Optimizing the Usability of Mobile Job Advertisements: A Multi-Method Approach

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***Abstract*— Accessing the Web from mobile devices has become increasingly common even when searching for job information. Nowadays, most job board offerings are mobile-optimized. However, the search results often refer to job advertisements (ads) and external career pages that are not completely optimized for mobile access. For this reason, mobile users may be confronted with inadequate usability or a dissatisfactory user experience. In this context, the purpose of this study is to assess the usability of job ads posted on job portals to identify deficits and best practices. The analysis is based on an exemplary sample of job ads posted on a German job board. As a result, recommendations for a mobile-optimized design of job ads are presented.**

Keywords-Usability; User Experience; User Interfaces; Heuristic Evaluation; Mobile Recruiting.

I. INTRODUCTION

Mobile optimization of job advertisements is a requirement that follows from the increasing proliferation of smartphones and mobile media technologies today [1]. Recent studies point out that about 69 percent of all Internet users access the web using mobile devices. Within the target audience of 14- to 29-year-olds, as many as 80 percent are using the mobile web, underlining the general importance of this communication channel [2]. All in all, these developments will also noticeably affect recruiting processes, confronting the companies' personnel management with new challenges concerning the utilization of mobile technologies for personnel marketing and recruiting [3]. In this context, it is becoming more and more common to use these devices in order to retrieve job information as well. In Germany, 58 percent of all online job seekers are already accessing job information via mobile devices; in high-tech industries or the media sector, as many as 63 percent browse the mobile Internet for a new professional challenge [4]. Thus, mobile optimization is becoming essential in order to maintain reach among target groups and to keep up with the changing usage of media channels.

However, a mobile-optimized user experience in the area of mobile recruiting cannot be achieved by optimizing a single touch point within the recruiting funnel as shown in Figure 1. A potential candidate might be attracted by a search result in a job portal that is linked to a job ad. The job ad, in turn, can provide links to the company's career webpage or the applicant management system. All elements in this media chain supporting the recruiting funnel have to be adapted to the requirements of mobile devices to achieve a consistent mobile-optimized candidate experience.

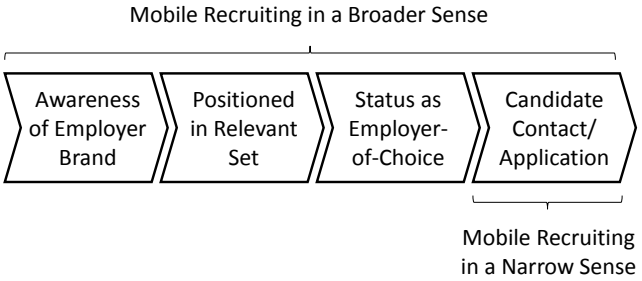

Figure 1. Mobile Recruiting in the "Recruiting Funnel" [5]

Nowadays, however, such a holistic mobile recruiting strategy is still rather rare. Companies often focus their activities on individual mobile recruiting elements. A prominent example is the incorrect usage of QR (Quick Response) codes in print media. QR codes can be used to facilitate mobile access to related online information. The QR code must, however, be linked to a mobile-friendly website, otherwise the user experience may be compromised. This can not only cause the user to abort the intended information retrieval, but also have a negative impact on the employer image [6]. Especially mobile recruiting in a narrow sense, i.e., the intended candidate application, cannot be achieved if an employer provides isolated mobile-optimized touch points. This discrepancy between the candidates' demand and the existing mobile recruiting offerings strongly supports the hypothesis that mobile optimization of the e-recruiting instruments along the recruiting funnel is still incomplete and requires improvement.

In this context, the paper at hand uses a multi-method approach to identify best practices and derive recommendations for the mobile optimization of job ads. Following this introduction, the research background and related work on mobile recruiting and mobile usability are the subject of Section II. The research methodology of this study is described in Sec-

tion III before the key findings of this study are presented in Section IV. Based on the findings of the study, some management implications and recommendations for mobile-optimized job ads are derived in Section V. This paper is concluded by a discussion of the study's limitations and an outlook on future work in Section VI.

