotheses are rejected. With any p -value under 0.05 ($p < 0.05$), the hypotheses are accepted (A).

5.4.1 Type of mobile app

H1.1	Using Paid mobile apps have a positive effect on app stickiness.
H1.2	Using Informational mobile apps have a negative effect on app stickiness.

In order to test if paid mobile apps have a positive effect on app stickiness, and if informational apps have a negative effect on app stickiness, a log linear regression has been performed. Based on the results of model 2, control and independent variables, the hypotheses are rejected ($p > 0.05$) or they are accepted ($p < 0.05$).

H₀ = Paid mobile apps do not have a positive effect on app stickiness.

H_α = Paid mobile apps have a positive effect on app stickiness.

The coefficient of paid mobile apps is 0.185 and it has a p -value of 0.008. The p -value is under the significance level of 0.05, so there is a significant effect between using paid mobile apps and app stickiness. The coefficient is positive which implies that the usage of paid mobile apps does have a significant positive effect on app stickiness. If the usage of paid mobile apps is increased by 1%, app stickiness will increase by 0.185%. The hypothesis is accepted.

H₀= Informational mobile apps don't have a negative effect on app stickiness.

H_α= Informational mobile apps have a negative effect on app stickiness.

The coefficient of informational mobile apps is 0.133 and it has a p -value of 0.101. The p -value is above the significance level of 0.05, so there is a non-significant effect between using informational apps and app stickiness. The coefficient is positive which implies that the usage of informational mobile apps does have a non-significant positive effect on app stickiness, and not a negative effect as hypothesized. If the usage of informational mobile apps is increased by 1%, app stickiness will increase by 0.133%. The hypothesis is rejected.

5.4.2 Usability of mobile app

H2.1	Positive user experience will have a positive effect on app stickiness.
H2.2	Consistent user experience will have a positive effect on app stickiness.
H2.3	Informative usefulness will have a positive effect on app stickiness.
H2.4	Entertainment usefulness will have a positive effect on app stickiness.
H2.5	Social usefulness will have a negative effect on app stickiness.

In order to test if user experience, consistent user experience, informative usefulness and entertainment usefulness have a positive effect on app stickiness, and if social usefulness has a negative effect on app stickiness, a log linear regression has been performed. Based on the results of model 2, control and independent variables, the hypotheses are rejected ($p > 0.05$) or they are accepted ($p < 0.05$).

H₀= Positive user experience will not have a positive effect on app stickiness.

H_α= Positive user experience will have a positive effect on app stickiness.

The coefficient of user experience is 0.028 and it has a p -value of 0.004. The p -value is under the significance level of 0.05, so there is a significant effect between user experience and app stickiness. The coefficient is positive which implies that user experience of a mobile app has a significant positive effect on app stickiness. If the variable user experience is increased by 1%, app stickiness will increase by 0.028%. The hypothesis is accepted.

H₀= Consistent user experience will not have a positive effect on app stickiness.

H_α= Consistent user experience will have a positive effect on app stickiness.

The coefficient of consistent user experience is **-0.051** and it has a *p*-value of **0.661**. The *p*-value is above the significance level of 0.05, so there is a non-significant effect between consistent user experience and app stickiness. The coefficient is negative which implies that having a consistent user experience of a mobile app has a non-significant negative effect on app stickiness, and not a positive effect as hypothesized. If the variable consistent user experience is increased by 1%, app stickiness will decrease by 0.051%. The hypothesis is **rejected**.

H₀= Informative usefulness will not have a positive effect on app stickiness.

H_α= Informative usefulness will have a positive effect on app stickiness.

The coefficient of informative usefulness is **0.108** and it has a *p*-value of **0.332**. The *p*-value is above the significance level of 0.05, so there is a non-significant effect between informative usefulness and app stickiness. The coefficient is positive which implies that informative usefulness of a mobile app has a non-significant positive effect on app stickiness. If the variable informative usefulness is increased by 1%, app stickiness will increase by 0.108%. The hypothesis is **rejected**.

H₀= Entertainment usefulness will not have a positive effect on app stickiness.

H_α= Entertainment usefulness will have a positive effect on app stickiness.

The coefficient of entertainment usefulness is **0.091** and it has a *p*-value of **0.038**. The *p*-value is under the significance level of 0.05, so there is a significant effect between entertainment usefulness and app stickiness. The coefficient is positive which implies that entertainment usefulness of a mobile app has a significant positive effect on app stickiness. If the variable entertainment usefulness is increased by 1%, app stickiness will increase by 0.091%. The hypothesis is **accepted**.

H₀= Social usefulness will not have a negative effect on app stickiness.

H_α= Social usefulness will have a negative effect on app stickiness.

The coefficient of social usefulness is **-0.022** and it has a *p*-value of **0.822**. The *p*-value is above the significance level of 0.05, so there is a non-significant effect between social usefulness and app stickiness. The coefficient is negative which implies that social usefulness of a mobile app has a non-significant negative effect on app stickiness. If the variable social usefulness is increased by 1%, app stickiness will decrease by 0.022. The hypothesis is **rejected**.

5.4.3 Perceived interactivity of mobile apps

H3.1	Being in control of a mobile app will positively influence app stickiness.
H3.2	Fast responsiveness of a mobile app will positively influence app stickiness.
H3.3	The option to personalize a mobile app will positively influence app stickiness.

In order to test if control, fast responsiveness and personalization have a positive effect on app stickiness a log linear regression has been performed. Based on the results of model 2,

control and independent variables, the hypotheses are rejected ($p > 0.05$) or they are accepted ($p < 0.05$).

H₀ = Being in control of a mobile app will not positively influence app stickiness.

H_α = Being in control of a mobile app will positively influence app stickiness.

The coefficient of controlling mobile apps is **0.237** and it has a p -value of **0.040**. The p -value is under the significance level of 0.05, so there is a significant effect between being in control of a mobile app and app stickiness. The coefficient is positive which implies that being in control of a mobile app has a significant positive influence on app stickiness. If the variable controlling mobile apps is increased by 1%, app stickiness will increase by 0.237%. The hypothesis is **accepted**.

H₀ = Fast responsiveness of a mobile app will not positively influence app stickiness.

H_α = Fast responsiveness of a mobile app will positively influence app stickiness.

