

Qualitative Investigation of Mobile Application Development: Current Practice and Future Directions

Masterarbeit

zur Erlangung des akademischen Grades „Master of Science (M. Sc.)“ im
Studiengang Wirtschaftswissenschaften
der Wirtschaftswissenschaftlichen Fakultät der Leibniz Universität Hannover

vorgelegt von

Name: Shafie

■■■■■■■■■■ ■■■■■■■■■■

Vorname: Schabnam

■ ■■■■■■■■■■

Prüfer: Prof. Dr. Breitner

Hannover, den 03.12.2019

Table of Contents

List of Abbreviations	VII
List of Figures	IX
List of Tables	IX
1. Introduction	1
1.1 Problem Identification and Motivation	1
1.2 Design Science Research Methodology	3
2. Mobile Application Development	5
2.1 Definitions and Characteristics.....	5
2.2 Challenges	8
2.3 Personal Finance	11
3. Current State of Research	14
3.1 Research Design	14
3.2 Process Models	15
3.2.1 Classical Methods	15
3.2.2 Agile Methods.....	21
3.3 Literature Analysis.....	30
4. Expert Interviews	34
4.1 Procedure	34
4.2 Methodology	36
5. Qualitative Analysis	42
5.1 Research Results.....	42
5.2 Analysis of the Results.....	60
5.3 Design Principles	65
6. Discussion, Limitations and Recommendations	69
7. Conclusions and Outlook	72
List of References	74
Appendix	81
A1 Category Building	81
A2 Guidelines.....	81

A3 Interview 1	85
A4 Interview 2	90
A5 Interview 3	94
A6 Interview 4	99
A7 Interview 5	104
A8 Interview 6	110
A9 Interview 7	116
A10 Interview 8	122
A11 Interview 9	127
A12 Interview 10	140
Declaration of own work	148

1. Introduction

1.1 Problem Identification and Motivation

The mobile products boom is at its peak and will not disappear so quickly. Smartphones and tablets have become one of the most important means of communication for both customers and companies. Smartphone sales were at 522 billion US dollar worldwide in 2018.¹ Along with the worldwide boom in smartphones, a completely new business model was developed, which was initiated by Apple Inc: mobile applications. Apple opened a distribution channel for mobile applications (apps) through their App Store in the year 2008.² Consumers were thus able to freely extend the benefits of their own mobile devices by adding additional apps according to their personal interests.

The concept of mobile apps seemed to inspire software developers and users alike. They were regarded as highly innovative, stood for a completely new operating concept and contributed to increasing the frequency of use of technical functions and the acceptance of end consumers.³ Mobile apps have become a global trend and the Apple App Store has become a successful concept with which Apple was able to realize more than 1 million daily sales just one month after publication.⁴

To date, the market for mobile apps has developed into an important line of business for many companies, offering enormous potential for the future according to current forecasts. Further analyses state that sales of mobile apps will continue to grow in the overall market. In year 2018, sales of mobile apps were around 1,5 billion US dollar in Germany and are expected to be 1.6 billion US dollar in 2019.⁵

The rapid market growth of smartphones and mobile apps led to an increasing number of apps for financial services also. Digital change has affected the banking sector, as many banks now offer different apps for their customers. In 2012, one third of 106 banks made a website optimized for mobile devices available to their customers worldwide.⁶ Banks recognize the urgent need for action, developing strategies and creating

¹ cf. Growth from Knowledge (2019).

² cf. Apple (2018).

³ cf. *ibid.*

⁴ cf. Apple (2008).

⁵ cf. Bitkom e. V. (2019).

⁶ cf. Medne (2012).

entire departments that are responsible for the development of mobile apps.⁷ Even though customer needs are the center of attention for banks when developing their mobile apps, they also have to keep an eye on ever changing rules and regulations made by both national and international authorities. A bank's mobile application portfolio can decide between a striving business and bankruptcy as more and more companies that heavily rely on their digital products enter the banking sector. Most of them completely renounce the need of "offline" branches, making their applications their only face to their customers.

That is why the popularity of mobile apps represents a major challenge for developers. Not only the improvement and further development of existing apps, but also the programming of new more personalized apps is demanded by the masses.

The development of mobile apps requires a basic understanding of the principles of project management methods and software engineering procedures. In software development, there is a multitude of models and procedures which have been continuously developed and designed to meet the growing demands of the IT industry. From the classic waterfall model to agile process models, model approaches for software development are proposed.

This master thesis approaches this subject with these two research questions (RQ):

RQ 1+2: Which process models are the most suitable for the development of mobile apps and why? How can the development of mobile apps be further improved?

Due to the digitalization, the behavior of customers has changed radically through the digital tools. Especially in the banking sector, this causes a big challenge. Deloitte analyzed a total of 238 banks from 38 countries and surveyed 8,000 customers. Only two percent of customers still visit a bank for transactions such as transfers. The vast majority use mobile banking apps.⁸ Therefore, it is important to understand how the development of mobile banking apps can further be improved. Thus, another research question arises:

RQ 3: What are the best practices for the development of mobile banking apps?

This master thesis follows the "Design Science Methodology", which will be explained in the following section. The structure of this master thesis will be described in the following as well.

⁷ cf. Laukkanen, et al. (2010).

⁸ cf. Deloitte (2018).