II. RESEARCH BACKGROUND

Internet job search and job ads have been subject to research for more than a decade. While early research focused on the impact of Internet-based job search on labor markets in general [e.g., 7, 8], more recent work has analyzed online job seeker behavior and job ads in more detail [9, 10]. However, this research was conducted with regard to traditional, desktop-based access to the Internet by mainly focusing on economic and managerial aspects. Only a few research papers have been published on mobile job seeker behavior and the requirements for job ads in the context of mobile recruiting [3, 5]. For this reason, the research background and related work on mobile recruiting and mobile-optimization of job ads as well as the research gap to be closed by this paper are described below.

A. Mobile Recruiting and Job Search

According to a multi-year study on mobile recruiting in Germany [3], HR (Human Resources) managers attribute a growing relevance to mobile devices in personnel recruiting. In the latest study, conducted in 2013, 97 percent of the participating HR managers stated that addressing potential candidates via mobile devices is becoming increasingly important and almost as many expressed particular interest in the mobile recruiting topic. In addition, most participating HR managers (more than 90 percent) were quoted as being familiar with the main mobile recruiting tools and would be generally willing to provide major mobile recruiting content such as career-relevant information as well as job ads. The proportion of companies and organizations actively using mobile recruiting technologies and applications rose from 8 percent in 2009 to 25 percent in 2011, and 45 percent in 2013. A mobile optimized career website is offered by 26 percent of the companies. Altogether, the application of various mobile recruiting tools increased significantly from 2009 to 2013 [3, 11]. This observation is supported by a study of the German industry association BITKOM that was conducted at the end of 2012. According to this study, 24 percent of all German companies already offered a mobile optimized career website, followed by 17 percent with company-owned iPhone apps [4]. A study focusing on large enterprises in Germany revealed that as many as 80 percent of the companies provide a mobile career website and about 30 percent have a mobile career app [12].

A 2012 study analyzed German job seeker behavior and intentions in this area. At that time, only 6.4 percent of the respondents stated that they had already applied for a job using a smartphone or tablet. This is not a result of a lack of interest. In the same study, 30.2 percent of the respondents stated that they expect an attractive employer to support such a mobile job application [5]. As shown in Figure 2, the aforementioned mobile recruiting study from 2013 [11] also revealed substantial differences in the utilization of mobile recruiting technologies.

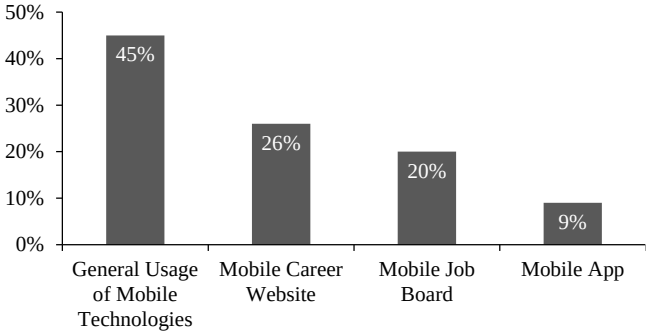

Figure 2. Usage of Mobile Recruiting in Germany 2013 [11]

Whereas nearly half of the participating HR managers in the study stated that they use mobile technologies in the context of their recruiting activities, not more than 26 percent operate a mobile career website. Only 20 percent offer a mobile job board and less than ten percent allow potential job seekers to apply directly via the mobile device. Against this background, it can be assumed that the industry is still far from achieving complete mobile-optimization of the recruiting process. As a result, candidates using smartphones might be confronted with a non-consistent mobile user experience and drawbacks because of media disruptions.