The coefficient of fast responsiveness is **-0.149** and it has a p -value of **0.122**. The p -value is above the significance level of 0.05, so there is a non-significant effect between fast responsiveness and app stickiness. The coefficient is negative which implies that fast responsiveness has a non-significant negative influence on app stickiness, and not positively as hypothesized. If the variable fast responsiveness is increased by 1%, app stickiness will decrease by 0.149%. The hypothesis is **rejected**.

H₀ = The option to personalize a mobile app will not positively influence app stickiness.

H_α = The option to personalize a mobile app will positively influence app stickiness.

The coefficient of personalizing mobile apps is **-0.099** and it has a p -value of **0.254**. The p -value is above the significance level of 0.05, so there is a non-significant effect between the option to personalize a mobile app and app stickiness. The coefficient is negative which implies that personalizing mobile apps has a non-significant negative influence on app stickiness, and not positively as hypothesized. If the variable personalizing mobile apps is increased by 1%, app stickiness will decrease by 0.099%. The hypothesis is **rejected**.

5.4.4 Self-efficacy of mobile apps

H4.1	Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience and app stickiness.
H4.2	Problems with mobile app self-efficacy have moderating effect on the relationship between user experience consistency and app stickiness.
H4.3	Problems with mobile app self-efficacy have a moderating effect on the relationship between WOM and app stickiness.
H4.4	Problems with mobile app self-efficacy have a moderating effect on the relationship between blogging and app stickiness.
H4.5	Problems with mobile app self-efficacy have a moderating effect on the relationship between co-creation and app stickiness.

H4.6	Problems with mobile app self-efficacy have a moderating effect on the relationship between app loyalty and app stickiness.
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In order to test the moderating effects on app stickiness, a log linear regression with interactions has been performed. Based on the results of model 3, moderation effects, the hypotheses can be rejected ($p > 0.05$) or they are accepted ($p < 0.05$). Moderation affects the strength of the relation between the dependent variable and the independent variable. To see if the moderation effect amplifies or weakens the strength of relation, the parameter of the variable mobile self-efficacy (0.035) of model 2 will be considered also in order to compare the results.

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between user experience and app stickiness.

H_α= Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience and app stickiness.

The coefficient of the interaction between problems with mobile self-efficacy and user experience is **0.027** and it has a p -value of **0.006**. The p -value is under the significance level of 0,05, so the moderation effect is significant. The variable problems with mobile self-efficacy has a moderation effect between user experience and app stickiness. If the moderation variable between problems with mobile self-efficacy and user experience is increased by 1% then app stickiness will increase by 0.052%**. If in model 2 the variable problems with mobile self-efficacy is increased by 1%, app stickiness will increase by 0.035%. So the moderation effect amplifies the relationship between user experience and app stickiness. The hypothesis should be **accepted**.

**=parameter mobile self-efficacy(0.025)+parameter user experience (0.027)

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between user experience consistency and app stickiness.

H_α= Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience consistency and app stickiness.

The coefficient of the moderation between problems with mobile self-efficacy and user experience consistency is **-0.013** and it has a p -value of **0.442**. The p -value is above the significance level of 0.05, so the moderation effect is not significant. The variable problems with mobile self-efficacy does not have a moderation effect between user experience consistency and app stickiness. If the moderation variable between problems with mobile self-efficacy and user experience consistency is increased by 1% then app stickiness will increase by 0.025%***. If in model 2 the variable problems with mobile self-efficacy is increased by 1% then app stickiness will increase by 0.035%. So the moderation effect weakens the relationship between user experience consistency and app stickiness. However the moderation effect is not significant. The hypothesis should be **rejected**.

***= variable user experience consistency is not significant, so only the parameter of mobile-self efficacy is used.

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between WOM and app stickiness.

H_α= Problems with mobile app self-efficacy have a moderating effect on the relationship between WOM and app stickiness.

The coefficient of the interaction between problems with mobile self-efficacy and WOM is **0.022** and it has a *p*-value of **0.019**. The *p*-value is above the significance level of 0.05, so the moderation effect is significant. The variable problems with mobile self-efficacy has a moderation effect between WOM and app stickiness. If the moderation variable between problems with mobile self-efficacy and WOM is increased by 1% then app stickiness will increase by 0.047%****. If in model 2 the variable problems with mobile self-efficacy is increased by 1% then app stickiness will increase by 0.035%. So the moderation effect amplifies the relationship between WOM and app stickiness. The hypothesis should be **accepted**.

****=parameter mobile self-efficacy (0.025)+parameter WOM (0.022)

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between blogging and app stickiness.

H_α= Problems with mobile app self-efficacy have a moderating effect on the relationship between blogging and app stickiness.

The coefficient of the interaction between problems with mobile self-efficacy and blogging is **0.019** and it has a *p*-value of **0.036**. The *p*-value is under the significance level of 0.05, so the moderation effect is significant. The variable problems with mobile self-efficacy has a moderation effect between blogging and app stickiness. If the moderation variable between problems with mobile self-efficacy and blogging is increased by 1% then app stickiness will increase by 0.044%*****.

If in model 2 the variable problems with mobile self-efficacy is increased by 1% then app stickiness will increase by 0.035%. So the moderation effect amplifies the relationship between blogging and app stickiness. The hypothesis should be **accepted**.

*****=parameter mobile self-efficacy(0.025)+parameter blogging (0.019)

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between co-creation and app stickiness.

H_α= Mobile app self-efficacy has a moderating effect on the relationship between co-creation and app stickiness.

The *p*-value of the interaction between problems with mobile self-efficacy and co-creation is **0.754**. The *p*-value is above the significance level of 0.05, so the moderation effect is not significant. The variable problems with mobile self-efficacy does not have a moderation effect between co-creation and app stickiness. If the moderation variable between problems with mobile self-efficacy and co-creation is increased by 1% then app stickiness will increase by 0.025%***. If in model 2 the variable problems with mobile self-efficacy is increased by 1% then app stickiness will increase by 0.035%. So the moderation effect weakens the relationship between user co-creation and app stickiness. However the moderation effect is not significant. The hypothesis should be **rejected**.

H₀= Problems with mobile app self-efficacy do not have a moderating effect on the relationship between app loyalty and app stickiness.

H_α= Problems with mobile app self-efficacy have a moderating effect on the relationship between app loyalty and app stickiness.

