



# **Superior mobile user experience – superior customer evaluation? Impact of personalized features in food and cooking apps**

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**ABSTRACT**

**Title of the dissertation:** “Superior mobile user experience – superior customer evaluation? Impact of personalized features in food and cooking apps”

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As the smartphone, mobile application, and healthy lifestyle markets are exploding, companies are facing the challenge of offering high-quality and user-friendly apps. Focusing on healthy lifestyle and food apps, the market offers several mobile applications dealing with the usage and success of behavioral change techniques. None has ever researched if and to what extent specific features, such as personalization, have an impact on customer evaluation when focusing on customer responses in app stores.

This dissertation is aiming to assess personalization in food and cooking apps while focusing on the impact it might have on customer ratings and downloads in app stores. To objectively assess personalization, features related to communication, interface, engagement and acknowledgement matter. Therefore, a reliable personalization scale, with an excellent interclass correlation coefficient (0.87) and Cronbach’s  $\alpha$  (0.92) capturing these features was developed to categorize and rate 52 food and cooking apps. The data were statistically analyzed by using a generalized linear model and plotted against publicly available data such as the number of app downloads, ratings, and the business model.

The results show that customer store ratings and app downloads are not directly related to personalization features and do not vary much across apps. Nevertheless, app downloads are dependent on the combination of the type of food and cooking apps, the applied business model, and customers’ evaluation of personalization and if they express it whether positive or negative. Overall marketers and app developers should focus on including more personalization in free recipes apps.

**Keywords:** mobile application, app features, personalization, healthy lifestyle, home cooking

## SUMÁRIO

**Título da dissertação:** “Experiência superior do utilizador móvel - classificação superior dos clientes? Impacto de características personalizadas em aplicativos alimentares e de cozinha”

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À medida que os mercados de smartphones e aplicações móveis estão a explodir, as empresas enfrentam o desafio de oferecer aplicações de alta qualidade e de fácil utilização. Centrando-se no estilo de vida saudável e nas aplicações alimentares, o mercado oferece várias aplicações móveis que lidam com a utilização e o sucesso das técnicas de mudança de comportamento.

Esta dissertação tem como objectivo aceder à personalização em aplicações culinárias, ao mesmo tempo que se concentra no impacto que pode ter nas classificações dos clientes e nos downloads nas lojas de aplicações. Para avaliar objectivamente a personalização, as características relacionadas com comunicação, interface, compromisso e reconhecimento são importantes. Portanto, foi desenvolvida uma escala de personalização fiável, com um excelente coeficiente de correlação interclasse (0.87), capturando estas características para categorizar e classificar aplicações alimentares. Os dados foram analisados estatisticamente através da utilização de um modelo linear generalizado e traçados contra dados disponíveis publicamente, tais como o número de downloads de aplicações, classificações e o modelo de negócio.

Os resultados mostram que as classificações das lojas dos clientes e os downloads não estão relacionados com as características de personalização e não variam entre aplicações. Os descarregamentos de aplicações, embora dependam da combinação do tipo de aplicações alimentares, do modelo de negócio aplicado, e da avaliação de personalização por parte do cliente e se a expressa se é positiva ou negativa. Em geral, os profissionais de marketing e os criadores de aplicações devem concentrar-se em incluir mais personalização nas aplicações de receitas gratuitas.

**Keywords:** aplicativo móvel, características do aplicativo, personalização, estilo de vida saudável, comida caseira

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## **CHAPTER 1: INTRODUCTION**

This chapter briefly presents the main topic and aim of the dissertation. After providing background information about personalization, health and cooking mobile applications, and current discussions, a problem statement leads towards the aim of the dissertation by including research questions. Headed by a short description of applied research methods and the managerial and academic relevance, a concise overview of the dissertation is given.

### **1.1. Background and Problem Statement**

In the fast-moving world we are living in today, marketing is undergoing a transformation towards digital, social media, and mobile marketing. According to the fact that all kinds of marketing activities contain digital features, marketing can no longer be separately classified into traditional and digital (Lamberton & Stephen, 2016). Hereby one element is getting more and more important within marketing strategies: Personalization. It is widely used to create more value by offering individualized and personalized products and services for customers (Montgomery & Smith, 2009; Nobile & Kalbaska, 2020). Thus, the marketing performance is improving, revenues are growing and customer satisfaction gets reinforced (Epsilon, 2018). With a growing mobile and smartphone market (Statista, 2020a), companies, managers, and especially product and marketing managers are facing the challenge of offering digital and technological solutions to their customers. Thus, applying personalization into mobile applications is used to better meet the individual needs of customers (Montgomery & Smith, 2009). Hereby, companies and app developers are focusing on communication (Scharl et al., 2005), interfaces, user-experience (Kim et al., 2013), or feedback possibilities (Bardus et al., 2016; Middelweerd et al., 2014).

Other than personalization, innovative and digital forms of marketing allow companies to interact with their customers in several ways along the marketing chain. They open up new forms of communication, targeting possibilities, and customer engagement. Additionally, they change the way consumers interact and share information with each other and brands (Lamberton & Stephen, 2016). More precisely, consumers are able to share information, opinions, and reviews about specific products and services in a more efficient way (Barreto, 2014). Nowadays, consumers have the possibility of sharing reviews and information by using customer rating systems. There is evidence that customer ratings are having an incremental influence on other customers' opinions and a measurable effect on the decision making process of products and services (Chevalier & Mayzlin, 2006), particularly, when focusing on the

mobile application market, which is rapidly growing at a high downloading rate (Statista, 2020b). Customers are able to rate applications, short apps, based on a star rating from 1 to 5, whereby a correlation between the number of app downloads and customer ratings exists (Harman et al., 2012; Martin et al., 2017). Therefore, providing well-functioning and user-friendly mobile apps are needed to keep pace with a growing rating and downloading competition. Companies have to make effective decisions on the scope, content, and the precise functionalities of apps. To develop a successful, frequently downloaded and top-ranked mobile app, companies need to focus on a superior experience. The app should deliver value and be perceived as useful, while having a user-friendly interface with an easy and intuitive navigation. Next to simple and essential features, mobile apps also have to deliver a personalized experience (Shaoolian, 2017).

Besides a growing market for mobile applications, another market is developing rapidly: the health & wellness market. There is a constantly growing interest in a healthy lifestyle (Weinswig, 2017), which nowadays includes a combination of health (physical and mental), food, and exercise (Euromonitor Research, 2017). Combined with innovations and technology, new business opportunities related to digital products and health appear (Yap & Liew, 2009). Consumers using several mobile technologies for tracking sleep, well-being, food intake, and physical activity (Weinswig, 2017). Having the advantage of delivering interactive and dynamic feedback to users, mobile applications are employed to actively impact the users' lives (Riley et al., 2011). However, in order to assimilate a healthy lifestyle, users need useful products that are less time consuming because maintaining a healthy lifestyle is related to a lot of time and actively planning ahead (Divine & Lepisto, 2005; Stutts, 2002).

Previous research about healthy lifestyle applications is mostly aiming to assess the number of behavior change techniques used to actually encourage behavior change. Studies about mobile health interventions for physical activities, food purchasing behavior, and well-being exist, to statistically reason the impact of encouraging a behavior change (McKay et al., 2019). Helf and Hlavacs (2016) extended the research by providing a critical review about healthy lifestyle apps focusing on ineffective gamification theories, lacking scientific evidence, upcoming trust and privacy issues, and missing personalization effects.

Hardly any study examined the success of healthy lifestyle and cooking apps from a managerial and business perspective. There is no evidence about the impact of specific app features on customer reviews and number of downloads. On the one hand, research has shown that there

exists a correlation between the total number of app downloads and star ratings (Martin et al., 2017), but on the other hand, none has ever researched the effect specific app features have on this customer evaluation. Therefore, this dissertation aims to assess the impact app features have on the success of healthy lifestyle and cooking apps. More specifically, app features such as recommendations, personalized designs, and user-interfaces are highlighted due to evidence that mobile health apps lack personalization and content based on users' needs and personality traits (Helf & Hlavacs, 2016). It is crucial for managers and marketers to get to know more about the impact of personalization in cooking and healthy recipes apps, how the app performance could be improved and what type of effect these features have on customer response.

### **1.2. Aim and Scope**

This dissertation aims to assess the impact of personalized features in cooking and healthy recipe apps on customer ratings and downloads. Namely, it is intended to better understand what are the most important features of personalization in food and cooking apps and to what extent they have an impact on the app's success when focusing on customer response in app stores. In order to achieve this objective, the following research questions are addressed:

*RQ1: Which app features contribute to personalization in food and recipe apps and how can they be assessed?*

*RQ2: How does customer evaluation of personalization impact customer ratings and actual buying behavior in terms of app downloads?*

The objective of this dissertation is to assess the success of cooking and healthy recipe apps based on customer ratings and downloads as measurements for customer response. App stores nowadays provide the possibility of submitting feedback in form of reviews and ratings. Thus, app stores became popular over time and consist of multiple feedback reviews, the user experience, desired features, and bugs. It is therefore very difficult to assess and categorize reviews for managers, developers, and users (Pagano & Maalej, 2013). On that account, this dissertation is highlighting customer ratings measured by a star rating and buying behavior in terms of the total number of app downloads. Although, some reviews are going to be consulted to support the main findings. Additionally, several studies already focused on healthy lifestyle apps as a whole, including food, well-being, or alcohol usage (Flaherty et al., 2018; McKay et al., 2019). Due to a restricted scope and interest, this dissertation is focusing on apps that cover healthy recipe recommendations, food consumption, and cooking behavior while concentrating

on the lack of personalized content (Helf & Hlavacs, 2016). Besides, the center of attention will lay on Android and iOS operating systems and related app stores.

### **1.3. Research Methods**

For the purpose of answering the research questions mentioned above, a deductive research approach was used. More precisely, a descripto-explanatory research approach was followed to explain a relationship between variables and to generalize the results (Saunders et al., 2009). Therefore, quantitative secondary data were collected that included information about healthy lifestyle and cooking apps found in apps stores. Out of 3851 collected apps, a sample of apps was determined to statistically conclude, by using generalized linear modeling, if and to what extent personalization has an impact on customer response in app stores. To that end, a scale measuring personalization was developed to classify apps based on the usage of personalized features, recommendations, and customized interfaces. Afterwards, that data set was combined with data derived from app stores, to work out the existence of significant relationships between personalization, customer ratings, and app downloads. The resulting data sets were interpreted and analyzed by using Excel and SPSS.

### **1.4. Relevance**

Having a well-functioning and user-friendly mobile application is currently a huge challenge for all companies. Especially, developing health-related apps that respond to customer needs by delivering the desired value is seen as difficult. Including personalized experiences, such as personal recommendations, are essential to distinguish between innovative and superior, and standard random apps (Shaoolian, 2017). Therefore, this dissertation is primarily targeting marketers, product managers, and equally app developers. It should help marketers to assess if consumers value personalization and in which way they perceive this aspect when focusing on the app market. Marketers and product managers could better understand the needs of customers and how they can engage in delivering more personally relevant content and app features. Product managers and app developers will get insights about specific app features and how users adopt them. The research provides insights which could be used to analyze, improve, and optimize app content. By doing so, marketers could enhance higher customer ratings in app stores, which consequently could have a positive effect on the number of app downloads (Martin et al., 2017) and therefore increase the company's profits.

### **1.5. Dissertation Outline**

The next chapter is presenting the literature review about personalization as the main component of marketing strategies, the mobile app market and the increasing healthy lifestyle trend. Afterwards, chapter three describes the research methods, data set and statistical analyses used to determine the effect personalized app features could have on customer response. The main findings and results derived are displayed in chapter four. Lastly, chapter five is presenting the main conclusions and managerial implications of the research, expounding limitations of the dissertation, and highlighting recommendations regarding future research in the area of app personalization.

## **CHAPTER 2: LITERATURE REVIEW**

This chapter is going to give a detailed review of existing literature dealing with personalization, healthy lifestyle importance and customer evaluations. First, the current developments of the smartphone and mobile application market are expounded. Then, literature about personalization and the healthy lifestyle market is reviewed by including a detailed market overview, cooking behaviors, and research about related mobile applications. After a concise assessment of studies focusing on customer ratings, a brief conclusion is highlighting the main points and derives hypotheses being tested in the next chapters.