From the candidates' perspective, job portals are the preferred entry point and the most popular source of information for a mobile job search. The aforementioned study [5] on German job seeker behavior has revealed that the most frequently used sources of job ads on mobile devices are job portal websites, social media/business networks, search engines like Google, job portal apps, and employer career websites as shown in Figure 3.

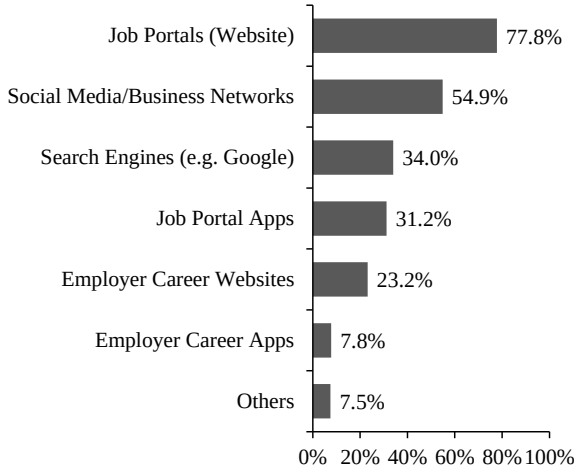

Figure 3. Sources of Job Ads Used on Mobile Devices 2012 [5]

For this reason, job portals and job ads are important entry points for mobile recruiting. Job portals complement the mobile recruiting activities of individual companies. Their providers aggregate job ads and career information across

companies and sectors. In 2011, an analysis carried out for [13] the Apple App Store already identified ten mobile job board applications for the German market [14]. Employers who place job ads on job boards usually get a package for the online channels supported by the portal. When doing this, job board providers mobile-optimize access to their own portal functions, but may not alter the design of the job ads provided by a company. In that case, the search results of the job board can refer to a career website or a job ad that is not mobile-optimized. Thus, the mobile users may be confronted with inadequate usability or a dissatisfactory user experience.

As a result, all three interest groups are confronted with setbacks concerning their individual goals: The job seeker does not get the information he/she was looking for or has a poor user experience. Consequently, he/she probably decides to discontinue the app usage. The employer placing the job ad may experience a negative impact on the recruiting process, its employer branding, or may even lose a potential applicant. The job board provider, in turn, loses an app user, i.e., reach, which constitutes the basis of the job board business model. But even if a user does not directly discontinue the app usage, the design of the mobile ad and its content does play a major role concerning job ads' efficacy in terms of recall and retention [15].

However, regular usability guidelines for mobile websites cannot be applied directly to mobile job ads. Job ads provide very specific information within a focused area of application and thus require adapted criteria for usability analysis. But, despite the importance of these aspects and their high practical relevance, neither specially focused developer guidelines nor scientific research studies on mobile job advertising exist to date. To fill this research gap, the study at hand aims to identify deficits and best practices on a mobile-optimized job ad design, proposing a multi-method approach.

B. Mobile Optimization of Job Ads

Requirements for the design of mobile-optimized job ads can be found in guidelines for the user-interface design of mobile applications or mobile websites, e.g., the well-known *Best Practice Guidelines* of the World Wide Web Consortium (W3C) [16]. Here, recommendations are given regarding image format support, style sheet support, page weight, or color usage. However, two problems exist concerning the usage of such guidelines: firstly, the development as well as the improvement of modern smartphones are progressing at a furious rate. As a result, guidelines on principles for mobile development rapidly become outdated [17]. Secondly, those guidelines merely refer to technical capabilities and do not address the importance of different design aspects from the user perspective or usage context [18]. Some existing approaches, such as Nielsen's usability heuristic [19] or the adapted metric of the Microsoft Usability Guidelines (MUG, [20]), present a more holistic view on aspects influencing system usability. The MUG guidelines are based on the ISO 9241 usability definition, defining usability as the "Extent to which a product can be used by specific users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use" [13]. Besides structural evaluation in the form of heuristic analysis, user-oriented usability tests constitute an important evaluation method in order to measure efficiency, effectiveness as well as user satisfaction [13, 21]. User satisfaction can be measured by experience-based rating scales, product liking, or level of acceptance of the task solving effort [13].