The *p*-value of the interaction between problems with mobile self-efficacy and app loyalty is **0.640**. The *p*-value is above the significance level of 0.05, so the moderation effect is not significant. The variable problems with mobile self-efficacy does not have a moderation effect between app loyalty and app stickiness. If the moderation variable between mobile self-efficacy and app loyalty is increased by 1% then app stickiness will increase by 0.025%***. If in model 2 the variable problems with mobile self-efficacy is increased by 1% then app stickiness will increase by 0.035%. So the moderation effect weakens the relationship between app loyalty and app stickiness. However the moderation effect is not significant. The hypothesis should be **rejected**.

5.4.5 Customer engagement behaviour of mobile apps

H5.1	Positive WOM will have a positive effect on app stickiness.
H5.2	Co-creation will have a positive effect on app stickiness.
H5.3	Positive Blogs will have a positive effect on app stickiness.
H5.4	Creating app Loyalty will have a positive effect on app stickiness.

In order to test if WOM, co-creation, blogging and app loyalty have a positive effect on app stickiness a log linear regression has been performed. Based on the results of model 2, control and independent variables, the hypotheses are rejected ($p > 0.05$) or they are accepted ($p < 0.05$).

H₀= Customer engagement outcome WOM will not have a positive effect on app stickiness.

H_α= Customer engagement outcome WOM will have a positive effect on app stickiness.

The coefficient of WOM is **0.272** and it has a *p*-value of **0.008**. The *p*-value is under the significance level of 0.05, so the effect between WOM and app stickiness is significant. The coefficient is positive which implies that positive WOM has a significant positive effect on app stickiness. If the variable WOM is increased by 1%, app stickiness will increase by 0.272%. The hypothesis should be **accepted**.

H₀= Customer engagement outcome Co-creation will not have a positive effect on app stickiness.

H_α= Customer engagement outcome Co-creation will have a positive effect on app stickiness.

The coefficient of co-creation is **0.107** and it has a *p*-value of **0.371**. The *p*-value is above the significance level of 0.05, so the effect between co-creation and app stickiness is non-significant.

The coefficient is positive which implies that co-creation has a non-significant positive effect on app stickiness. If the variable co-creation is increased by 1%, app stickiness will increase by 0.107%. The hypothesis should be **rejected**.

H₀= Customer engagement outcome reading blogs will not have a positive effect on app stickiness.

H_α= Customer engagement outcome reading blogs will have a positive effect on app stickiness.

The coefficient of blogging is 0,199 and it has a *p*-value of 0,008. The *p*-value is under the significance level of 0.05, so the effect between reading blogs and app stickiness is significant. The coefficient is positive which implies that reading positive blogs will have a significant positive effect on app stickiness. If the variable blogging is increased by 1%, app stickiness will increase by 0.199%. The hypothesis should be **accepted**.

H₀= Customer engagement outcome creating app Loyalty will not have a positive effect on app stickiness.

H_α= Customer engagement outcome creating app Loyalty will have a positive effect on app stickiness.

The coefficient of app loyalty is 0.266 and it has a *p*-value of 0.036. The *p*-value is under the significance level of 0.05, so the effect between creating app loyalty and app stickiness is significant. The coefficient is positive which implies that app loyalty has a significant positive effect on app stickiness. If the variable app loyalty is increased by 1%, app stickiness will increase by 0.266%. The hypothesis should be **accepted**.

Chapter 6: General discussion

The effect of app characteristics on app stickiness has been proven in earlier literature. This research shows the effect of customer engagement behaviour on mobile app stickiness. The behaviours which are considered in this study are: blogging, co-creation, loyalty and WOM. In this chapter the results of the hypotheses will be presented. Furthermore the research question and the sub-research questions, the implications, the limitations and directions for further research will be outlined in this chapter.

6.1 Discussion

In this paragraph the interpretation of the results, concerning the hypotheses, will be presented. The present study also gives new insights on the effect of customer engagement behaviour on mobile app stickiness. These different factors (independent variables with their items) are observed:

- Mobile app type
- Mobile app usability
- Mobile app interactivity
- Mobile app self-efficacy
- Customer engagement behaviour of mobile apps

The hypotheses of the different factors are analysed, using log-linear regression, in order to explain their effect on mobile app stickiness. Each factor will be presented separately.

Mobile app type

	Hypotheses	Result
H1.1	Using Paid mobile apps have a positive effect on app stickiness.	Accepted
H1.2	Using informational mobile apps have a negative effect on app stickiness.	Rejected

An article written by Kim, Yoon and Han showed that mobile apps can be divided into paid mobile apps and free mobile apps. Due to the existence of free mobile apps, consumers are more hesitant about downloading paid apps. Also, a mobile app can be utilitarian or it can be hedonic (Kim, Yoon, & Han, 2014).

Utilitarian motives are more structured and they are aimed at achieving a specific task or purpose. Hedonic motives are relatively unstructured and they are more experiential (Furner, Racherla, & Babb, 2012).

The present study found that the usage of paid mobile apps have a significant positive influence on app stickiness. Paid mobile apps engender app stickiness. An increase in paid mobile apps, increases mobile app stickiness. The usage of informational mobile apps (e.g. News apps) have a non-significant effect on app stickiness. So informational mobile apps do not have an influence on app stickiness.

Mobile app usability

The usability and the user experience of a mobile app is important.

User experience can be defined as a combination of perceptions and responses of users, as a result of using a product or service. It also comprises the affective reactions of users such as their emotions, their perceptions, their preferences and their behaviours (Hassenzahl & Tractinsky, 2006).

Besides user experience, user experience consistency should also be considered in order to improve app usage. User experience consistency is the degree to which design, content and interaction don't change (Furner, Racherla, & Babb, 2014).

The usefulness of a mobile app influences the attitude of the user toward using a mobile app. Usefulness can be divided into three antecedents: perceived informative usefulness, perceived entertaining usefulness and perceived social usefulness. Perceived informative usefulness relates to needs which strengthen information, knowledge, and understanding. Perceived entertaining usefulness relates to needs which strengthen pleasurable and emotional experiences. Perceived social usefulness relates to needs which strengthen contact with family, friends and the world (Bauer, Reichardt, Barnes, & Neumann, 2005).