### **2.1. Mobile Application Market**

The global smartphone market has remarkably evolved over the last couple of years and is predicted to continue growing significantly (Statista, 2020a). Even if the growth rate is slightly shrinking, and unit sales remain static, the global revenue is constantly increasing (Statista, 2020c). Thus, smartphones are developing, becoming more innovative, and technologically relevant. Usage possibilities extend basic communication and information gathering to an extent of becoming a supportive, life-essential mobile device. Mobile users are nowadays exposed to numerous mobile applications offering various services such as socializing, managing work and health, planning tasks, or ordering food (Jesdabodi & Maalej, 2015).

Statistics have shown that the mobile application market is exploding and will rapidly grow within the upcoming years as well (Statista, 2020b). The most successful and important mobile operating systems, Android and iOS, are holding around 99% of the global market share, whereby first is responsible for 74.6% and iOS for around 25% (Hamed et al., 2017; Statista, 2020d). Corresponding well-known app stores, such as Google Play and Apple App Store play

an essential role in mobile technology by hosting most of the internationally available apps, store, publish, and update them. Through such an attractive market, developers, marketers, and managers are challenged to develop, maintain, or optimize high-quality mobile applications.

### **2.2. Personalization**

Marketers are facing the challenge of following a consistent marketing strategy with several components. Personalization is one of the main elements that appear within an overall marketing strategy (Montgomery & Smith, 2009; Nobile & Kalbaska, 2020). By including personalization marketers and companies can enhance marketing performance, increase revenues, and attain competitive advantage (Boudet et al., 2019). However, implementing it into the core business strategy is challenging because all companies and businesses understand personalization in different ways, and believe that their companies are not dealing right with it (Boudet et al., 2019; Nobile & Kalbaska, 2020). Thus, the literature presents several definitions of personalization and is not able to offer one specific interpretation that is accepted across industry borders. Still, Montgomery and Smith (2009) combined several of these interpretations and defined personalization as an adaptation of a product or the marketing mix towards the needs of an individual by focusing on precise information about this customer. Personalization has also been described as the process of changing information based on a customer's preferences (Li, 2016). Consequently, the aim is to create value for the customer and offer benefits in terms of improved products, services, and experiences (Li, 2016; Montgomery & Smith, 2009). In addition, personalization is able to create an impact on trust, purchase intention, and loyalty by intensifying customer satisfaction (Epsilon, 2018) and is enabled by technology to communicate, make adaptations and gather consumer data (Montgomery & Smith, 2009).

#### **2.2.1. App Personalization**

The growing importance of mobile devices is patent. Mobile devices are the interface between regular phones and computers, offering consumers many opportunities in terms of social networking (Chung et al., 2008) and support of daily life (Kim et al., 2013). Current researchers are reviewing the capability of mobile devices to apply personalization techniques rapidly, by offering more personalized features that meet the needs of individual users (Montgomery & Smith, 2009). It was observed that mobile applications impacted a transformation, by offering individual information about how companies and businesses are communicating and interacting

with consumers (Scharl et al., 2005). Other than communication, previous research focused on personalization in news mobile applications. Users are able to individualize their offerings by evaluating and afterward selecting news categories based on personal preferences (Chung et al., 2016). Moreover, mobile applications are currently using location and GPS to receive more personalized services (Ho, 2012) and relevant product information (Kim et al., 2013). However, marketers and app developers have to improve mobile applications by further developing location- and time features to enable more personalization, encourage continuous usage, and improve user perceptions. Adding individual upgrades and small personal changes are additionally useful when focusing on user experience, engagement, and word of mouth (Kim et al., 2013). User-friendly interfaces, visuals, and aesthetics are main drivers of increasing customer engagement, enhancing user experiences, and mobile app adoption (Kim et al., 2013; Kumar et al., 2018).

However, the current literature is not reflecting enough research in terms of personalization in mobile applications and offers only a limited amount of scientific articles (Shapira et al., 2009). There is little evidence about what kind of features users specifically perceive as personalization and to what extent they value such features. Especially, extensive research in the field of healthy lifestyles, cooking, and food mobile applications has shown that there is limited research about such apps. Even if the combination of health, wellness, and mobile technologies is a rapidly growing market by having the advantage of providing dynamic feedback (Riley et al., 2011) and offering the potential to facilitate a better life (Chomutare et al., 2011; Miller, 2012), little is known about specific app features. It was observed that current health intervention apps are missing individual content (Helf & Hlavacs, 2016) or disregard the potential of personalized education (Chomutare et al., 2011).

Even though personalization is not well worked out and needs improvements in healthy lifestyle and cooking apps (Plaza et al., 2013), more recent studies have focused on some features considered and valued as personalization. Alongside GPS (Ho, 2012), customized push notifications, reminders, and mostly awards (Schoeppe et al., 2017), personalized feedback, self-monitoring, and goal settings (Bardus et al., 2016; Middelweerd et al., 2014) can be categorized into personalization when analyzing apps. It was also uncovered that apps with higher quality tend to have more features whereby a positive correlation between the total number of app features and overall quality exists (Schoeppe et al., 2017). Moreover, Tonkin and other authors (2017) have worked out that offering personalized and tailored applications

and features are considered by users as valued, desired, and very important, particularly having the possibility of customizing the settings and features according to their own preferences. Healthy lifestyle apps are used to support and encourage behavior change (Helf & Hlavacs, 2016; Lieffers et al., 2014; Schoeppe et al., 2016). So its users highly value the possibility of individualizing their own goals and challenges, receiving feedback and rewards about personal achievements, and having detailed information regarding local suppliers and seasonal food based on GPS (Schoeppe et al., 2017; Tonkin et al., 2017).

### **2.2.2. Objective Assessment of Personalization**

As already mentioned above, there is limited research about personalization and app features, especially when focusing on cooking and food apps. There is even less research about the objective assessment and classification of personalized features in apps. Current studies only focusing on the overall quality of health-related mobile applications. Therefore, a reliable scale (MARS = Mobile App Rating Scale) was developed as an instrument to assess the app quality based on four main categories (Mauch et al., 2018; Stoyanov et al., 2015). Although the MARS classification is an objective and reliable assessment and covers a broad range of app features, design, and functionalities, none is particularly related to personalization. Even if, many authors are focusing on different app features (Bardus et al., 2016; Franco et al., 2016; Ho, 2012; Mendiola et al., 2015; Middelweerd et al., 2014; Plaza et al., 2013; Schoeppe et al., 2017; Tonkin et al., 2017), some more related to personalization than others, there is no specific scale or measurement to objectively assess personalized features in apps.

Even if there is limited research about personalization in cooking and food apps, nor offering an objective assessment of such, some studies have focused on features that are considered as personalization. Still, apps have to be improved and extend the features to better address the desires and needs of customers. Therefore, offering an objective measurement to assess the amount and quality of personalized features is needed.

### **2.3. Healthy Lifestyle Market**

Consumers are getting more conscious about their health, which is currently reflected in an increased health and wellness market (Weinswig, 2017). Digitalization and advanced technology make it easy and accessible to provide innovative and digital solutions for tracking fitness levels and food intake, monitoring personal performance, and maintaining a healthy lifestyle.

### **2.3.1. Market Overview**

Globally, there is a current shift of eating and living habits towards a healthier lifestyle, conscious food consumption, and well-being. The health and wellness market is rapidly growing and increasing all over the world on a constant level (Weinswig, 2017). Due to increasing concerns about diseases, mentally and physically, obesity, and food sensitivities, it was observed that consumers are aware of the booming importance of maintaining a healthy lifestyle. Nowadays, this combines healthy food, physical activity, and mental well-being while being used as a way of avoiding health problems (Boumphrey & Brehmer, 2017; Divine & Lepisto, 2005; Euromonitor Research, 2017). Therefore, consumers are changing their attitudes towards food consciousness, healthy lifestyle, and self-care while demanding products and services that meet the need for more personalized wellbeing and health (Boumphrey & Brehmer, 2017). Nonetheless, former studies have shown that maintaining a healthy lifestyle comes at a high investment of personal time and money. In order to successfully incorporate physical activity and a healthy eating behavior, consumers need to have no time pressure and plan ahead, and to engage expert help and advice (Stutts, 2002). Thus, researchers mentioned the importance of offering cheaper, less time consuming and innovative products and services to resolve the conflict between a healthy lifestyle, convenience, and cost (Divine & Lepisto, 2005; Yap & Liew, 2009). Resulting, the increasing interest in a healthy lifestyle and food consumption opens new and innovative opportunities for businesses to include technology in terms of mobile devices and applications into their products and services (Boumphrey & Brehmer, 2017; Euromonitor Research, 2017; Yap & Liew, 2009).

### **2.3.2. Cooking and Eating Behavior**

Pursuing a healthy lifestyle is often related to preparing home-cooked meals and eating fresh and healthy ingredients at home. The motives to prepare and cook food at home are described as pursuing and maintaining a healthy lifestyle, meeting dietary needs, and determining social identity (Ranteallo & Andilolo, 2016). Even if home-cooked meals are perceived as healthier and cheaper, daily cooking and eating at home is not widely spread. It was found out that the definition of cooking show differences and that it needs to be discussed to what extent cooking includes using and heating processed convenience food or just cooking a meal from scratch with fresh ingredients (Wolfson et al., 2016). The importance and benefits of healthy food are widely known (van Kesteren & Evans, 2020) whereby the practical implication at home is still missing (Wolfson et al., 2016). The main challenge is to balance costs, time, and cooking due to a negative correlation between busy lives and cooking at home. In order to eat healthy,

preparation and precise planning are needed. However, healthy food and home-cooked meals including fresh ingredients are highly valued by consumers (Wolfson et al., 2016).

### **2.3.3. Mobile Applications & Tracking**

Various mobile applications dealing with health issues, physical activity tracking or eating behavior are currently available in app stores. Users are searching for health apps to receive nutrition information, try out tracking methods, and to get support when it comes to behavior change (Lieffers et al., 2014; Schoeppe et al., 2016). Applying technology, more precisely, using mobile applications towards healthy lifestyle changes is a market with vast potential. In 2011, scientists already mentioned the potential of combining health behavior interventions with mobile technology and forecasted the market as rapidly increasing and fascinating (Riley et al., 2011). Other than that, a couple of years later, it was again predicted that the market is going to become more innovative and important than ever before by providing information and services that impact the users' lives in the long run (Helf & Hlavacs, 2016).

Former research was conducted to try to understand how consumers are using and interacting with apps and which factors contribute to continuous usage (Direito et al., 2014; Flaherty et al., 2019). Even if there is limited scientific research about the engagement with apps, motivation to change a behavior, the anticipated effort (Flaherty et al., 2019), a user-friendly interface, and appealing content (Chan et al., 2017) have been identified as the main drivers behind why users engage and interact with apps managing health. Other than engagement and interaction, it was observed that healthy lifestyle apps certainly have the potential to motivate young adults by providing features such as goal-setting, self-monitoring, and performance feedback (Dute et al., 2016). However, most of the recent studies are focusing on the success and effectiveness when it comes to incorporating behavior change techniques (Direito et al., 2014; Dute et al., 2016; Flaherty et al., 2018; McKay et al., 2019; Simons et al., 2018) due to limited scientific evidence (Helf & Hlavacs, 2016).

McKay et al. (2019) tried to assess the potential of already used behavior change techniques to precisely encouraging behavior change by researching mobile health intervention apps for well-being, smoking, nutrition, physical activity, and alcohol usage. A detailed overview is provided whereby recommendations regarding more personalized relationships and individual feedback are pointed out (Franco et al., 2016). Following this, Helf and Hlavacs (2016) offered an overall critical review of healthy lifestyle apps. Here, it was uncovered that no matter how many gamification techniques are used, trust and privacy issues remain, personalization features are lacking (Helf & Hlavacs, 2016), and scientific validation is missing (Pires et al., 2020).

Focusing on the topic of cooking, recent studies found out that the usage of mobile applications dealing with cooking, meal planning, and recipes are perceived as highly relevant when it comes to usage and performance (Mauch et al., 2018). Next to weight management, fitness level tracking, or smoking behavior, mobile applications dealing with eating and cooking apps belong to the category of healthy lifestyle apps (Franco et al., 2016; McKay et al., 2019). The apps provide support regarding food preparations, recipes, and grocery shopping and therefore, can ease changes regarding specific eating habits. Thus, most cooking and food apps include specific features related to home cooking such as searching for new recipes and ingredients, rating and sharing recipes, creation of meal plans and dietary goals by including cooking instructions, shopping lists and recommendations (Azar et al., 2013; Flaherty et al., 2018; Klepacz et al., 2018; Mauch et al., 2018). Even if most apps are based on paid subscriptions or freemium models (Klepacz et al., 2018), cooking and healthy food apps are often lacking behavior change techniques, behavioral insights and the ability of providing appropriate data (Azar et al., 2013; Flaherty et al., 2018; Klepacz et al., 2018).