As this study aims at giving practical recommendations for the design and development of mobile job ads, a multi-method approach with regard to both −structural evaluation as well as user based testing of usability aspects− will be adopted. In order to not just ensure success in terms of usability, but also in terms of a company's communication success, research on design aspects influencing the reception of job ads' content will be conducted additionally. The intended research approach will be described in the next section.

III. METHODOLOGY

Usability analysis can be classified in empirical and analytical methods. Empirical testing can comprise user and task observations of prototypes and final products by field or laboratory studies, including walk through and thinking-aloud analysis [19, 22, 23]. Heuristic evaluations, in turn, refer to assessment by a small group of evaluators according to a predefined set of usability guidelines or criteria [19]. As described above, mobile development often draws on technical guidelines and best practice standards, leading to the problems of being quickly outdated as well as not seeing the goal of overall usability concerning user satisfaction and usage acceptance [17, 18]. Heuristic usability evaluations however, by implementing a systematic inspection of user interface design aspects, enable the identification of usability problems to which special attention should be paid [19]. Here, two main methodologies are available for evaluation. Firstly, validator tools offer a standardized evaluation and in-depth analysis of websites, determining how well the site performs on mobile devices. Secondly, a heuristic evaluation can be carried out by looking at interface design in accordance with certain rules as listed in the guidelines. Here, a small number of evaluators (at least three) assess the compliance of a user-interface with usability principles, the so-called heuristics [19]. As presented in Figure 4, phase 1 of the study at hand implements two methods of usability evaluation for an exemplary set of mobile job ads: (1) A tool based usability evaluation by the *W3C mobileOK Checker* [24] and the *mobiReady testing tool* [25] validator. Both tools provide an overall value of "mobile fitness" as well as a detailed report on specific technical checks. (2) A heuristic analysis by evaluators, i.e., usability experts. The evaluation heuristic was defined by considering usability criteria of common standards, e.g., the W3C guidelines [16], the BBC Mobile Style Guide [26], the mobile applications of the MUG [20] or the Microsoft Mobile Design Guidelines [27].

In phase 2, empirical user testing is carried out to consider how users perceive mobile job ads and to identify usability issues and misconceptions from the user perspective [19]. Here, test subjects are asked to search for a job on the job board and to utilize presented job ads for this purpose (user walkthrough) by applying a thinking aloud approach for the analysis. This enables us to identify the job ads' major aber-

rations and drawbacks with which the user is confronted when attempting to achieve his or her goal and to evaluate design aspects within an actual usage context. Following this procedure, the test users will be asked to rate the likability of the observed job ads as well as to rank them in order of their preference to get a measure of the users' final satisfaction with the ads [13].