A research conducted by Kim, Yoon and Han showed that perceived informative usefulness and perceived entertainment usefulness affect the attitude of the users toward mobile app usage positively. However perceived social usefulness did not affect the attitude of the users (Kim, Yoon, & Han, 2014).

	Hypotheses	Result
H2.1	Positive user experience will have a positive effect on app stickiness.	Accepted
H2.2	Consistent user experience will have a positive effect on app stickiness.	Rejected
H2.3	Informative usefulness will have a positive effect on app stickiness.	Rejected
H2.4	Entertainment usefulness will have a positive effect on app stickiness.	Accepted
H2.5	Social usefulness will have a negative effect on app stickiness.	Rejected

The present study found that positive user experience has a significant positive effect on mobile app stickiness. The perceptions and the responses of users, formed by using a mobile app, have an positive effect on app stickiness.

An increase in positive user experience, increases mobile app stickiness. However, the effect of consistent user experience is not significant. So consistent user experience does not have an influence on app stickiness.

Informative usefulness is not significant. So using mobile apps in order to gain information do not have an effect on app stickiness.

Also, social usefulness of a mobile app does not have a significant effect on app stickiness. Using mobile apps in order to maintain social relationships do not have an effect on mobile app stickiness.

On the contrary, entertainment usefulness of a mobile app has a significant positive effect on app stickiness. Mobile apps which are experienced as fun, positively influence mobile app stickiness. An increase in entertainment usefulness of mobile apps, increases app stickiness.

Mobile app interactivity

In today's modern media environment interactivity plays an important role. Due to the online environment, consumers are becoming more empowered and more active in consuming and transmitting information. Therefore, consumers nowadays expect more interactivity. According to a paper written by Wu, perceived interactivity consists of three dimensions: perceived user control, perceived responsiveness and perceived personalisation (Wu, 2005).

Perceived user control refers to the ability of the user of being able to have control over the navigation. Perceived responsiveness refers to whether the user gets fast feedback, and if the feedback is relevant to the action/problem of the user. Perceived personalisation refers to the possibility to adapt something accordingly to the preferences of the user (Wu, 2005).

	Hypotheses	Result
H3.1	Being in control of a mobile app will positively influence app stickiness	Accepted
H3.2	Fast responsiveness of a mobile app will positively influence app stickiness	Rejected
H3.3	The option to personalize a mobile app will positively influence app stickiness	Rejected

The present study found that controlling mobile apps have a significant positive effect on mobile app stickiness. Being in control of a mobile app positively influence app stickiness. An increase in being in control of a mobile app, increases mobile app stickiness. The effect of fast responsiveness and the effect of personalization are not significant. So getting fast and relevant feedback, and being able to personalize a mobile app do not have an effect on app stickiness.

Mobile app self-efficacy

The ability and the motivations of consumers using a mobile app differ. This difference can be occurred due to mobile self-efficacy (Furner, Racherla, & Babb, 2012). It reflects the degree of anxiety when using a smartphone or a mobile app. If the anxiety is too high (low mobile-self efficacy), users end up not using the mobile app (Furner, Racherla, & Babb, 2014). Mobile self-efficacy has an impact on both user experience and user experience consistency. Users with high level of mobile self-efficacy are less concerned about user experience and user experience consistency. They have more user experience and therefore they are expected to being able to use low quality user experience. They do not experience as much frustration and stress as users with a low level of mobile self-efficacy.

Users with a low level of mobile self-efficacy are less familiar with using a smartphone or a mobile app. They are more likely to experience more stress and frustrations (Furner, Racherla, & Babb, 2014).

	Hypotheses	Result
H4.1	Problems with mobile app self-efficacy have a moderating effect on the relationship between user experience and app stickiness.	Accepted
H4.2	Problems with mobile app self-efficacy have moderating effect on the relationship between user experience consistency and app stickiness.	Rejected
H4.3	Problems with mobile app self-efficacy have a moderating effect on the relationship between WOM and app stickiness.	Accepted
H4.4	Problems with mobile app self-efficacy have a moderating effect on the relationship between blogging and app stickiness.	Accepted
H4.5	Problems with mobile app self-efficacy have a moderating effect on the relationship between co-creation and app stickiness.	Rejected
H4.6	Problems with mobile app self-efficacy have a moderating effect on the relationship between app loyalty and app stickiness.	Rejected

The present study found that problems with mobile self-efficacy weaken the relationships between user experience consistency and app stickiness, the relationship between co-creation and app stickiness and the relationship between app loyalty and app stickiness. however, these results are not significant. Problems with Mobile self-efficacy do not have a moderation effect between these variables and mobile app stickiness.

On the other hand, problems with mobile self-efficacy do have a moderation effect between user experience and app stickiness, between WOM and app stickiness and between blogging and app stickiness. All these moderation effects are significant. Problems with mobile self-efficacy amplify the relationship between these variables and mobile app stickiness.

Customer engagement behaviour of mobile apps

WOM can be characterized as oral, person to person communication. It is a communication between the receiver of the message and the communicator of the message. People can share brand, product or service experiences with each other. WOM can have either positive influence on decisions or negative influence on decisions. Negative WOM has a more powerful impact than positive WOM. People are more willing to conduct in WOM if they have negative experience with the product or with the brand (Buttle, 2011).

Customer co-creation is the participation of the customer in the creation of the company's core offering. This can occur through co-design or shared inventiveness. A research performed by Schau, Muniz and Arnould showed that if consumers have the opportunity to participate in brand communities (blogging), they will participate.

Therefore companies should construct brand communities (Schau, Albert, & Arnould, 2009). On these communities consumers can share their opinions and their experiences about brands and products with each other (Muniz & O'Guinn, 2011).

Loyal customers are customers who repurchase a brand, considering only that brand, and do not engage in brand information seeking behavior for other brands (Oliver, 1999).

	Hypotheses	Result
H5.1	Positive WOM will have a positive effect on app stickiness.	Accepted
H5.2	Co-creation will have a positive effect on app stickiness.	Rejected
H5.3	Reading positive blogs will have a positive effect on app stickiness.	Accepted
H5.4	Creating app Loyalty will have a positive effect on app stickiness.	Accepted

The present study found that positive WOM, reading positive blogs and creating app loyalty have a significant positive effect on app stickiness. An increase in hearing more positive opinions and experiences about certain apps from others, increases app stickiness. An increase in reading more positive blogs about certain apps, increases app stickiness. Also if users notice that app developers create more app loyalty, app stickiness will increase. So these customer engagement behaviours lead to a positive influence on mobile app stickiness. On the contrary, The effect of co-creation is not significant. So being able to give feedback or being able to participate in a creation process does not have an effect on app stickiness.