### **2.4. Consumer Response**

The rapid growth of the smartphone market (Statista, 2020a) and the increasing number of mobile applications (Jesdabodi & Maalej, 2015; Statista, 2020b) offer customers and users new opportunities to provide feedback and share information. They have the advantage of submitting comments, sharing opinions, or providing useful information more efficiently and easier than ever before (Barreto, 2014). Nowadays, several online shops, travel and hotel comparison websites, as well as app stores, are providing feedback tools in a form of online customer ratings and comments. These are used to filter, reduce, and categorize information about products and services and could directly affect the decision making process (Chen & Xie, 2008; Chevalier & Mayzlin, 2006).

Focusing on mobile app stores, recent studies found out that these platforms are becoming highly relevant when it comes to submitting positive or negative feedback and sharing information about currently available apps (Pagano & Maalej, 2013; Peng et al., 2019; Zolkepli et al., 2020). Customers are using reviews to provide a detailed report about requested app features, perceived user experience, or bugs and problems, nevertheless, it is becoming difficult to manage and assess this type of information (Pagano & Maalej, 2013). Customer ratings are normally based on a numerical star rating and do not provide as detailed information as customer comments. However, they do present information regarding customer preferences, satisfaction, and product improvements (Peng et al., 2019). In addition, Zolkepli and colleagues

(2020) have recently discovered that app features and their perceived value affect customer ratings decisively. It was uncovered that customer ratings are positively correlated with mobile app downloads (Harman et al., 2012; Martin et al., 2017). In addition, users are more likely to download an app when more customer comments and reviews exist (Pereira-Azevedo et al., 2016). Hence, customer ratings and comments in mobile app stores should not be underestimated when it comes to consumer preferences, satisfaction and app success in the marketplace.

### **2.5. Conclusions and Research Hypotheses**

The rapid increases observed in the global smartphone (Statista, 2020a) and the mobile application market (Statista, 2020b), combined with an increasing interest in a healthy lifestyle (Weinswig, 2017), give increased relevance to mobile apps in terms of nutrition tracking, getting nutrition information and discovering healthy recipes (Liefers et al., 2014; Schoeppe et al., 2016). Using recipe manager and meal planning apps could be beneficial by offering highly functional apps with substantial usage and performance (Mauch et al., 2018). Some studies focused on existing app functionalities, user motivation, content, and interfaces (Chan et al., 2017; Flaherty et al., 2019). In particular, the lack of personalization in healthy lifestyle apps has been often signaled (Franco et al., 2016; Helf & Hlavacs, 2016; Kim et al., 2013; Shapira et al., 2009) but not studied in-depth. Personalization is used to better target and address the needs of individual users and create value by delivering more personally relevant products and services (Boudet et al., 2017; Montgomery & Smith, 2009; Nobile & Kalbaska, 2020; Vesanen, 2007). Moreover, personalization is used to encourage app engagement and enhances customers to share information in terms of word of mouth (Kim et al., 2013) and by using star ratings in app stores (Pagano & Maalej, 2013; Peng et al., 2019; Zolkepli et al., 2020).

The literature review has presented limited research about personalization in food, cooking, and healthy recipes apps, how to objectively assess it, and the way businesses could benefit from applying it. The review has strengthened the importance of researching the effect personalized features in healthy recipes and cooking apps have on customer response. Based on existing literature, the following has been developed as a research hypothesis.

*H1: A higher number of applied personalized features in food and cooking apps will lead to higher customer ratings and app downloads.*

Other than that, it was shown that visuals and interfaces are seen as the main drivers when it comes to mobile app adoption, user experience, and customer engagement. Therefore, the second hypothesis has been developed focusing on interfaces in cooking and food apps.

*H2: Within personalization features, the evaluation of the interface will have the highest impact on customer ratings and app downloads.*

Therefore, assessing app features belonging to personalization, classifying food and cooking apps by using a personalization scale, and comparing the level with publicly available data is needed. The next chapter is explaining the methodology behind answering the research questions and testing the hypotheses.

### **CHAPTER 3: RESEARCH METHODOLOGY**

This chapter is going to present the methodology and research approach used in this dissertation to test the hypotheses and answer the research questions mentioned in previous chapters. More specifically, as accurately as the research approach, the data collection and data analysis tools are described.

#### **3.1. Research Approach**

Saunders, Lewis, and Thornhill (2009) are precisely differentiating between two research approaches: deduction and induction. *Deduction* is a highly structured approach moving from scientific research and theory to data whereby a causal relationship between concepts or variables are explained. After developing a theory and hypotheses, mostly quantitative data are collected in order to analyze, confirm or disconfirm the theory. A deductive research approach is less risky by having a large number of theories and data to generalize the conclusion. *Induction* is a more flexible research approach and predominantly used in social science. Hereby, mostly qualitative data are collected to afterward develop a theory based on the results of the data analysis. It is mainly used when researching a relatively new topic with limited existing research and is seen to be riskier due to the probability of obtaining data patterns and theories that are not useful. Other than the research approaches, the research purpose can be divided into three study types as well: exploratory, descriptive, and explanatory (Robson, 2002; Saunders et al., 2009). An *exploratory* study is highlighted by its flexibility and ability to adapt

to changes when a broad research topic is going to narrow down along the research process. It is used to intensify an understanding of a complex phenomenon, topic, or problem to get new insights and information by conducting focus groups or expert interviews. Therefore, it mainly uses an inductive research approach by collecting primary qualitative data. Unlike exploratory, *descriptive* studies are inductive, structured, and pre-planned (Birks & Malhotra, 2007) by having a detailed overview about what type of event is described and which data need to be collected to precisely being able to draw conclusions (Robson, 2002; Saunders et al., 2009). Therefore, descriptive studies are mainly quantitative with secondary data but large representative samples. *Explanatory* studies are mainly focusing on the study of a problem to explain and establish a causal relationship between concepts or variables (Robson, 2002; Saunders et al., 2009). To get a more detailed and coherent view of the relationship, an explanatory study is more deductive and structured (Birks & Malhotra, 2007) by using more quantitative research data.

This dissertation aims to study the impact of personalization and personalized features in food and cooking apps on customer app ratings and app downloads. Therefore, a deductive research approach was followed to explain the relationship between the personalization of apps, customer ratings in app stores, and app downloads. Quantitative data were collected to test the theory and hypotheses mentioned in Chapter two. Moreover, the research purpose of this dissertation is descripto-explanatory because it mainly sets the focal point on studying the relationship between personalization, customer ratings and app downloads but describes and assesses, to a small extent, the personalization level of food and healthy recipes apps. Therefore, the usage of descriptive statistics can be seen as a precursor to explanation (Saunders et al., 2009).

The secondary data about the current market offer of food and cooking apps were already collected and extracted by app stores, screened, and sorted. After the development of a scale to assess personalization in healthy lifestyle apps, the data were classified and analyzed by using descriptive statistics. Subsequently, the results were combined with data about customer ratings in app stores and app downloads to statistically test the hypotheses indicated. More precisely, by analyzing the data statistically, the impact of personalized features in food and cooking apps on customer response was worked out.

### **3.2. Personalization Scale Development**

The literature review showed that there is limited research about personalized features in healthy lifestyle and food apps. Several studies detected that personalization is completely

missing or only detectable to a small extent. However, more recent studies have worked out mobile application features that are considered as personalization (Bardus et al., 2016; Ho, 2012; Mendiola et al., 2015; Schoeppe et al., 2017). Still, no objective assessment of personalization exists. In order to assess which features apps within the sample are including and to what extent personalization is applied, a scale was developed.

The development of the personalization scale followed the same approach undertaken by Stoyanov and his colleagues (2015) to develop the Mobile App Rating Scale (MARS) a couple of years ago. Their aim was “to develop a reliable, multidimensional scale for classifying and rating the quality of mobile health apps” (Stoyanov et al., 2015, p.2). A similar research approach was followed to assess personalization in food and healthy recipes apps by developing a reliable scale.

Using Google Scholar, a detailed literature review, consistent with the scope of the study, was conducted to get a comprehensive overview of mobile application features belonging to personalization. The search was narrowed down to articles and papers in English and by including search terms like “mobile”, “app”, “features”, “personalized features”, “personalization in apps”, or “healthy lifestyle” and corresponding combinations. The inclusion of articles, papers and studies was based on a precise screening and considered only the ones focusing on app features related to personalization or healthy lifestyle apps.<sup>1</sup> Several app features related to personalization were identified within the literature, carefully assessed and classified into sub-categories whereby the scale was developed. The scale items and detailed descriptions were worked out to ensure consistency across the mobile app classification. A balanced response scale with five scale points (1-Not present, 2-Present to a low extent 3-Present to a medium extent, 4-Present to a high extent, 5-Present to a very high extent) and a neutral point in the middle was used to avoid forcing the app assessors into one direction. In order to provide full consistency, a detailed personalization scale document was provided to independent assessors, according to which all app features were assessed and rated.<sup>2</sup> Two assessors were downloading the apps in BlueStacks, using and rating them along the document. In addition, the assessors also evaluated the business model applied for each app studied. Hereby, they could choose between two options: free and paid, whereby paid also included a freemium business model and subscription-based models. Free apps were mostly monetized by including advertisements.

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<sup>1</sup> All articles used to develop the scale are marked in the references with a star \*.

<sup>2</sup> The document can be found in Appendix 1.

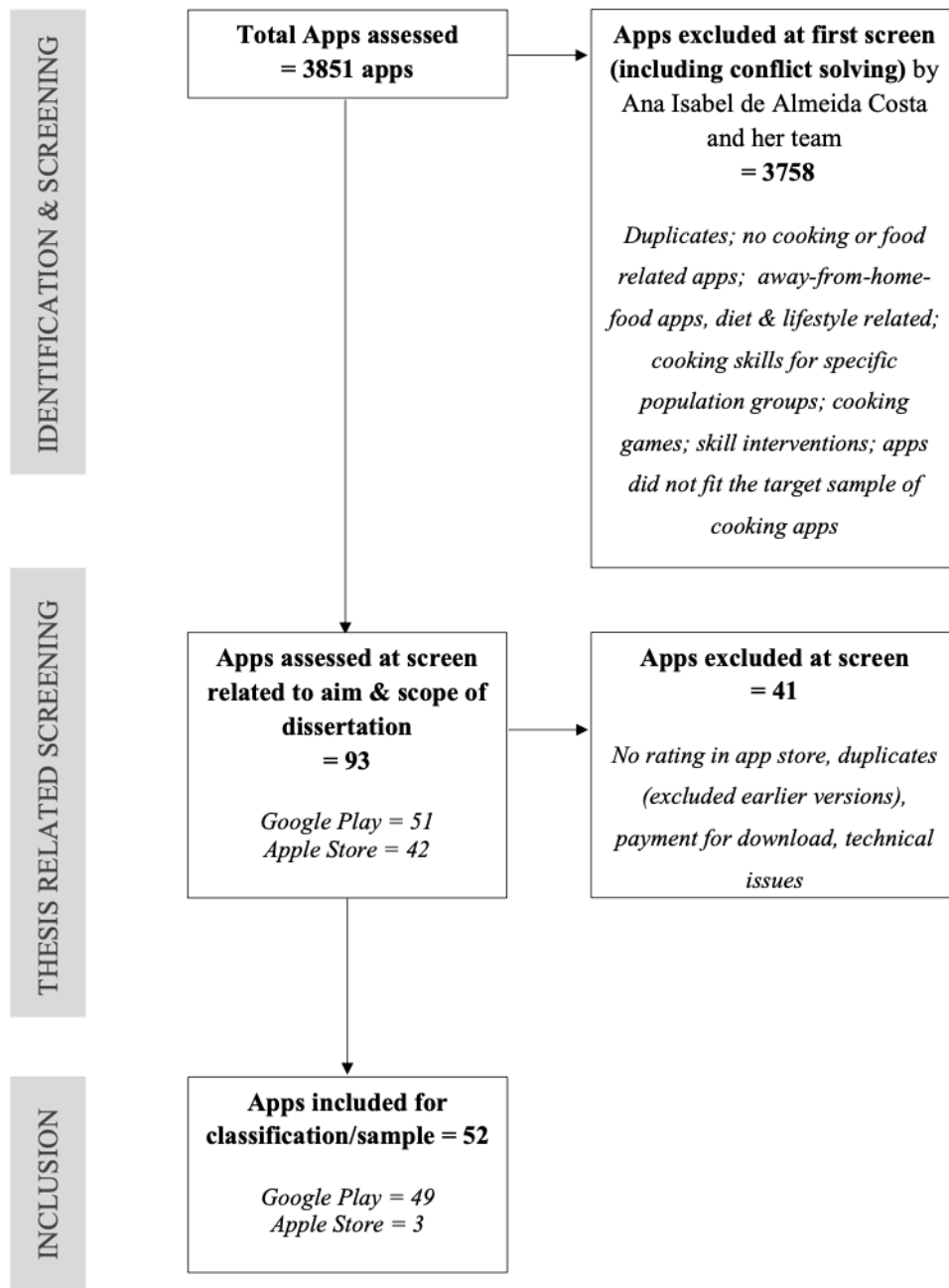
### 3.3. Population & Sample Evaluation

Relevant commercial apps and their characteristics were compiled through the systematic search of publicly available apps in official app stores, Google Play and Apple App Store, using a purposefully developed search syntax, by Ana Isabel de Almeida Costa and her team in June 2020. The scope of this search encompassed apps supporting healthy food consumption, home cooking and associated skills and behaviors.