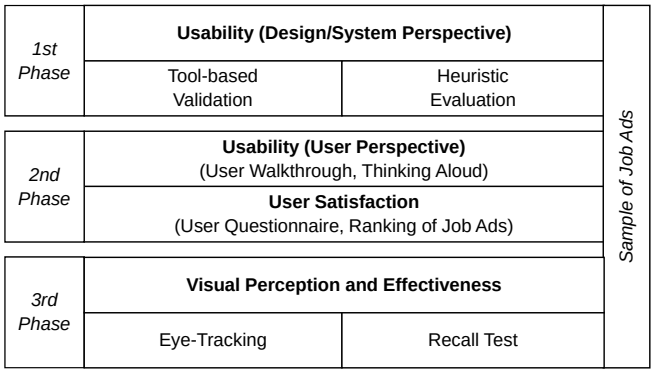

Figure 4. Study's Multi-method Approach

As mentioned above, the aim of the study is not only to evaluate pure usability aspects but also to assess the communication efficiency of the job ads. With this in mind, a third phase focusing on the visual perception and effectiveness of the job ads was conducted. For this purpose, one of the most advanced usability testing methods is the eye-tracking technique, which can be conducted directly on a mobile device (using head-mounted systems) or based on a simulation/representation of the design artefact on a desktop-based configuration. Thus, researchers are able to gain information on unconscious perception and information processing, which can be used to optimize user interfaces [28, 29]. As it has been shown that content related design aspects such as structure or visual design have a major influence on user perception and comprehension [30], these aspects were included in the study. To allow for aggregated group analysis and because the focus of this part of the study was on visual perception and not on user interaction, the study incorporates a desktop-based test configuration. The eye-tracking analysis was followed by recall tests on the user perception of the job ads' content. The users were asked to name companies, job titles or to recall employer brands in order to measure ad efficacy [15]. The combination of the results from the eye-tracking and recall testing is intended to gain recommendations for improving both, usability as well as communication effectiveness of the job ads. Aspects of the information quality [31] provided in the mobile-optimized job ad and its implications for the ease of finding appropriate job information in job portals are not analyzed but might be subject to future research.

IV. FINDINGS OF THE STUDY

The implementation of the multi-stage research approach to assess the usability of job ads was applied to a sample of 13 exemplary job ads from a German job board (partly mobile-optimized and non-mobile-optimized).

A. Tool-based Validation and Heuristic Evaluation

As a first step, the heuristic evaluation was applied to the sample. The evaluation was based on a heuristic that was developed by analyzing, consolidating, and adapting existing design guidelines to the specific requirements of this study as mentioned above. By doing this, e.g., the formerly advised maximum page size of maximum 20 kilobyte [16] was identified as no longer being up to date, since processing power and data transmission have improved tremendously [17]. Therefore, some more recent studies suggest that mobile pages should ideally not exceed 50 or maximum 100 kilobyte [32]. Other criteria refer to more detailed aspects like touch screen optimization, automatic redirects to mobile sites when accessed by mobile, the integration of inbuilt mobile functions like click-to-mail/-call, design aspects like font, contrast and images, as well as content related aspects concerning the appropriateness and relevance of information, e.g., job description, company, qualification or application.

As shown in Table I, a catalog with criteria subdivided into the categories access/navigation (ACN), design (DES), content (CON), and interactivity (INT) was derived. The catalog contained more than 30 criteria for the evaluation of the job ads and was intended to complement the tool-based assessment of "mobile fitness" mentioned in the preceding section. The tools calculate the mobile fitness as a percentage of mobile optimization. Likewise, each category of the heuristic evaluation was measured by assigning a percentage representing the extent to which the job ads comply with the criteria in the category as well as from an overall perspective.

TABLE I. AREAS OF HEURISTIC EVALUATION

Category		No. of. Criteria	Areas of Analysis (No. of Criteria)
ACN	Access/ Navigation	9	Mobile accessibility (3), use of mobile technologies (2), mobile optimized navigation (2), ease of access to additional sources (2)
DES	Design	12	Layout and structure (3), text and readability (3), mobile optimized embedding of media (6)
CON	Content	10	Corporate identity, appropriateness and relevance of employer and job information (8), contact channels
INT	Interactivity	5	Click-to-mail/-call, social media integration, locate job on map, option to apply via mobile device

The sample of job ads was assessed by eight evaluators using these heuristic criteria. An overall result was calculated based on the ratings of the two validation tools (VAL) and the consolidated heuristic evaluation (HEU). At this stage of the study, no weighting of the criteria, categories or types of tests was applied. This means the overall result was calculat-

ed as the arithmetic average of the partial results. Table II shows the average calculated across the job ads of the sample for the tool-based and the heuristic evaluation. The table also shows the lowest (Min.) and highest (Max.) rating as well as the difference (Diff.) between the highest and lowest ranking job ad within each category and for the overall result.