6.2 Conclusions and implications

In this paragraph answers to the research question and the sub-research questions will be formulated. First the sub-questions will be answered. Also, this research shows some interesting insights about the influence of different customer engagement behaviours on mobile app stickiness. Although not all postulated hypothesis are accepted, this study may contain valuable implications for mobile app developers. These implications will also be presented in this paragraph.

Customer engagement behaviours are different behavioural expressions of customers, other than purchases. These behavioural expressions can be positive (writing positive on a blog about the brand/product) ,but it also can be negative (negative WOM referrals). In the present study the following behavioural expressions are considered: blogging behaviour (positive blogs), co-creation behaviour, WOM behaviour (positive WOM) and loyalty behaviour.

The concept of mobile app stickiness (retention) is becoming more and more important nowadays. The average cost of acquiring a new user instead of retaining a customer will grow in the future.

Therefore, The main research question addressed in this study is:

How can app developers use customer engagement behaviour in order to increase mobile app stickiness?

Sub-research questions to be answered throughout the research include: (a) Does paid and informational mobile apps influence app stickiness? (b) Which characteristics of or factors related to mobile apps contribute to an increase of mobile app stickiness? (c) Which effect (amplified or weakened) does problems with mobile self-efficacy have on the relationship between user experience and mobile app stickiness, and on the relationship between customer engagement behaviours and mobile app stickiness? (d) Which effect does reading positive blogs have on mobile app stickiness? (e) Which effect does Co-creation have on mobile app stickiness? (f) Which effect does creating app loyalty have on mobile app stickiness? (g) Which effect does positive Word-of-mouth have on mobile app stickiness?

Based on the results of chapter 5.4, it can be concluded that paid mobile apps have a significant positive effect on mobile app stickiness. Informational mobile apps (News apps) do not have a significant effect on mobile app stickiness. An increase in the usage of paid mobile apps, increases mobile app stickiness. Users use a mobile app more frequently if they have paid for it.

Based on the results of chapter 5.4, there are some characteristics of or factors related to mobile apps which increase mobile app stickiness. Positive user experience has a significant positive influence on mobile app stickiness. An increase in positive user experience, increases mobile app stickiness. If users have favourable perceptions, favourable affective reactions and favourable responses, as a result of using a mobile app, they will stick longer to a mobile app. Also, entertainment usefulness of a mobile app has a significant positive effect on mobile app stickiness. An increase in entertainment usefulness of mobile apps, increases app stickiness. Mobile apps which are experienced as fun, positively influence mobile app stickiness.

Besides user experience and entertainment usefulness, the ability of a user of being able to have control over the navigation of a mobile app also has a significant positive effect on mobile app stickiness. An increase in being in control of a mobile app, increases mobile app stickiness.

Problems with mobile self-efficacy moderates the effect between user experience and mobile app stickiness, between WOM and mobile apps stickiness and between blogging and mobile app stickiness. Based on the results of chapter 5.4, problems with mobile self-efficacy amplify the relationship between these variables and mobile app stickiness. On the other hand, problems with mobile self-efficacy weaken the relationship between co-creation and app stickiness and the relationship between app loyalty and app stickiness. However, these results are not significant. Problems with mobile self-efficacy do not have a moderation effect between these variables and mobile app stickiness.

Customer engagement behaviour exists of different behavioural manifestations other than purchases. These behaviours are: blogging, co-creation, loyalty and WOM. Based on the results of chapter 5.4, an increase in hearing more positive opinions and experiences about certain apps from others, increases app stickiness.

An increase in reading more positive blogs about certain apps, increases app stickiness. Also if users notice that app developers create more app loyalty, app stickiness will increase. On the contrary, being able to give feedback or being able to participate in a product creation process does not have an effect on app stickiness.

Based on the findings of this study, an answer to the research question and some implications can be formulated. The contribution of this study to the existing literature is that this study extends the prior research by analysing the effect of customer engagement behaviours on mobile app stickiness, instead of analysing the effect of mobile app characteristics on mobile app stickiness.

The primary objective of this research was to test and understand the influence of some customer engagement behaviours on mobile app stickiness. The customer engagement behaviours which were considered are: blogging, co-creation, loyalty and WOM. These behaviours, except co-creation, are significant and have a positive effect on mobile app stickiness.

In order to increase mobile app stickiness these behaviours should be monitored and facilitated by app developers. App developers should stimulate and motivate app users to manifest positive customer engagement behaviours. Therefore, app developers need to develop platforms where e.g. WOM and blogging can be encouraged. App developers should create a site or an online community where app users can spread their ideas, opinions and experiences. On these platforms app users can communicate with each other, and they can influence each other.

Besides developing platforms for the users, app developers can also facilitate customer-to-customer interaction by organizing events and online chats. Finally, app developers can develop viral internet campaigns which generate buzz. This can trigger app users to share their opinions with each other.

On these different platforms, developed and controlled by app developers, users who do not use a mobile app frequently can be triggered by other users to make more use of a mobile app. Users who use a mobile app frequently can help, inform and motivate users who do not use a mobile app frequently.

Some app users are more likely to engage in WOM or blogging when they are rewarded. App developers should anticipate on that. They can introduce an incentive and reward program in which current customers can participate. With these programs firms can encourage current customers to make recommendations and to share their positive experiences to other app users.

Not only the customers need to engage with the firm. Firms themselves also need to engage with the customers. Firms can do this by establishing and contributing to customer communities, and listening to customer feedback. It is crucial that negative customer engagement behaviour (negative WOM and negative blogs) is managed properly, in order to turn it into positive engagement behaviour. Negative engagement behaviours require visible actions and reactions from the firm. Actions such as apologies and modifications of the mobile app can be ways which dissuades negative customer engagement behaviour.

App developers should enhance app loyalty by introducing loyalty programs for certain mobile apps. They should also enhance the relationship with the users. Introducing a loyalty program is a way to stimulate stickiness. The customers can be rewarded when they use a mobile app more frequently. Rewards such as using paid mobile apps for free or open additional content and features of a mobile app without payments.