A total of 3851 apps were collected from app stores in this way, and subsequently screened by the same team following pre-defined inclusion and exclusion criteria and based on app descriptions. Duplicates, meaning the same apps but available in another store or as earlier versions, were automatically excluded to only assess unique apps with the latest versions. The apps of interest were related to healthy food consumption and cooking at home by adults. Therefore, the apps were screened based on apps offered for a population aged 16 or older and belonging to educational users of cooking knowledge, behavior, and skills without being professional. In addition, only apps focused on food and promoting or increasing home cooking knowledge, behavior, and skills were included. Hence, apps that were not related to food, nutrition or, diet likewise apps focusing on away-from-home-food were excluded. To actually assess apps promoting home cooking, apps related to only one task such as meal planning, shopping list-making, or online grocery shopping were eliminated as long as they were not combined with home cooking. Moreover, all apps focusing on special populations regarding disabilities, chronic illnesses, particular health conditions, or infant feeding were also excluded. Lastly, it was necessary to eliminate apps focusing just on one single ingredient, a special style of cooking, cuisine or diets, and on cooking games.

After receiving the final data set from Ana Isabel de Almeida Costa, with 93 app entries, another screening process was conducted by the author following criteria related to the scope of the thesis. Thus, apps without a star rating in one app store and the ones where downloads needed to be paid were excluded. After having downloaded the apps for inspections, duplicates were uncovered whereby the earlier versions were excluded from the dataset. Some apps were facing technical issues and did not work properly; they were excluded as well. A final sample of 52 apps was finally compiled. These apps were classified into two types of apps: *recipes* and *planning* apps. *Recipes* apps can be used passively by receiving recipe inspirations or specific cooking skills in form of videos or images. *Planning* apps including more interactive apps by creating recipes or grocery lists. Thus, it could be ensured that the sample is able to provide data about the objective of this dissertation.

**Figure 1.** Flow diagram of app screening process.



### 3.4. Secondary Data Collection

Other than the data obtained by applying the personalization scale to rate the 52 apps studied, secondary data were collected from Google Play and Apple App Store. The total number of app downloads, the existence of comments, and the number of ratings were extracted for each of the 52 apps studied. Having observed and read the content of comments in detail, it could be classified whether the apps had comments related to personalization and if yes, whether these comments were positive or negative.

### 3.5. Dependent and Independent Variables

To precisely analyze the collected quantitative data, it is useful to define the data type at first sight. Quantitative data are determined in two different groups: categorical and scale/metric (Saunders et al., 2009). The distinction between variables and data is necessary to correctly analyze and present the data. Table 1 provides a short overview of the variables employed in data analysis in this thesis.

Two variables were defined as **dependent variables**. Customer app store ratings were provided in 5-point rating scales in both app stores. Ratings corresponding to the apps studied were manually extracted from app stores in November 2020. This variable is metric and was hence used for regressions. However, the variable was not following a normal distribution and had a very low variance across the ratings. In order to use it in multivariate analysis, this variable was transformed into a categorical ordinal variable with three classes (low, medium, and high ratings), according to the quartiles (25%, 50%, and 75%). In order to have a second measure of customer response to app features, indicative of how they evaluate them, the total number of app downloads for each app studied was extracted at the same time from the stores. The variable number of app downloads was classified by the store into nine groups (less than 5,000; between 5,000 and 10,000; between 10,000 and 50,000; between 50,000 and 100,000; between 100,000 and 500,000; between 500,000 and 1,000,000; between 1,000,000 and 5,000,000; between 5,000,000 and 10,000,000; more than 10,000,000), the values of which followed a normal distribution. It was hence treated as a scale dependent variable.

The **independent variables** were measured in metric and categorical formats. The overall app rating scores were calculated as the average ratings of four sub-categories of personalization proposed (the developed scale is presented in the next chapter) and measured as scale/metric. Independent variables such as business model (0 = Free, 1 = Paid), app type (0 = Recipes, 1 = Planning) or comment direction related to personalization (-1 = negative, 0 = no comments, 1 = positive) were deemed categorical variables. The total number of app ratings, an independent and metric variable, was also entered as a co-variate.

**Table 1.** Dependent and independent variables.

DEPENDENT VARIABLES		
VARIABLE	MEASUREMENT	LEVELS / CLASSES
Customer App Store Ratings	Categorical, ordinal	Low (0) = 25% Quartil Medium (1) = 50 % Quartil High (2) = 75% Quartil
Number of downloads	Metric	/
INDEPENDENT VARIABLES		
VARIABLE	MEASUREMENT	LEVELS / CLASSES
Overall App Rating Scores	Metric	/
Subcategory: Communication	Metric	/
Subcategory: Interface	Metric	/
Subcategory: Engagement	Metric	/
Subcategory: Acknowledgement	Metric	/
Business model	Categorical, numerical	Free (0) Paid (1)
App Type	Categorical, numerical	Recipes (0) Planning (1)
Comment direction related to personalization	Categorical, numerical	Negative (-1) No comment (0) Positive (1)
# App Ratings	Metric	/

### 3.6. Data Analysis

App personalization was evaluated in a purposefully developed EXCEL Macro by two assessors (one of them the author of this thesis) who scored them independently on the main categories and corresponding features defined by the pre-developed scale. Reliability and consistency indices were computed in SPSS for these scores, to assess reliability and consistency, and hence verify the internal consistency of the scale and the level of agreement between assessors. It was stipulated that a 3<sup>rd</sup> assessor would act as a conflict solver, if the level of agreement was deemed low. Consistency was assessed by computing an *interclass correlation coefficient (ICC)*. The inter-rater reliability (r-value) ICC is a reliability index (from 0 to 1) to measure the agreement and correlation degree between two or more assessors measuring the same dimensions (Koo & Li, 2016). *Cronbach's α*, which measures the internal consistency by providing a reliability coefficient for groups of questions, was computed to assess the reliability of the proposed personalization scale.

Using appropriate **descriptive statistics**, the distribution of the dependent variables for the recipe and the planning apps could be easily analyzed. The overall app personalization score and corresponding sub-category means, based on assessor scores, were calculated, enabling the identification of which category and feature displayed the highest mean personalization. In addition, it was analyzed which business model was the dominant one and what was the average customer rating in app stores, for the set of apps considered. It could be analyzed how many downloads the apps are generating and how many people on average are rating the apps. Using descriptive statistics, a detailed overview about the data and observations were given and clues regarding answering the research questions and testing the hypothesis were disclosed.

In order to examine the strength and significance of associations between app personalization level and features, and customer app evaluations and behavior, a multivariate regression analysis approach was next undertaken. To decide which regression model was adequate to apply, **correlation** coefficients between dependent and independent variables were first computed in SPSS. **Pearson's correlation coefficient** was used to measure the strength of correlations existing between the variables while using a significance level of 0.05. The correlations between independent and dependent variables hereby obtained provided preliminary indication of the existence of potentially relevant moderation effects.

After running the descriptive analysis and bivariate correlations, it was very obvious that one of the dependent variables, customer app store ratings, was not normally distributed and actually varied very little across apps. By looking at the relatively small sample size, ordinal variables, and the fact that none of the independent variables actually correlated with this dependent variable, it was relatively fast clear that the data were too complicated to be statistically analyzed easily using simple linear regression. Therefore, support by supervisor Ana Isabel de Almeida Costa was needed to run the non-linear modeling in SPSS using total number of app downloads as the dependent variable. Still, the interpretation, implications, and explanations about the moderating effects observed were worked out independently by the author of this thesis.

A **generalized linear modeling approach** with the dependent variable total number of app downloads was employed. A custom model with a normal distribution, identity function, and a 0.05 significance level was used. The categorical independent variables (App type, business model, comments direction regarding personalization) were entered as factors while scale variables (Communication, Interface, Engagement, Acknowledgment,) were entered as covariates, following model specification. Three two-way interaction effects (App

type\*business model, app type\*comments direction & business model\*comments direction) and a three-way interaction effect between these variables were included to test a possible moderation effect which was already detected when looking at the results of the bivariate correlations.

## CHAPTER 4: RESULTS & DISCUSSION

This chapter presents the main results derived from the personalization scale development and statistical data analyses and discusses the impact personalization and corresponding features have on customer response in app stores. After a detailed overview of the personalization scale development results, the main findings after classifying cooking apps, obtained in several statistical analyses, are presented.

### 4.1. Personalization Scale Results

Inspired by Stoyanov et al. (2015), all features assessed within the search were classified into four main categories consisting of several app features. Table 2 provides detailed information regarding the features and their classification into four main categories.

**Table 2.** Classification of mobile app features related to personalization.

MAIN CATEGORIES	APP FEATURES	DESCRIPTION OF APP FEATURE
1 <b>Communication</b>	Push notifications	Feature that allows to receive personalized and customized notifications regarding specific achievements, to get a reminder to work on your goal, related to current time, etc.
	Feedback	Feature that gives personalized feedback regarding achievement, current status, etc. Does not have to be a push notification, could also rely on in-app messages, pop-ups etc.
2 <b>Interface</b>	Personal details	Possibility of changing personal details, having a personal account with for ex. name, age, weight & height etc. are included, possibility of using an avatar or uploading a personal picture etc.
	Interchangeable interface	Feature that allows to personalize the app interface by changing colors, language, font etc.
	Visibility of features	Feature that functions as a way to decide on the visibility of features. Possibility of turning on and off specific features based on personal preferences.
3 <b>Engagement</b>	Goal setting	Feature that allows to set personalized goals and/or choose between challenges.
	Diary	Possibility to insert personal notes, dietary tracking, feedback etc. in a personal diary.
	Self-monitoring	Feature that functions as a way of monitoring own goals/challenges, diet plans, recipes, cooking behavior etc. by offering a detailed overview feature.
4 <b>Acknowledgement</b>	Rewards	Feature that allows users to receive personalized rewards and achievements when passing a goal or challenge.
	Suggestions & Recommendations	Possibility of receiving personalized suggestions and recommendations based on personal preferences and previous behavior.
	GPS	Feature that allows users to receive suggestions and recommendations based on user's GPS. For ex. information regarding local supplier, supermarkets etc.

An **inter-rater reliability ICC of 0.87** was obtained for the two independent assessors. This indicated a good or even excellent level of agreement between assessors. In addition, the ICC attained per main category indicated moderated to excellent reliability<sup>3</sup>. In view of this, it was decided that there was no need for a 3<sup>rd</sup> assessor acting as a conflict solver, as conflicts were rare or negligible. Moreover, a **Cronbach's  $\alpha$  value of 0.92** was obtained, indicating that the app personalization scale proposed had a high level of internal consistency and was therefore highly reliable. Therefore, the rating results of both assessors were finally averaged for all items, sub-categories, and main categories to get a final personalization rating score for each app (with a score of 5 as an indicator of the app with highest level of personalization).

## 4.2. Descriptive Statistics

### 4.2.1. Dependent Variables

**App Store Star Ratings** exhibited a mean of 4.13 (SD = 0.89). Most apps had a high number of customer stars ratings whereby the highest rating observed was 4.9 and the lowest 1.0. Out of the 52 apps studied, 14 were classified as having a low rating, 28 a medium and 10 apps a high rating. In addition, More than half of the apps (65%) had **downloads** between 100,000 – 5,000,000, followed by 21% with less than 100,000 and 14% with more than 5,000,000 app downloads.<sup>4</sup>

### 4.2.2. Independent Variables

The **overall app rating score** based on the personalization scale exhibited a **mean of 2.26** (SD = 0.58) (on a scale from 1 to 5). Meaning, the food and cooking apps studied generally had only a low to moderate level of personalization. Even if the test for normality, Shapiro-Wilk, showed a p-value above 0.05, the distribution of the overall app rating scores across all apps was somewhat left-skewed and platykurtic so slightly flatter than a normal distribution. Table 3 is giving an overview about the distribution.