1.2 Design Science Research Methodology

This thesis follows the "Design Science Research Methodology" (DSRM) proposed by Peffers et al. which divide research in Design Science (DS) into six steps: Through the problem identification and motivation (**Step 1**), requirements for a solution are derived (**Step 2**).⁹ The main development work takes place during the design and development phase (**Step 3**). Peffers et al. divide the evaluation of the artifact created into two parts. First, the demonstration (**Step 4**) should show that the artifact fulfills its purpose and functions. The actual evaluation (**Step 5**) follows the demonstration. It differs from it by the use of operationalized measures. The evaluation compares the artifact with other artifacts that solve the same problem. Only if the newly created artifact provides a greater benefit than a previous solution it is useful. **Step 6** represents the communication in which the scientific work is published.¹⁰

The whole DSRM process is displayed below for a better understanding.

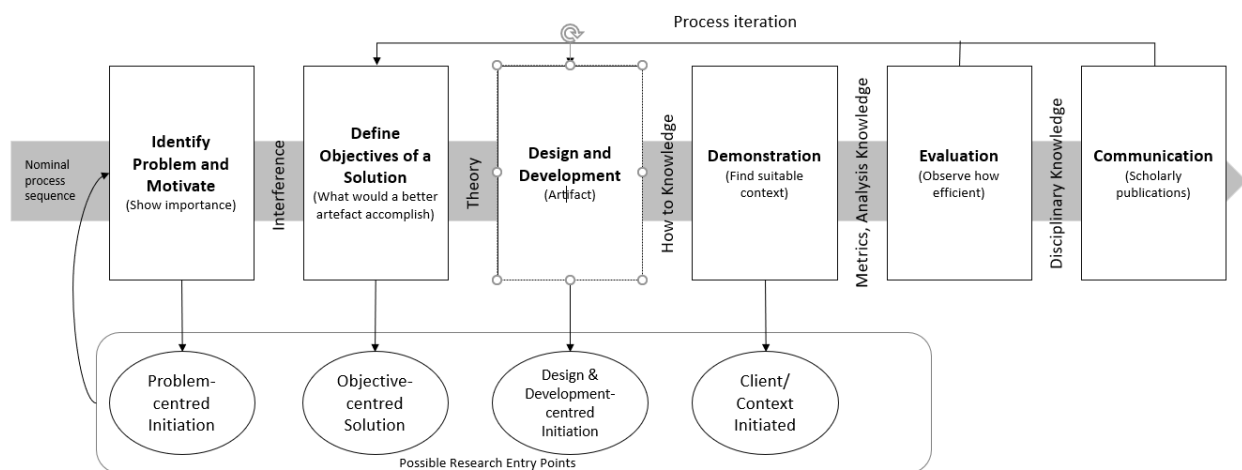


Figure 1: Design Science Research Methodology

Source: Own illustration, based on Peffers, et al. (2008).

In the introduction, the problem was identified and the motivation for the topic was given, which will be continued in Chapter 2. In Chapter 3, various objects of the solution are proposed by describing the relevant process models in the literature. In the design and development phase, expert interviews are conducted with Grounded Theory (GT) in order to get reasonable results which is the content of Chapter 4. The fifth Chapter is the fourth phase of DSRM, where the results of the interviews are analyzed and discussed to derive design principles to solve the research questions formulated in the

⁹ cf. Peffers, et al. (2008).

¹⁰ cf. *ibid.*

introduction. Because of the scope of this thesis, the phases evaluation and communication cannot be performed.¹¹ This master thesis will end with the description of its impact on research and practice as well as a presentation of a conclusion and an outlook.

In every Chapter, each DSRM step is briefly explained at the beginning.

¹¹ cf. Peffers, et al. (2008).

7. Conclusions and Outlook

This thesis aims to give an insight into the development of mobile apps. The results can be used by small to big companies to gain an advantage, especially in the banking sector. Therefore, this thesis followed the DRSM. A state of literature review was performed and interviews with ten experts were conducted. The results were used to answer the research questions and develop design principles solving the research problems formulated in the introduction.

The results indicate a trend towards agile app development, with both Scrum and Kanban found to be the most suiting. Scrum was proposed by both literature and practice, as it shines in projects with a need for short development phases, high flexibility and constant adaptability. The banking sector, predominantly described by its fast and volatile nature, needs agile app development that ensures both high security standards and adaptability to new regulations and laws. These needs can be satisfied by Scrum. It should be noted that, even though it was only mentioned by some interviewees, there are situations in which Kanban is preferable. Mainly small companies with no need of too much organizational overhead profit from its less strict rules and even shorter project phases.

No matter the unanimous preference of agile app development, it still faces several challenges. In firms that have been successfully finishing their projects following a more traditional way of management, change does not come easy. Especially top management positions seem to have difficulties adapting to the culture that needs to be nourished to introduce agile development to a company. That is why, even though many companies publicly claim to use Scrum, there is often more than meets the eye. Autarch non-supervised work, creativity and embracing failure as part of successful app development are great challenges for most teams. Other challenges were the inexperience of agile methods to a team or even the refusal of employees or management to try out new methods.

This thesis recommends to first analyze the companies needs before choosing the most fitting development method. Important factors were shown to be the companies' size, culture and market environment. It is wise to follow the specific needs of the team chosen to fulfil a certain task. This can result in a mixture of best practices from various development methods (e.g. Scrumban) which fit their challenges best. As for mobile banking apps, specifically its highly heterogeneous range of key users should be the center of attention for every development team.

Future research should seek to reinforce the qualitative results conducting even more interviews. A quantitative analysis and cross-national studies are also recommended. Furthermore, the design principles need to be applied in practice.

In 2019, big traditional companies are in harsh competition with small lean companies that heavily rely on their digitized infrastructure. One of the most crucial battlefields is a firm's respective mobile app as it has become the companies face to the customer. Organizations in the banking sector will need to invest heavily into the development of their mobile applications, otherwise they risk bankruptcy as customers will tend to choose a bank that suits their needs in a digital world. *Digitalization never respected a company's history and will destroy those who seek to survive without it.*