App developers should be cautious in creating relationships with users. Not all users are equally motivated to build a close and an intimate relationship with the app developer. As discussed in paragraph 2.1.2, attachment theory plays a role in analysing relationships between an app developer and an app user. The attachment theory consists of two attachment styles.

Attachment anxiety is the extent to which a person worries that the relationship partner might not be available in times of need. Attachment avoidance is the extent to which a person has an excessive need for self-reliance. Insights about these two attachment styles can help app developers to identify which type of user seeks closeness in relationships. Anxious customers welcome more frequent contacts and a variety of touch points with the firm. Anxious customers are more likely to respond positively to being recognized by a loyalty program. However avoidant people do not desire much closeness.

6.3 Limitations and future research

In this paragraph some limitations of this research will be outlined. These limitations can be used for future research.

The first limitation is about the online distribution of the survey. The survey is developed with the website www.thesistools.nl. This website made it possible to distribute the survey online. However distributing the survey online, limits the control of the researcher. If respondents did not understand a question, they were not able to ask the researcher directly about it. This increases the change of unfilled surveys. Also, by distributing the survey online, the researcher is not able to check if the respondents made the survey independently. Some respondents can give answers according to what their friends gave as an answer.

The second limitation is about the data of the respondents. In this research only respondents with a smartphone are considered. However apps can also be downloaded on tablets and other mobile devices. These possibilities are not included in this research. Therefore, the sample is not representative for the overall population of app users. This means that the findings cannot automatically be generalized for all app users. For future research the sample size should be extended with app users of different devices, besides only of smartphones.

The third limitation is about focussing on mobile apps. This research focusses on mobile apps in general. However, focussing on a particular type of mobile app (informational or entertainment) enables the researcher to give more specific recommendations. For future research focussing on a particular type of mobile app should be done.

The fourth limitation is about focussing on customer engagement behaviour. This research focusses on several customer engagement behaviours.

For future research focussing one or two customer engagement behaviours should be considered. This enables a more profound and a more elaborated research on certain customer engagement behaviours.

The fourth limitations is about the data. This research is based on the data from a survey rather than on the data from real life behaviour (database). Real life behaviour data could give better insight in the way app users use customer engagement behaviour. For future research data of a database concerning app stickiness should be considered.

The fifth limitations is that this research focusses on one point in time. However customer engagement can be classified as temporally or ongoing. Based on this research no statements about the long-term effects of the customer engagement behaviours can be done. For future research the long-term effect of customer engagement behaviour should be analysed. If the actions of the users are ongoing, firms need to develop specific processes in order to monitor and address customer engagement behaviour. If the actions of the users are temporally, firms need to assess the likely firm level outcomes of customer engagement behaviour and act on that.

The sixth limitation is about WOM and blogging. In this research only positive WOM and positive blogs are used as variables. For future research the whole concept (negative and positive) of WOM and of blogging should be considered.

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Appendix A: The Survey

Customer engagement of Mobile Apps

1.

What is your gender?*

- Male
- Female

2.

What is your age?*

3.

Do you have a smartphone?*

- Yes
- No

4.

I need help with downloading and installing mobile apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

5.

It is a challenge for me to use a smartphone and to work with mobile apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

6.

How many apps do you have on your mobile phone currently (approximately)?*

7.

How many of those apps are you using regularly?*

8.

I switch regularly to different mobile apps ,instead of sticking to one mobile app (mobile apps with the same purposes, switching between different news apps for example)*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

9.

If I stick longer to a mobile app, I will do more than only in-app purchases like telling others about the app. in-app purchases=Many apps let you make in-app purchases to buy extra content (like bonus game levels or subscriptions).*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

10.

I use more informational apps(news, check public transportation times etc., apps which you use for a specific purpose) than experimental apps(games,music etc., apps which you use for fun)*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

11.

I am more willing to promote/write blogs about paid apps than about free apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

12.

I am more loyal to paid apps than to free apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

13.

I will do more in app-purchases for paid apps than for free apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

14.

I will use an app which delivers a good user experience(good design,good content,easy navigation)more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

15.

I will use an app which delivers a consistent experience(no regular changes in the app)more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

16.

I am more willing to promote/write blogs about apps with good user experience*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

17.

I will use mobile apps in order to seek information*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

18.

I will use mobile apps for fun*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

19.

I will use mobile apps for social relationships*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

20.

I will use an app more frequently if I have a good control of the app(know how the app works)*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

21.

It is not a challenge for me to use a smartphone and to work with mobile apps*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

22.

I am anxious when I use my smartphone*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

23.

I am more willing to promote/write blogs about apps which I can control*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

24.

I will get frustrated if I have an app which has a long response time (waiting long before my problems with the app are fixed by the app developer)*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

25.

I will stop using the app if the app has a long response time*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

26.

I am more willing to promote/write blogs about apps which have a fast response time*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

27.

I will use an app more frequently if I can read app reviews of other users*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

28.

I will use an app with the option to personalize it(changing the design)more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

29.

If an app creates more customer loyalty, I am willing to use the app more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

30.

I am more willing to promote/write blogs about apps which have the option to personalize it*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

31.

I will use an app more frequently which has push notifications

Push notifications= push notification allows an app to notify you of new messages or events without the need to actually open the application, similar to how a text message will make a sound and pop.*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

32.

I will use an app more frequently which has in-app messaging

in-app messaging= In app messages are notifications displayed while the user is active within the app itself.*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

33.

When I hear good experiences about an app by others, I am willing to use the app more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

34.

When I read positive comments in blogs by others, I am willing to use the app more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

35.