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<sup>3</sup> The overview about all interclass correlation coefficients is presented in Appendix 2.

<sup>4</sup> A graphical presentation can be found in Appendix 3.

**Table 3.** Overview about overall app rating score distribution.

Descriptives		Test of Normality			
Overall_App_Rating		Shapiro-Wilk			
	Statistics	Statistics	df	Sig.	
Mean	2.256	<b>Overall_App_Rating</b>	0.972	52	0.253
Variance	0.341				
Std. Deviation	0.5837				
Minimum	1.2				
Maximum	3.3				
Skewness	-0.139				
Kurtosis	-0.69				

The **sub-category** *Engagement* had the highest mean with 2.82 (SD = 0.82), followed by *Interface* (mean = 2.64, SD = 0.83) and *Communication* (mean = 2.11, SD = 0.78). *Acknowledgment* with sub-category features *Rewards*, *Suggestions*, and *GPS* accounted for the lowest overall score, with a mean of 1.46 (SD = 0.44). There was little to no multicollinearity between the sub-category Communication, Interface, Engagement and Acknowledgement scores. The Tolerance statistic for these variables was above the critical value of 0.40. The same applied to the VIF statistics, whereby the critical value was 2.5 and the Condition Index had a maximum value of 4.08, while having a critical value of 15. Therefore, it was concluded that there was no relevant multicollinearity between these independent variables.

The personalized feature *Diary* was present in most of the apps and hence had the highest overall mean across all single features (mean = 3.14, SD = 0.87), while *GPS* had the lowest mean with 1.20 (SD = 0.58). This was well-aligned with the **analysis of comments and reviews** in the app stores:

“ [..] *Easy interface, you add recipes to your plan and it automatically generates a categorized grocery list for you [..].*”

– Positive user comment from planning app Mealime – Meal Planner, Recipes & Grocery List

More than half of the apps (30/52) included comments about personalization, while 60% of these comments were positive evaluations of features *Diary*, *Self-Monitoring*, and *Interchangeable Interface*. These features were also scored by assessors as being the most frequent in the apps studied and accounted for the highest means across the main categories.<sup>5</sup>

<sup>5</sup> A detailed overview of the mean distribution of app features can be found in Appendix 4.

Regarding **app type**, 58% (30/52 apps) of the apps analyzed could be categorized as recipe apps, while the remaining 42% belonged to planning apps. It could be observed that recipe apps generally had lower overall app score means than planning apps, indicating that they also offered, on average, relatively less personalized features. Regarding the **business model** of the 52 apps studied, it could be observed that ca. 40% were free and 60% paid (freemium or subscription models). The mean of the **number of total app ratings** in app stores was 22,000. However, the range of this variable was quite large: between 22 and 249,331 ratings.

### 4.3. Impact of Personalization on Customer Evaluation

To statistically test if personalized app features were significantly associated to consumer evaluations and behaviors in app stores, correlations between the dependent and independent variables, and subsequently, a multivariate regression model was computed.

#### 4.3.1. Bivariate Correlation Coefficients

Table 4 provides the results of the bivariate correlations. There was no statistically significant correlation between *customer ratings in app stores* and overall app personalization scores. The same applied happened with the correlations with the four sub-categories considered. This led to the conclusion that the level of personalized features of food and cooking apps, as scored by the assessors, was not associated to customer ratings in app stores. Nevertheless, the correlation between the total number of app ratings and the total number of app downloads was significant at the 0.01 level. Thus, having a higher number of app ratings and downloads resulted in higher customer ratings.

**Table 4.** Correlation – dependent variable: Customer ratings in app stores

		Correlations				
		Communication	Interface	Engagement	Acknowledgement	Overall App Rating
Customer App Store Ratings	Pearson Correlation	0.107	0.193	0.039	-0.011	0.116
	Sig. (2-tailed)	0.45	0.17	0.782	0.938	0.412
	N	52	52	52	52	52

		Correlations				
		App Type	Business Model	# App Ratings	# App Downloads	Comments_direction
Customer App Store Ratings	Pearson Correlation	0.098	0.138	0.359**	0.372**	0.169
	Sig. (2-tailed)	0.491	0.328	0.009	0.007	0.230
	N	52	52	52	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

The second dependent variable *number of app downloads* was also not significantly correlated with overall app personalization scores or the scores of the corresponding sub-categories, except for *Interface* (Table 5).

**Table 5.** Correlation – dependent variable: Number of app downloads

		<b>Correlations</b>				
		Communication	Interface	Engagement	Acknowledgement	Overall App Rating
# App Downloads	Pearson Correlation	0.217	0.290*	0.094	-0.04	0.201
	Sig. (2-tailed)	0.123	0.037	0.506	0.78	0.153
	N	52	52	52	52	52

\*. Correlation is significant at the 0.05 level (2-tailed).

		<b>Correlations</b>				
		App Type	Business Model	# App Ratings	Customer App Store Ratings	Comments_direction
# App Downloads	Pearson Correlation	0.052	0.015	0.571**	0.372**	0.066
	Sig. (2-tailed)	0.715	0.918	0.000	0.007	0.64
	N	52	52	52	52	52

\*\* Correlation is significant at the 0.01 level (2-tailed).

\*. Correlation is significant at the 0.05 level (2-tailed).

*App type* was significantly correlated with the *Business Model* (0.387), with personalization *Comments Direction* (0.439) and the sub-category *Interface* (0.498). This could be also observed when calculating two crosstabulations between *App Type* and *Business Model*, and *App Type* and *Comments Direction*, whereby slightly more than half of the recipe apps were free and most of the planning apps needed to be paid (Table 6). More active planning apps also had more positive comments, while passive recipe apps normally did not receive comments at all or if any, slightly more negative ones.

**Table 6.** Crosstabulations – App type, business model and comments direction

		<b>App Type * Comments direction</b>			
		<b>Comments direction</b>			
		negative	no comments	positive	Total
<b>App Type</b>	Recipes	9	17	4	30
	Planning	3	5	14	22
<b>Total</b>		12	22	18	52

		<b>App Type * Business Model</b>		
		<b>Business Model</b>		
		Free	Paid	Total
<b>App Type</b>	Recipes	17	13	30
	Planning	4	18	22
<b>Total</b>		21	31	52

Moreover, *Business Model* was positively correlated with *Comments direction* (0.335), significant at 0.05 level, *Interface* (0.378) and *Engagement* (0.375), being both correlations statistically significant at a 0.01 level (2-tailed). Therefore, it could be concluded that paid apps

had more features related to the interface as well as relatively more engaging content.<sup>6</sup> Hereby, it could already be hypothesized that *App Type* and *Business Model* could moderate the association of personalization and/or comments direction on the total number of downloads.

Overall, it was observed that personalized features in food and cooking apps did not seem to have an impact on customer app store ratings and the total number of app downloads. These were interdependent and both related to the total number of app ratings. Still, the type of app and the business model seemed to matter in terms of personalized features and the comments direction. Thus, a moderation effect and possible three-way interaction effect of app type, business model and comments direction could be associated to the number of app downloads.

#### 4.3.2. Multivariate Regression Analysis

A **generalized linear modeling approach** with the total number of app downloads as the dependent variable was finally computed. Table 7 provides a detailed overview of the model results. The model with its predictors improved the model fit while having a statistically significance level of 0.05. Additionally, the goodness of fit test also indicated that the model had a good fit. Results showed that two personalization sub-category scores were significantly associated to app downloads, namely *Interface* and *Acknowledgment*. In addition, the independent variable *Business Model* (significant at 0.05 level) and the two way interaction between *Business Model* and *App Type*, were also significant associated at a 0.10 level. Most important, there was a statistically significant three-way interaction between *Business Model* and *App Type* and *Comments Direction*. Therefore, it could be concluded that the total number of downloads was mainly associated to the type of app used (more passive, recipes or more interactive, planning apps), the business model applied (free or paid) and how consumers commented on the personalization features of apps. The objective assessment of personalization, especially of *Interface* and *Acknowledgement*, was also associated to app downloads, but only when controlling for the aforementioned interaction.

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<sup>6</sup> A detailed correlation overview can be found in Appendix 5.

**Table 7.** Overview: GLM – Custom model, DV: Number of app downloads

Omnibus Test			Goodness of Fit		
Likelihood Ratio Chi-Square	df	Sig.	Pearsons Chi-Square	df	Value/df
28.457	15	0.019	115.575	36	3.210

**Test of Model Effects**

	Type III		
	Wald Chi-Square	df	Sig.
(Intercept)	17.633	1	0.000
<b>Business Model</b>	6.401	1	<b>0.011</b>
App Type	0.381	1	0.537
Comments direction	1.319	2	0.517
<b>App Type * Business Model</b>	3.542	1	<b>0.060</b>
Business Model *			
Comments direction	1.325	2	0.516
App Type * Comments direction	3.997	2	0.136
<b>App Type * Business Model * Comments direction</b>	9.407	2	<b>0.009</b>
Communication	0.377	1	0.539
<b>Interface</b>	6.168	1	<b>0.013</b>
Engagement	0.472	1	0.492
<b>Acknowledgement</b>	4.523	1	<b>0.033</b>

Dependent Variable: # App Downloads

Based on the model’s estimated marginal means and pairwise comparisons, it could also be observed that free apps were likely to be more downloaded than paid apps (at 0.01). In addition, it was observed that when apps were free, there was no significant difference between the mean downloads of recipe and planning apps. Meaning, free planning apps were equally likely to be downloaded than free recipe apps. However, if apps were paid, recipe apps were more dominant and more likely to be downloaded than paid planning apps. Likely, the prices or subscription fees for planning apps are higher than for recipe apps.

Figures 2 and 3 plot the estimated marginal means of the three-way interactions between *Business Model* and *App Type* and *Comments Direction*.<sup>7</sup>

**Free recipe** apps with positive comments regarding personalization (mean: 9.20) were more frequently downloaded than when having negative (5.95) or no comments (4.76). Looking at its pairwise comparisons<sup>8</sup>, this was statistically significant and could probably be explained by focusing on the expectations users had about personalization. Recipe app design does not entail

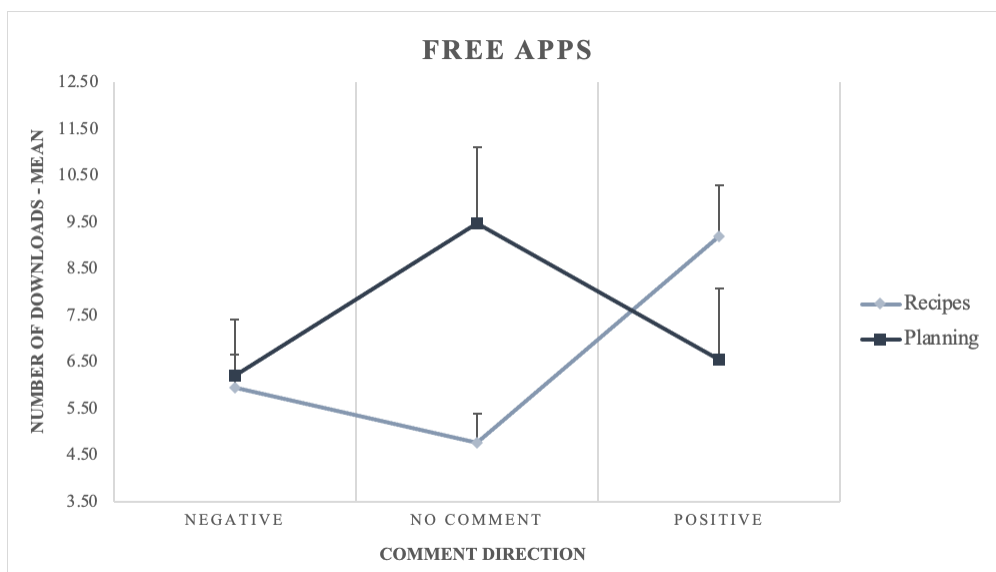
<sup>7</sup> The estimated marginal means can be found in Appendix 6.

<sup>8</sup> The pairwise comparisons can be found in Appendix 7.