When I am able to give feedback, in order to improve the mobile app, I am willing to use the app more frequently*

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Appendix B: Descriptive statistics

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	106	47,5	50,7	50,7
	2,00	103	46,2	49,3	100,0
	Total	209	93,7	100,0	

Table 1

		GENDER	AGE
N	Valid	209	209
Mean		1,4928	28,3684
Std. Error of Mean		,03467	,59148
Minimum		1,00	18,00
Maximum		2,00	65,00

Table 2

		APPS	APPUSAGE
N	Valid	209	209
Mean		30,6890	10,8517
Std. Error of Mean		1,18252	,55458
Minimum		4,00	1,00
Maximum		75,00	57,00

Table 3

Appendix C: Factor analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,515	18,384	18,384	5,515	18,384	18,384	3,265	10,882	10,882
2	3,362	11,206	29,590	3,362	11,206	29,590	2,843	9,477	20,359
3	2,160	7,201	36,791	2,160	7,201	36,791	2,651	8,838	29,197
4	1,647	5,490	42,280	1,647	5,490	42,280	2,298	7,660	36,857
5	1,459	4,863	47,143	1,459	4,863	47,143	2,063	6,875	43,732
6	1,344	4,479	51,622	1,344	4,479	51,622	1,627	5,423	49,155
7	1,253	4,177	55,799	1,253	4,177	55,799	1,534	5,112	54,268
8	1,175	3,916	59,715	1,175	3,916	59,715	1,343	4,476	58,743
9	1,119	3,731	63,446	1,119	3,731	63,446	1,242	4,141	62,885
10	1,011	3,369	66,816	1,011	3,369	66,816	1,179	3,931	66,816
11	,950	3,165	69,981						
12	,944	3,148	73,129						
13	,776	2,588	75,717						
14	,716	2,388	78,105						
15	,694	2,313	80,418						
16	,674	2,246	82,665						
17	,634	2,113	84,777						
18	,581	1,935	86,713						
19	,565	1,885	88,597						
20	,517	1,722	90,319						
21	,496	1,654	91,974						
22	,434	1,448	93,422						
23	,371	1,236	94,657						
24	,346	1,155	95,812						
25	,314	1,046	96,858						
26	,278	,926	97,784						
27	,240	,800	98,584						
28	,219	,732	99,316						
29	,203	,677	99,993						
30	,002	,007	100,000						

Extraction Method: Principal Component Analysis.

Table 4

Table 5

Rotated Component Matrix^a

	Component									
	1	2	3	4	5	6	7	8	9	10
PERSONALIZATION	,787									
PROMOPERSONAL	,720									
GIVEFEEDBACK	,622									
APPREVIEWS	,609									
COMMENTSBYOTH	,570							,475		
SHAREEXPERIENCE	,524									
EXPBYOTHERS	,506							,459		
NOCHALLENGE		-,941								
CHALLENGE		,939								
HELP		,777								
ANXIOUS		,485								
PROMOTEEXP			,827							
PROMOCONTROL			,820							
PROMOFASTRESP			,749							
LOYALPAIDFREE				,841						
INAPPPURCHASE				,826						
PAIDFREEAPPS				,722						
STOPLONGRESP					,816					
FRUSLONGRESP					,742					
USEREXPERIENCE					,571					
INAPPMESSAGING						,748				
PUSHNOTIFICATIONS						,687				
FUN							,741			
CONTROL					,448		,496			
INFORMATIONAL							,442			
CONSISTENEXP										
SOCIAL								-,752		
SEEKINFO									,770	
STICKAPP									,578	
SWITCHING										,810

Extraction Method: Principal Component Analysis.

Appendix D: Normality test

		GENDER	AGE	STICKINESS	INFORMATIO NAL	PAIDFREEAP PS	USEREXPERI ENCE	CONSISTEN EXP	FASTRESP
N	Valid	209	209	209	209	209	209	209	209
	Missing	14	14	14	14	14	14	14	14
Skewness		,029	1,682	,391	-,277	,403	-1,643	-,473	-,611
Std. Error of Skewness		,168	,168	,168	,168	,168	,168	,168	,168

SEEKINFO	FUN	SOCIAL	CONTROL	LOYALTY	MOBSELFEF F	WOM	COCREATIO N	BLOGGING	PERSONALIZ ATION
209	209	209	209	209	209	209	209	209	209
14	14	14	14	14	14	14	14	14	14
-1,607	-1,580	1,083	-1,280	-1,971	1,222	-1,028	-,704	-,629	-,263
,168	,168	,168	,168	,168	,168	,168	,168	,168	,168

Table 6

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
GENDER	,344	209	,000	,636	209	,000
AGE	,174	209	,000	,828	209	,000
STICKINESS	,232	209	,000	,895	209	,000
INFORMATIONAL	,197	209	,000	,909	209	,000
PAIDFREEAPPS	,188	209	,000	,869	209	,000
CONSISTENEXP	,316	209	,000	,733	209	,000
USEREXPERIENCE	,275	209	,000	,865	209	,000
FASTRESP	,242	209	,000	,880	209	,000
SEEKINFO	,432	209	,000	,657	209	,000
FUN	,439	209	,000	,638	209	,000
SOCIAL	,408	209	,000	,711	209	,000
CONTROL	,315	209	,000	,776	209	,000
LOYALTY	,375	209	,000	,641	209	,000
MOBSELFEFF	,355	209	,000	,724	209	,000
WOM	,307	209	,000	,825	209	,000
COCREATION	,289	209	,000	,856	209	,000
BLOGGING	,225	209	,000	,873	209	,000
PERSONALIZATION	,196	209	,000	,899	209	,000

Table 7

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LogGender	,344	209	,000	,636	209	,000
LogAGE	,146	209	,000	,918	209	,000
LogBLOGGING	,229	209	,000	,872	209	,000
LogINFORMATIONAL	,252	209	,000	,836	209	,000
LogPAIDFREEAPPS	,225	209	,000	,842	209	,000
LogCONSISTEXP	,381	209	,000	,573	209	,000
LogUSEREXPERIENCE	,276	209	,000	,801	209	,000
LogFASTRESP	,266	209	,000	,777	209	,000
LogSEEKINFO	,435	209	,000	,579	209	,000
LogFUN	,445	209	,000	,576	209	,000
LogSOCIAL	,376	209	,000	,738	209	,000
LogCONTROL	,367	209	,000	,648	209	,000
LogAPPSTICK	,342	209	,000	,546	209	,000
LogMOBSELFEFF	,374	209	,000	,731	209	,000
LogCOCREATION	,346	209	,000	,713	209	,000
LogLOYALTY	,320	209	,000	,776	209	,000
LogWORDOFMOUTH	,302	209	,000	,763	209	,000
LogPERSONALIZATION	,266	209	,000	,832	209	,000