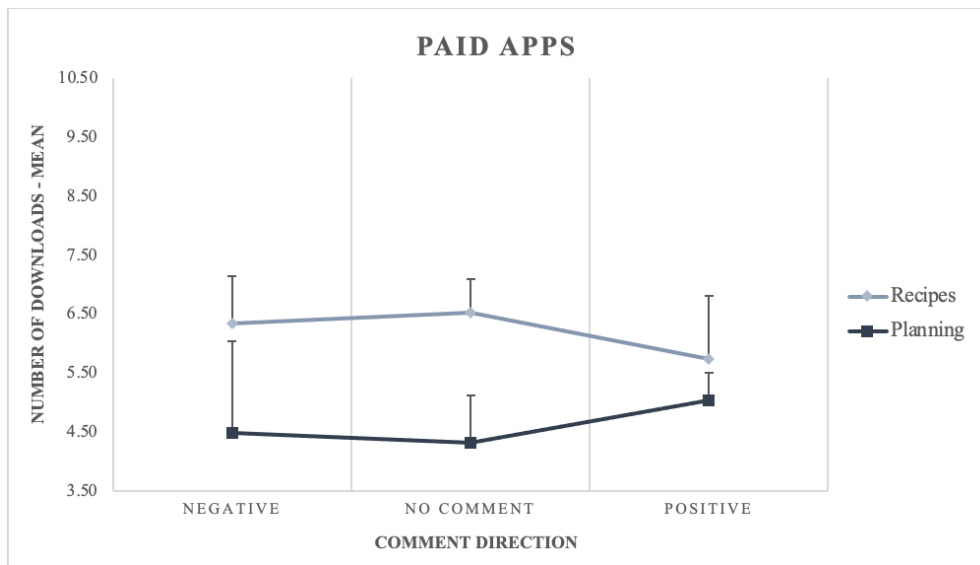
as many personalized features and positive comments regarding personalization as planning app design, because the first functions essentially as a library with a search function. Therefore, it could be indicated that users of free apps were not expecting personalization in recipe apps. Being positively surprised, they offered comments whereby the combination of free and positive comments increased the download rate. The fact that the apps are free is boosting the downloads because it was statistically worked out that the effect is higher when recipe apps are free instead of being paid.

Results showed that **free planning** apps, on the other hand, did not rely on the existence and direction of comments about personalization when it came to downloads. There was no statistically significant difference between the means of free planning apps having positive (6.55), negative (6.21), or no comments (9.47). Still, having no comments was slightly better than having negative comments, which was also the case for most of the free planning apps. These results indicate that users are expecting interactive planning apps to be more personalized. Hence, they do not seem to focus as much on comments regarding these features because they do not report their satisfaction as much as when something unforeseeable happens. But if negative comments exist, users are less likely to download planning apps than having no comments because negativity is linked to frustration and disappointment. The number of downloads of paid planning apps was not statistically different when having positive, negative, or no comments.

**Figure 2.** Three-way interaction effect – Free apps



**Figure 3.** Three-way interaction effect – Paid apps



#### 4.4. Discussion

It could be concluded that customer app store ratings do not vary much between apps and are not correlating with many variables. Thereby, personalization do not matter in terms of app store ratings. The total number of app downloads appears to be a better statistical way to measure customer response. The number of downloads an app has seems to depend on an interaction between the type of app, business model, and the way consumers perceive personalization and how they express their assessment. With different combinations of app types, business models and comments, the impact personalization has on customer evaluation and app downloads differ. Following these conclusions, is this dissertation able to answer the research questions and hypotheses mentioned at the beginning?

#### **RQ1: Which app features contribute to personalization in food and recipe apps and how can they be assessed?**

The literature review has shown that there exist limited research and information about personalized features in food and recipe apps and how they can be objectively assessed. However, a few studies have found out that the following app features are perceived as highly valued when it comes to personalization and contribute to the individual impact: Push notifications, feedback, rewards, diary tracking, gamification and usage of personalized avatars, interchangeable interface and features, goal setting, self-monitoring, suggestions, and overall

reminders.<sup>9</sup> Based on this, a reliable scale to objectively assess personalization and features within food and recipe apps was developed. Rating these features across four main categories, *Communication*, *Interface*, *Engagement*, and *Acknowledgment* is a credible and objective method to assess to what extent apps include personalization.

**RQ2: How does customer evaluation of personalization impact customer ratings and actual buying behavior in terms of app downloads?**

The statistical data analysis showed that there was no significant correlation between personalization and customer evaluation measured either in terms of customer app store ratings or by using the total number of app downloads. However, when including app type, business model and customers' assessment of personalization, the usage of features related to *Interface* and *Acknowledgment* did have an impact on customer evaluation. The way customers perceive and evaluate personalization and how they express it within comments in app stores, is impacting app downloads and customer ratings when combining it with different app types and business models.

**H1: A higher number of applied personalized features in food and cooking apps will lead to higher customer ratings and app downloads.**

Even if customer ratings were positively correlated with the total number of app downloads and ratings, there was no statistical evidence that a higher number of personalized features would directly lead to higher customer evaluations of apps. Nevertheless, overall passive recipe apps were more likely to get downloaded while including on average less personalization. Thus, it could be concluded that having less personalized features will lead to higher customer ratings and app downloads. But this always depends if the recipe app is for free and if customer expresses their evaluation positively, negatively or not at all. Especially, the features belonging to *Interface* and *Acknowledgement* have an impact on app downloads when specific combinations of app type, business model and comments direction are applied. Recipe apps have on average less personalized features, especially in the main category *Interface*. Focusing on free recipe apps, users do not expect the possibility of individually changing the interface, adding or removing specific features, or including more personal details. Expressing their evaluation positively within app stores, led to higher number of app downloads.

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<sup>9</sup> All articles and references used are marked in the references with a star \*.

**H2: Within personalization features, the evaluation of the interface will have the highest impact on customer ratings and app downloads.**

As already mentioned above, there was no relevant significant correlation between the four sub-category scales and customer app store ratings and app downloads. However, combining app type, business model and customer reviews, the only two features having an impact are *Interface* and *Acknowledgment*. Whereby *Interface* do have a higher effect than *Acknowledgement*. This feature seem to matter to increase downloads, because related sub-features of *Interface* such as *Interchangeable Interface*, *Visibility of Features* and *Personal Details* are not as present in recipe apps than in planning apps. Based on the fact that these features are obviously observable when downloading an app, it has a main impact on customer evaluation and the way users perceive personalization and features. However, features belonging to *Interface* and *Acknowledgement* are only having an impact after controlling the variables app type, business model and comments direction. What matters for downloads is how customers perceive and judge personalization and which app type and business model is applied. Only after these variables are controlled, the objective assessment of personalization matters and influences app downloads. Thus, depending on the combination applied, *Interface* has the highest impact on app downloads.

**CHAPTER 5: CONCLUSIONS & LIMITATIONS**

After being exposed to statistical data analyses and responding results, the main conclusions, managerial implications, and limitations of this dissertation are presented. Moreover, future research topics are described as being linked to existing limitations.

**5.1. Main Conclusions & Managerial Implications**

The markets for healthy lifestyle trends and for mobile applications are booming and growing constantly (Statista, 2020a, 2020b; Weinswig, 2017; Yap & Liew, 2009). Several mobile applications are already on the market to improve well-being, food consumption, nutrition intake, fitness level tracking, or enhancing cooking skills. These apps are combining a healthy lifestyle with technology whereby several quality differences exist. The current literature is reflecting a trend of analyzing the quality of food and cooking apps (Mauch et al., 2018), and offering a critical overview about missing scientific evidence and lacking personalized features (Helf & Hlavacs, 2016). Thus, especially food and cooking apps are lacking personalized features even if this topic is becoming more and more important when focusing on being

innovative, supportive, and offering a superior experience for users (Boudet et al., 2019). Using an objective assessment in terms of a reliable personalization scale, is beneficial when assessing personalized features.

Users are searching for mobile apps that are user-friendly, downloaded frequently, and offering a valued personalized experience. But most importantly, users are looking for apps that are working accurately and especially are free of charge (Shaoolian, 2017). Focusing on food and cooking apps, marketers and app developers should enhance personalized features in apps that are free. Paid apps are most likely associated with advanced features whereby offering small changes in terms of interchangeable interfaces, visibility of features, feedback, or suggestions in free apps could increase customer satisfaction, customer response and indirectly the download rate and therefore app success.

This dissertation has found out that interactive planning apps are including more personalized app features such as push notifications, interchangeable interfaces, or a personal diary than recipe apps. Recipe apps are less engaging and mostly seen as recipe inspiration apps. Marketers and app developers should focus on implementing personalized features even if customer app store ratings are not directly related to them. Personalized features are highly valued by customers when being applied precisely and could enhance the user experience and customer engagement (Kim et al., 2013; Kumar et al., 2018).

Food and cooking apps are different in terms of the business model and the existence of positive or negative comments regarding personalization. Free recipe apps have more positive comments which probably rely on the fact that users do not expect personalized features when downloading a free and less interactive app. Marketing managers could use this finding to invest in more individual and customizable app features and content to increase the effect of users being positively surprised by the app. App developers should specifically focus on interchangeable interfaces, the possibility of adding and removing features, and advance personal profiles. Enhancing these impacts the way users perceive personalization and increases the download rate. Therefore, marketers should promote personalization within free recipe apps in app stores and different marketing platforms. However, independently on the app type, marketers should overall focus on promoting features belonging to acknowledgement and especially the interface. Hereby focusing on GPS possibilities, personal suggestions, interchangeable interfaces, or individual feature arrangements. In addition, they could create incentives whereby users are more willing to write a positive and highly valued review which indirectly affects the download probability and app adoption. Focusing hereby only on free

recipe apps, the effect will be even more obvious because paid apps are way less likely to be downloaded than free apps.

### **5.2. Limitations and Future Research**

The dissertation is aiming to develop a deeper understanding of the correlation of personalization, customer app store ratings, and app downloads. Although a detailed literature review and data analysis process was conducted, this dissertation shows several limitations that need to be addressed.

Even if the search, assessment, and related screening of healthy lifestyle, more specifically food and cooking apps, followed an extensive and detailed way, some standardized procedures were missing. Thus, the different quality levels of app descriptions and the exclusion process whereby amongst others, duplicates were eliminated, it could have happened that some high quality and well-suited apps were excluded by mistake even if they would have been highly valuable for the assessment. In addition, this is in line with the relatively small sample of apps. The detailed and well-worked out exclusion criteria, based on the research and study purpose, were focusing specifically on apps enhancing the cooking knowledge, skills, and behavior. Therefore, the small sample size with only 52 apps leads to receiving several statistically non-significant results within the analysis and variables which could not be classified as normally distributed. Future research could be done by increasing the sample size including more apps related to a healthy lifestyle, nutrition, and fitness. Hereby, the inclusion criteria could be extended by focusing on lifestyle apps in general and including apps related to fitness, exercises, nutrition-tracking, and cooking.

Another aspect is the limited research about personalized app features. Due to a limited scope and time restrictions, the research about app features in general and especially the ones considered as personalization was constrained and concentrated on only a few articles and references. Even though previous scientific and technological research about this topic is limited as well, future work could extent the research and dive deeper into the topic of app personalization to get a better understanding and detailed insights. Thus, future research could be focused on conducting customer surveys and receiving quantitative data about features being perceived as personalization by actual customers. Likewise, conducting interviews with experts from the field and app market by showing the scale and receiving feedback would help to validate the scale content. Therefore, the personalization scale developed could be supported, optimized, or extended by the results of primary data.

## IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

Following this, the scale worked out is reliable, relevant, and useful as an objective assessment. It was developed based on literature regarding personalization in apps and especially in healthy lifestyle, cooking, recipes, and food apps. Even if it is applicable for all types of apps focusing on different topics, it probably being mainly reliable and trustworthy for healthy lifestyle apps. Henceforth, research should be conducted in other categories and industries to (dis-) confirm the results worked out and consequently extend it to become more widely applicable.

Other than that, this dissertation focused only on personalized features, app type, and business model, so consequently left out app details regarding technical issues or ad usage. Therefore, it is limited to the scope of all available app features and did not work out if other features have a more significant impact on customer evaluation measured by customer star rating in app stores or app downloads. Future research needs to be conducted to assess if automation techniques, technical machine learning, or the usage of advertisement displays could enhance the level of personalization or customer satisfaction alone.

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**APPENDICES**

**Appendix 1. Personalization scale document**

MASTER THESIS – SOPHIA CHARLOTTE WESTERMANN



**Personalization Scale – Food and cooking apps**

This document helps to classify and rank app features related to personalization on a scale. There are four main categories with sub features. All items have to be rated on a 5-point scale from 1-Not present to 5-Present to a very high extent. Please choose the points that most accurately describes the existence of the specific app features. Use the provided Excel Sheet to insert your responses and the name of the app you are rating.

**CATEGORY 1 – COMMUNICATION**

**Push Notifications**

Feature that allows to receive personalized and customized notifications regarding specific achievements, to get a reminder to work on your goal, or to cook a specific recipe.

**1. Does the app provides personalized push notifications regarding specific achievements etc.?**

1	Not present	Does not provided push notifications at all
2	Present to a low extent	Personalized notifications to a very low extent
3	Present to a medium extent	Basic notifications used as a reminder
4	Present to a high extent	Provides numerous personalized notifications
5	Present to a very high extent	Perfectly timed/personalized/high quality notifications to remind to cook a recipe/work on personal goal

**Feedback**

Feature that gives personalized feedback regarding achievements, current status etc. Does not have to be a push notification, could also rely on in-app messages, pop-ups.

**2. Does the app provides feedback in any type of communication? Usage of in-app messages, pop-ups etc.?**

1	Not present	There is no type of feedback tool within the app
2	Present to a low extent	Minimal usage of feedback
3	Present to a medium extent	Usage of feedback by messages
4	Present to a high extent	Broad range of feedback by messages, notifications, etc.
5	Present to a very high extent	Perfectly timed, clear and personalized feedback regarding achievements, current status etc.

**CATEGORY 2 – INTERFACE**

**Personal Details**

Possibility of changing personal details, having a personal account with for ex. name, age, email address etc. are included, possibility of using an avatar or uploading a personal picture etc.

**3. To what extent does the app include personal details / personalized interface?**

1	Not present	No possibility of inserting personal details within the app
2	Present to a low extent	Inaccurate. App only make use of personal name
3	Present to a medium extent	Possibility of inserting basic information like name or age
4	Present to a high extent	Usage of clear profile with name, email, age
5	Present to a very high extent	Most comprehensive by including name, age, email plus the possibility of uploading a personal picture or using an avatar

**Interchangeable Interface**

Feature that allows to personalize the app interface by changing colors, language, font etc.

**4. Does the app allows a user to change the interface based on personal preferences?**

1	Not present	No possibility of personalizing the interface
2	Present to a low extent	Limited functions, barely relevant language settings
3	Present to a medium extent	Basic features to change the language/background color
4	Present to a high extent	Offers a broad range of feature to change colors, language
5	Present to a very high extent	Highly attractive possibilities to change colors, language, font, feature arrangement

**Visibility of features**

Feature that functions as a way to decide on the visibility of features. Possibility of turning on and off specific features based on personal preferences.

**5. To what extent does the app allow changing the visibility of features?**

1	Not present	No option to change visibility or features.
2	Present to a low extent	Limited functions. App contains few visibility decisions
3	Present to a medium extent	OK. App offers possibility to turn on/off basic features
4	Present to a high extent	App allows user to turn on/off more than basic features
5	Present to a very high extent	Highly relevant possibilities to change the visibility of all features, adding and turning off

**CATEGORY 3 – ENGAGEMENT**

**Goal setting**

Feature that allows to set personalized nutrition or cooking goals/or choose between challenges.

**6. Does the app allows users to set personalized goals/challenges?**

1	Not present	No goals/challenges provided
2	Present to a low extent	Limited options to choose goals/challenges
3	Present to a medium extent	Basic options to choose goals etc., some customizable
4	Present to a high extent	App provides possibilities to set personalized goals
5	Present to a very high extent	Highly relevant and easy setting of personalized goals/challenges

**Diary**

Possibility to insert personal notes, save recipes or shopping lists etc. in a personal diary

**7. To what extent does the app allow users to insert personal notes, track calories, save recipes or shopping lists etc.?**

1	Not present	App does not include any type of diary/saving
2	Present to a low extent	Limited options to save recipes or shopping lists
3	Present to a medium extent	App offers few more basic diary or saving possibilities
4	Present to a high extent	Numerous possibilities to save, track and insert notes etc.
5	Present to a very high extent	High variety of including personal notes, feedback by including a diary or saved items/shopping list section

**Self-monitoring**

Feature that functions as a way of monitoring own goals, diet plans, recipes, shopping lists cooking behavior etc. by offering a detailed overview feature

**8. Is the app capable of providing features/sections for self-monitoring by including an overview?**

1	Not present	No option for self-monitoring
2	Present to a low extent	Insufficient self-monitoring function
3	Present to a medium extent	Allows basic functions for self-monitoring
4	Present to a high extent	Allows numerous options to monitor goals, own recipes
5	Present to a very high extent	Complete and comprehensive overview section to monitor cooking behavior, diet plans, goals/challenges etc.

**CATEGORY 4 – ACKNOWLEDGEMENT**

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**Rewards**

Feature that allows users to receive personalized rewards and achievements when passing a goal/challenge or having cooked a recipe.

**9. Does the app provides personalized rewards/bonuses when achieving a goal or completing a challenge?**

- |   |                               |   |
|---|-------------------------------|---|
| 1 | Not present                   | App does not provide any reward                                 |
| 2 | Present to a low extent       | Barely usage of not well functioned reward system               |
| 3 | Present to a medium extent    | Basic standard rewards, personalization to small extent         |
| 4 | Present to a high extent      | Allows receiving personalized rewards for basic goals           |
| 5 | Present to a very high extent | Precise, personalized rewards when passing own goals/challenges |

**Suggestions & Recommendations**

Possibility of receiving personalized suggestions and recommendations based on personal preferences regarding food choice or recipes, and previous behavior.

**10. To what extent does the app gives personalized suggestions/recommendations regarding recipes, food consumption, eating behavior?**

- |   |                               |  |
|---|-------------------------------|--|
| 1 | Not present                   | No suggestions/recommendations at all              |
| 2 | Present to a low extent       | Unprecise and insufficient recommendations         |
| 3 | Present to a medium extent    | Basic recommendations to function adequately       |
| 4 | Present to a high extent      | Allows receiving numerous personalized suggestions |
| 5 | Present to a very high extent | Complete, high level personalized recommendations  |

**GPS**

Feature that allows users to receive suggestions and recommendations based on user’s GPS. For ex. information regarding local supplier, supermarket etc.

**11. Does the app make use of suggestions based on GPS?**

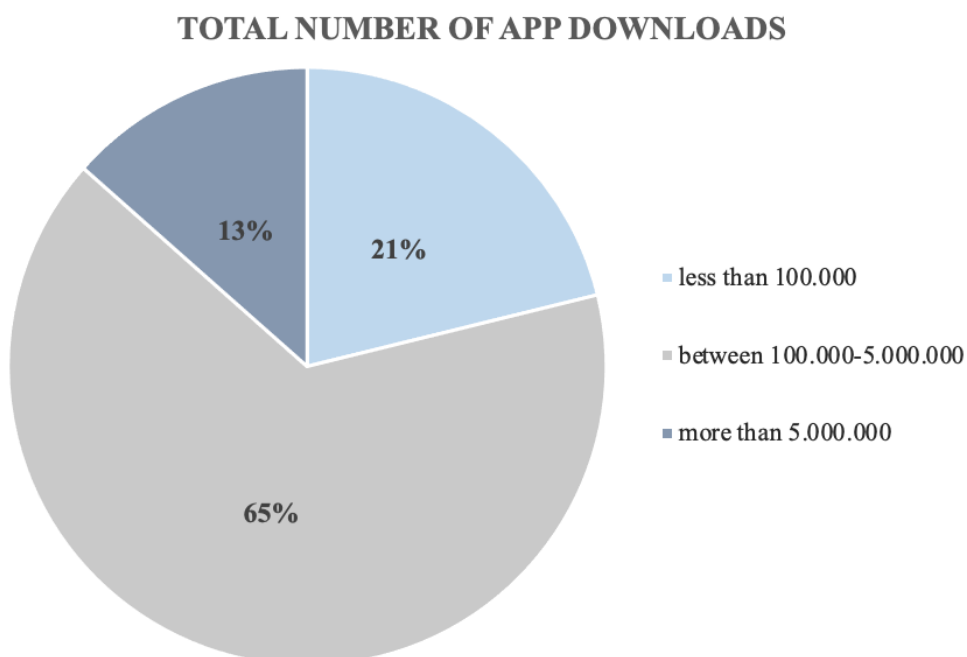
- |   |                               |  |
|---|-------------------------------|--|
| 1 | Not present                   | No GPS function available  |
| 2 | Present to a low extent       | Insufficient usage of GPS, mostly not correct                      |
| 3 | Present to a medium extent    | OK. Basic GPS functions, allowance of suggestions                  |
| 4 | Present to a high extent      | Offers moderate suggestions based on GPS                           |
| 5 | Present to a very high extent | Perfectly GPS targeted suggestions regarding food, suppliers, etc. |

**Appendix 2. Interclass correlation coefficients – Overview**

Reliability Statistics		
Categories	Cronbach's Alpha	N of Items
<b>Overall</b>	<b>0.916</b>	<b>22</b>
Communication	0.934	4
Interface	0.800	6
Engagement	0.897	6
Acknowledgment	0.680	6

Intraclass Correlation Coefficient					
Categories		Intraclass Correlation	95% Confidence Interval		Sig
			Lower Bound	Upper Bound	
<b>Overall</b>	Single Measures	0.238	0.163	0.342	0.000
	Average Measures	<b>0.873</b>	0.810	0.920	0.000
Communication	Single Measures	0.775	0.684	0.851	0.000
	Average Measures	<b>0.932</b>	0.897	0.958	0.000
Interface	Single Measures	0.400	0.282	0.535	0.000
	Average Measures	<b>0.800</b>	0.702	0.874	0.000
Engagement	Single Measures	0.536	0.403	0.666	0.000
	Average Measures	<b>0.874</b>	0.802	0.923	0.000
Acknowledgement	Single Measures	0.220	0.120	0.351	0.000
	Average Measures	<b>0.629</b>	0.450	0.764	0.000

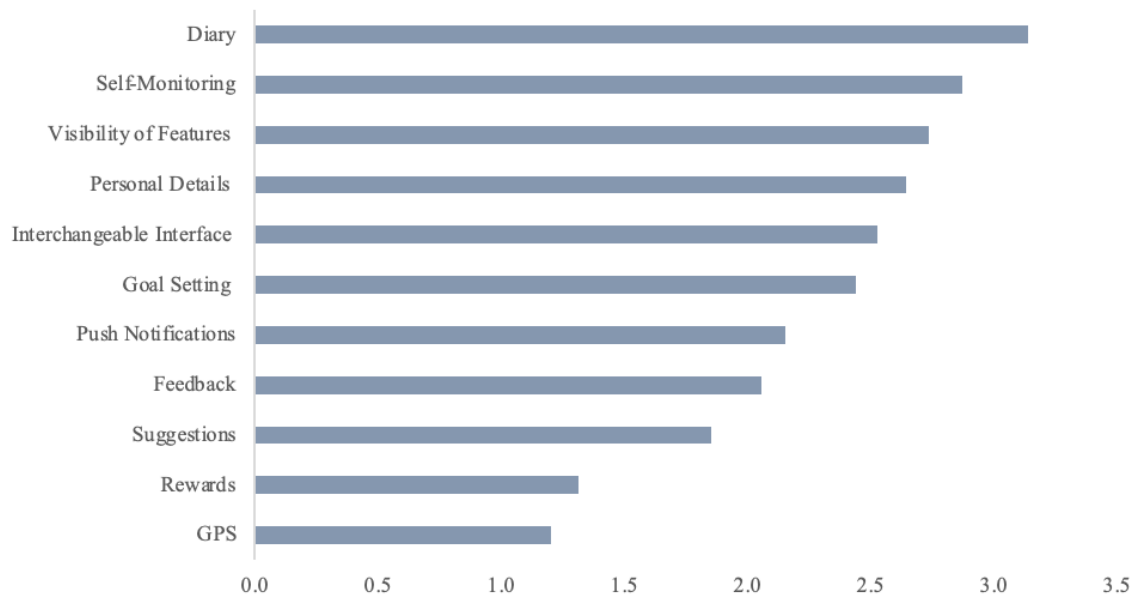
**Appendix 3. Percentage of total number of app downloads**



# IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

## Appendix 4. Overview app features mean distribution

MEAN DISTRIBUTION OF APP FEATURES ACROSS ALL APPS



## Appendix 5. Correlations between independent variables

		Correlations							
		App Type	Business Model	# App Ratings	Comments_direction	Communication	Interface	Engagement	Acknowledgement
App Type	Pearson Correlation	1	<b>0.387**</b>	0.082	<b>0.439**</b>	0.234	<b>0.498**</b>	0.118	-0.068
	Sig. (2-tailed)		0.005	0.564	0.001	0.095	0.000	0.405	0.634
Business Model	Pearson Correlation	<b>0.387**</b>	1	-0.182	<b>0.335*</b>	0.213	<b>0.378**</b>	<b>0.375**</b>	0.178
	Sig. (2-tailed)	0.005		0.197	0.015	0.130	0.006	0.006	0.208
# App Ratings	Pearson Correlation	0.082	-0.182	1	0.135	0.183	0.066	-0.063	-0.020
	Sig. (2-tailed)	0.564	0.197		0.342	0.193	0.643	0.660	0.887
Comments_direction	Pearson Correlation	<b>0.439**</b>	<b>0.335*</b>	0.135	1	-0.177	0.032	-0.082	-0.291
	Sig. (2-tailed)	0.001	0.015	0.342		0.208	0.825	0.563	0.036
Communication	Pearson Correlation	0.234	0.213	0.183	-0.177	1	<b>0.651**</b>	<b>0.580**</b>	<b>0.516**</b>
	Sig. (2-tailed)	0.095	0.130	0.193	0.208		0.000	0.000	0.000
Interface	Pearson Correlation	<b>0.498**</b>	<b>0.378**</b>	0.066	0.032	<b>0.651**</b>	1	<b>0.488**</b>	<b>0.356**</b>
	Sig. (2-tailed)	0.000	0.006	0.643	0.825	0.000		0.000	0.010
Engagement	Pearson Correlation	0.118	<b>0.375**</b>	-0.063	-0.082	<b>0.580**</b>	<b>0.488**</b>	1	<b>0.620**</b>
	Sig. (2-tailed)	0.405	0.006	0.660	0.563	0.000	0.000		0.000
Acknowledgement	Pearson Correlation	-0.068	0.178	-0.020	-0.291	<b>0.516**</b>	<b>0.356**</b>	<b>0.620**</b>	1
	Sig. (2-tailed)	0.634	0.208	0.887	0.036	0.000	0.010	0.000	
Customer App Store Rating	Pearson Correlation	0.098	0.138	<b>0.359**</b>	0.169	0.107	0.193	0.039	-0.011
	Sig. (2-tailed)	0.491	0.328	0.009	0.230	0.450	0.170	0.782	0.938

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

N = 52

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

**Appendix 6. GLM – Three-way effect: Estimated marginal means**

Estimated Marginal Means 2: Cat\_Business\_Model\* App\_Type\* AppComments\_PERSNL\_DIRECTION

			Estimates			
Cat_Business_Model	App_Type	AppComments_PERSNL_DIRECTION	Mean	Std. Error	95% Wald Confidence Interval	
					Lower	Upper
Free	Recipes	negative	5,95	,694	4,59	7,31
		no comment	4,76	,622	3,54	5,98
		positive	9,20	1,082	7,08	11,32
	Planning	negative	6,21	1,211	3,83	8,58
		no comment	9,47	1,624	6,29	12,66
		positive	6,55	1,521	3,57	9,53
Freemium and Paid	Recipes	negative	6,34	,813	4,74	7,93
		no comment	6,53	,567	5,42	7,64
		positive	5,73	1,079	3,62	7,85
	Planning	negative	4,49	1,541	1,47	7,51
		no comment	4,32	,802	2,75	5,89
		positive	5,04	,462	4,13	5,95

Covariates appearing in the model are fixed at the following values: Mean\_Communication=2.106; Mean\_Interface=2.638; Mean\_Acknowledgement=1.458; Mean\_Engagement=2.821

**Appendix 7. GLM – Three-way effect: Pairwise comparisons**

		Pairwise Comparisons						
(I)	(J)	Mean Difference (I-J)	Std. Error	df	Sig.	95% Wald Confidence Interval for Difference		
Cat_Business_Model* App_Type* AppComments_PERSNL_DIRECTION	Cat_Business_Model* App_Type* AppComments_PERSNL_DIRECTION					Lower	Upper	
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSNL_DIRECTION=-1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSNL_DIRECTION=0]	1,19	,974	1	,222	-,72	3,10	
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSNL_DIRECTION=1]	-3,25 <sup>a</sup>	1,266	1	,010	-5,73	-,77	

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-,26	1,382	1	,854	-2,96	2,45
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-3,52 <sup>a</sup>	1,758	1	,045	-6,97	-,08
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,59	1,702	1	,727	-3,93	2,74
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-,38	1,013	1	,705	-2,37	1,60
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,58	,883	1	,513	-2,31	1,15
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,22	1,272	1	,862	-2,27	2,71
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	1,46	1,725	1	,396	-1,92	4,84
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	1,63	1,027	1	,112	-,38	3,65
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	,91	,857	1	,287	-,77	2,59

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,19	,974	1	,222	-3,10	,72
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-4,44 <sup>a</sup>	1,214	1	,000	-6,82	-2,06
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-1,45	1,495	1	,333	-4,38	1,48
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-4,71 <sup>a</sup>	1,730	1	,006	-8,10	-1,32
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-1,78	1,598	1	,264	-4,92	1,35
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,57	1,094	1	,150	-3,72	,57
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-1,77 <sup>a</sup>	,858	1	,039	-3,45	-,09
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-,97	1,241	1	,434	-3,40	1,46
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,27	1,603	1	,865	-2,87	3,42

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	,44	1,122	1	,693	-1,76	2,64
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,28	,822	1	,735	-1,89	1,33
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	3,25 <sup>a</sup>	1,266	1	,010	,77	5,73
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	4,44 <sup>a</sup>	1,214	1	,000	2,06	6,82
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	2,99	1,684	1	,075	-,31	6,29
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-,27	1,953	1	,889	-4,10	3,56
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	2,65	1,882	1	,158	-1,03	6,34
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	2,86 <sup>a</sup>	1,327	1	,031	,26	5,47
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	2,67 <sup>a</sup>	1,216	1	,028	,29	5,05
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	3,47 <sup>a</sup>	1,507	1	,021	,52	6,42

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	4,71 <sup>a</sup>	1,890	1	,013	1,01	8,42
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	4,88 <sup>a</sup>	1,360	1	,000	2,22	7,55
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	4,16 <sup>a</sup>	1,214	1	,001	1,78	6,54
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,26	1,382	1	,854	-2,45	2,96
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	1,45	1,495	1	,333	-1,48	4,38
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-2,99	1,684	1	,075	-6,29	,31
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-3,27	1,953	1	,094	-7,09	,56
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,34	1,962	1	,863	-4,18	3,51
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-,13	1,424	1	,928	-2,92	2,66
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,32	1,329	1	,808	-2,93	2,28

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,48	1,675	1	,776	-2,81	3,76
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	1,72	2,031	1	,398	-2,26	5,70
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	1,89	1,369	1	,168	-,79	4,57
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	1,17	1,251	1	,351	-1,28	3,62
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	3,52 <sup>a</sup>	1,758	1	,045	,08	6,97
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	4,71 <sup>a</sup>	1,730	1	,006	1,32	8,10
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,27	1,953	1	,889	-3,56	4,10
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	3,27	1,953	1	,094	-,56	7,09
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	2,93	2,207	1	,185	-1,40	7,25

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	3,14	1,818	1	,084	-,43	6,70
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	2,94	1,712	1	,086	-,41	6,30
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	3,74	2,011	1	,063	-,20	7,68
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	4,98 <sup>a</sup>	2,298	1	,030	,48	9,49
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	5,15 <sup>a</sup>	1,834	1	,005	1,56	8,75
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	4,43 <sup>a</sup>	1,713	1	,010	1,08	7,79
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	,59	1,702	1	,727	-2,74	3,93
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	1,78	1,598	1	,264	-1,35	4,92
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-2,65	1,882	1	,158	-6,34	1,03

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,34	1,962	1	,863	-3,51	4,18
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-2,93	2,207	1	,185	-7,25	1,40
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	,21	1,779	1	,906	-3,28	3,70
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	,02	1,632	1	,992	-3,18	3,21
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,81	1,883	1	,665	-2,88	4,51
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	2,06	2,127	1	,334	-2,11	6,23
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	2,23	1,758	1	,205	-1,22	5,67
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	1,51	1,576	1	,339	-1,58	4,59
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	,38	1,013	1	,705	-1,60	2,37

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	1,57	1,094	1	,150	-,57	3,72
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-2,86 <sup>a</sup>	1,327	1	,031	-5,47	-,26
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,13	1,424	1	,928	-2,66	2,92
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-3,14	1,818	1	,084	-6,70	,43
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,21	1,779	1	,906	-3,70	3,28
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,19	,974	1	,842	-2,10	1,71
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,60	1,332	1	,650	-2,01	3,21
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	1,85	1,800	1	,305	-1,68	5,38
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	2,02	1,081	1	,062	-,10	4,14
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	1,30	,967	1	,180	-,60	3,19

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	,58	,883	1	,513	-1,15	2,31
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	1,77 <sup>a</sup>	,858	1	,039	,09	3,45
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-2,67 <sup>a</sup>	1,216	1	,028	-5,05	-,29
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,32	1,329	1	,808	-2,28	2,93
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-2,94	1,712	1	,086	-6,30	,41
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,02	1,632	1	,992	-3,21	3,18
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	,19	,974	1	,842	-1,71	2,10
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	,80	1,218	1	,512	-1,59	3,19
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	2,04	1,655	1	,218	-1,20	5,29

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	2,21 <sup>a</sup>	,971	1	,023	,31	4,12
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	1,49 <sup>a</sup>	,740	1	,044	,04	2,94
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-,22	1,272	1	,862	-2,71	2,27
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	,97	1,241	1	,434	-1,46	3,40
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-3,47 <sup>a</sup>	1,507	1	,021	-6,42	-,52
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-,48	1,675	1	,776	-3,76	2,81
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-3,74	2,011	1	,063	-7,68	,20
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,81	1,883	1	,665	-4,51	2,88
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-,60	1,332	1	,650	-3,21	2,01
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,80	1,218	1	,512	-3,19	1,59

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	1,24	1,869	1	,506	-2,42	4,91
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	1,41	1,337	1	,290	-1,21	4,03
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	,69	1,184	1	,559	-1,63	3,01
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,46	1,725	1	,396	-4,84	1,92
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,27	1,603	1	,865	-3,42	2,87
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-4,71 <sup>a</sup>	1,890	1	,013	-8,42	-1,01
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-1,72	2,031	1	,398	-5,70	2,26
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-4,98 <sup>a</sup>	2,298	1	,030	-9,49	-,48
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-2,06	2,127	1	,334	-6,23	2,11

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,85	1,800	1	,305	-5,38	1,68
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-2,04	1,655	1	,218	-5,29	1,20
	[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-1,24	1,869	1	,506	-4,91	2,42
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	,17	1,776	1	,923	-3,31	3,65
	[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,55	1,591	1	,729	-3,67	2,57
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,63	1,027	1	,112	-3,65	,38
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-,44	1,122	1	,693	-2,64	1,76
	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-4,88 <sup>a</sup>	1,360	1	,000	-7,55	-2,22
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-1,89	1,369	1	,168	-4,57	,79
	[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-5,15 <sup>a</sup>	1,834	1	,005	-8,75	-1,56

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-2,23	1,758	1	,205	-5,67	1,22	
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-2,02	1,081	1	,062	-4,14	,10	
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-2,21 <sup>a</sup>	,971	1	,023	-4,12	-,31	
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-1,41	1,337	1	,290	-4,03	1,21	
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-,17	1,776	1	,923	-3,65	3,31	
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-,72	,904	1	,425	-2,49	1,05	
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-,91	,857	1	,287	-2,59	,77
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	,28	,822	1	,735	-1,33	1,89
[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	[Cat_Business_Model=0]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-4,16 <sup>a</sup>	1,214	1	,001	-6,54	-1,78

IMPACT OF PERSONALIZED APP FEATURES ON CUSTOMER EVALUATION

[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	-1,17	1,251	1	,351	-3,62	1,28
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	-4,43 <sup>a</sup>	1,713	1	,010	-7,79	-1,08
[Cat_Business_Model=0]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=1]	-1,51	1,576	1	,339	-4,59	1,58
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=-1]	-1,30	,967	1	,180	-3,19	,60
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=0]	-1,49 <sup>a</sup>	,740	1	,044	-2,94	-,04
[Cat_Business_Model=1]*[App_Type=0]*[AppComments_PERSONL_DIRECTION=1]	-,69	1,184	1	,559	-3,01	1,63
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=-1]	,55	1,591	1	,729	-2,57	3,67
[Cat_Business_Model=1]*[App_Type=1]*[AppComments_PERSONL_DIRECTION=0]	,72	,904	1	,425	-1,05	2,49