Table 8

Appendix E: Regression

Model 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,300 ^a	,090	,072	,12341

a. Predictors: (Constant), LogAppusage, LogAGE, LogGender, LogApps

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,307	4	,077	5,039	,001 ^b
	Residual	3,107	204	,015		
	Total	3,414	208			

a. Dependent Variable: LogAppstickiness

b. Predictors: (Constant), LogAppusage, LogAGE, LogGender, LogApps

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,315	,193		1,636	,103
	LogGender	-,004	,096	-,003	-,037	,970
	LogAGE	,058	,125	,033	,462	,644
	LogApps	,005	,069	,007	,074	,941
	LogAppusage	-,007	,066	-,010	-,106	,916

a. Dependent Variable: LogAppstickiness

Table 9

Model 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,434 ^a	,189	,112	,19051

a. Predictors: (Constant), LogWORDOFMOUTH, logAppusage, LogSEEKINFO, LogAGE, LogCONTROL, LogGender, LogINFORMATIONAL, LogFUN, LogSOCIAL, LogCONSISTEXP, LogBLOGGING, LogLOYALTY, LogPAIDFREEAPPS, LogMOBSELFEFF, LogCOCREATION, LogUSEREXPERIENCE, logApps, LogFASTRESP

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,604	18	,089	2,455	,001 ^b
	Residual	6,896	190	,036		
	Total	8,500	208			

a. Dependent Variable: logAppstickiness

b. Predictors: (Constant), LogWORDOFMOUTH, logAppusage, LogSEEKINFO, LogAGE, LogCONTROL, LogGender, LogINFORMATIONAL, LogFUN, LogSOCIAL, LogCONSISTEXP, LogBLOGGING, LogLOYALTY, LogPAIDFREEAPPS, LogMOBSELFEFF, LogCOCREATION, LogUSEREXPERIENCE, logApps, LogFASTRESP

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,016	,239		,066	,947
	LogGender	,035	,096	,026	,368	,713
	LogAGE	,125	,127	,070	,990	,323
	LogApps	-,055	,067	-,077	-,817	,415
	LogAppusage	-,005	,065	-,007	-,069	,945
	LogINFORMATIONAL	,133	,081	,119	1,646	,101
	LogPAIDFREEAPPS	,185	,069	,192	2,664	,008
	LogUSEREXPERIENCE	,028	,010	,224	2,942	,004
	LogCONSISTEXP	-,051	,116	-,031	-,439	,661
	LogFASTRESP	-,149	,096	-,146	-1,554	,122
	LogSEEKINFO	,108	,111	,065	,972	,332
	LogFUN	,091	,044	,138	2,090	,038
	LogSOCIAL	-,022	,097	-,016	-,225	,822
	LogCONTROL	,237	,115	,150	2,063	,040
	LogMOBSELFEFF	,035	,068	,039	,513	,608
	LogPERSONALIZATION	-,099	,087	-,084	-1,144	,254
	LogBLOGGING	,199	,075	,190	2,661	,008
	LogCOCREATION	,107	,119	,079	,896	,371
	LogLOYALTY	,266	,126	,169	2,116	,036
	LogWORDOFMOUTH	,272	,101	,256	2,685	,008

a. Dependent Variable: LogAppstickiness

Table 10

Model 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,457 ^a	,209	,101	,19167

a. Predictors: (Constant), ModeratorBLOG, LogCOCREATION, ModeratorLOYALTY, LogGender, LogSEEKINFO, LogFUN, LogAGE, LogINFORMATIONAL, ModeratorUSCON, LogCONSISTEXP, LogBLOGGING, LogSOCIAL, LogMOBSELFEFF, LogPAIDFREEAPPS, LogAppusage, ModeratorBLG, LogPERSONALIZATION, LogFASTRESP, LogCONTROL, LogLOYALTY, ModeratorCOCREAATION, ModeratorUSEXP, LogApps, LogUSEREXPERIENCE, LogWORDOFMOUTH

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,777	25	,071	1,935	,007 ^b
	Residual	6,723	183	,037		
	Total	8,500	208			

a. Dependent Variable: LogAppstickiness

b. Predictors: (Constant), ModeratorBLOG, LogCOCREATION, ModeratorLOYALTY, LogGender, LogSEEKINFO, LogFUN, LogAGE, LogINFORMATIONAL, ModeratorUSCON, LogCONSISTEXP, LogBLOGGING, LogSOCIAL, LogMOBSELFEFF, LogPAIDFREEAPPS, LogAppusage, ModeratorBLG, LogPERSONALIZATION, LogFASTRESP, LogCONTROL, LogLOYALTY, ModeratorCOCREAATION, ModeratorUSEXP, LogApps, LogUSEREXPERIENCE, LogWORDOFMOUTH

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,058	,249		,233	,816
	LogGender	,040	,097	,029	,408	,684
	LogAGE	,112	,129	,063	,864	,389
	LogApps	-,061	,069	-,084	-,878	,381
	LogAppusage	-,001	,067	-,002	-,019	,985
	LogINFORMATIONAL	,154	,083	,137	1,856	,065
	LogPAIDFREEAPPS	,203	,072	,211	2,832	,005
	LogUSEREXPERIENCE	,038	,141	,027	,274	,785
	LogCONSISTEXP	-,092	,124	-,057	-,740	,460
	LogFASTRESP	-,152	,098	-,149	-1,552	,122
	LogSEEKINFO	,098	,115	,059	,855	,394
	LogFUN	,083	,151	,038	,545	,586
	LogSOCIAL	-,026	,100	-,018	-,258	,796
	LogCONTROL	,221	,136	,133	1,624	,106
	LogMOBSELFEFF	,025	,070	,028	,356	,722
	LogPERSONALIZATION	-,082	,090	-,070	-,910	,364
	LogBLOGGING	,195	,077	,186	2,529	,012
	LogCOCREATION	,122	,121	,090	1,004	,317
	LogLOYALTY	,279	,130	,178	2,148	,033
	LogWORDOFMOUTH	,317	,118	,299	2,689	,008
	ModeratorUSEXP	,027	,010	,218	2,799	,006
	ModeratorUSCON	-,013	,016	-,064	-,770	,442
	ModeratorLOYALTY	,007	,015	,036	,468	,640
	ModeratorCOCREAATION	,006	,018	,026	,314	,754
	ModeratorWOM	,022	,009	,177	2,639	,019
	ModeratorBLOG	,019	,009	,144	2,109	,036

Table 11

a. Dependent Variable: LogAppstickiness