TABLE II. OVERALL RESULTS OF PHASE 1

	VAL	HEU	Heuristic (HEU) by Category				Over-all
			ACN	DES	CON	INT	
Avg.	27%	50%	43%	56%	77%	24%	38%
Min.	12%	38%	22%	37%	45%	3%	26%
Max.	54%	69%	74%	83%	98%	48%	48%
Diff.	42%	32%	51%	46%	53%	45%	22%

The key finding is that each of the examined job ads needs to be improved in order to provide an acceptable mobile user experience. None of the thirteen tested job ads achieves an overall rating of 50 percent. This is mainly caused by the dissatisfactory results for most of the job ads in terms of technical validation. However, the results provided by the validators and the heuristic rating as well as the resulting ranking (descending order from highest to lowest score representing the measured mobile usability) differ greatly in the majority of the cases as presented in Table III.

TABLE III. DETAILED RESULTS OF PHASE 1

	VAL		HEU	
Job ID	Score	Rank	Score	Rank
1	22%	7	45%	8
2	54%	1	38%	13
3	32%	5	50%	6
4	34%	4	41%	11
5	53%	2	43%	9
6	25%	6	42%	10
7	49%	3	47%	7
8	12%	11	61%	3
9	14%	10	54%	4
10	12%	11	39%	12
11	14%	9	63%	2
12	12%	13	54%	5
13	14%	8	69%	1

Many of the job ads achieve results between 10 and 20 percent in validation; only two of the job ads rated 50 percent or more. For the heuristic evaluation, all job ads reached 38 percent or more; six of them even achieved 50 percent or more. However, the results of both approaches did not correlate at all as shown in Figure 5. Moreover, as shown in Table III, the job ad with the highest score in the tool-based validation achieved the lowest score in the heuristic evaluation. This is due to the fact that the validators are somewhat outdated (feature phone focus) and do not consider the context (mobile recruiting) of use as the heuristic evaluation does. As a first result, a validation with the aforementioned validator tools cannot be recommended for mobile-optimization of mobile job ads.

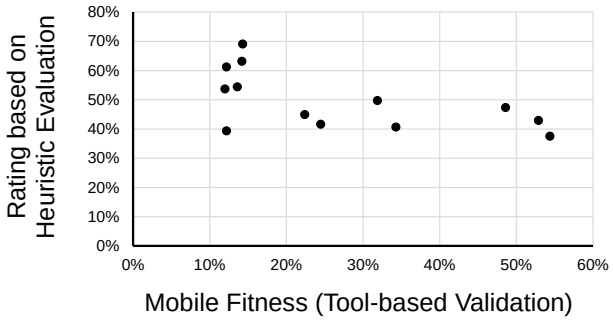

Figure 5. Usability Validation vs. Heuristic Evaluation

Focusing on the study results for the heuristic criteria in more detail, the weakest category of the heuristic criteria is "interactivity" as shown in Table II: not one of the examined job ads fulfilled half of the criteria. In contrast, the majority of the job ads achieve quite good results in the area of "content", but this was also the category with the biggest difference between the lowest and highest ranking job ad. The job ads with above-average heuristic results lose their top positions in the overall rating because of their low score in validation. The top positions in the overall rating have only average scoring in heuristics, which is bolstered by a good validator score, possibly indicating a kind of trade-off between technical optimization and adoption of the technical capabilities of up-to-date smartphones. Overall, each of the analyzed job ads has plenty of room for improvement. In most cases, the technical "mobile fit" in terms of validation turns out to be poor. The performance of the mobile job ads in the areas of "content", "design" and "navigation" is better, but far from good. Most notably, all of the tested job ads fail in the area of "interactivity", where a good concept could really set a mobile job ad apart from the competitors.

B. User Walkthrough and User Satisfaction

The user walkthrough and the analysis of the user satisfaction with the job ads were conducted within a group of twelve test users. Each participant had to test between four and five job ads only, in order to prevent mental overstrain. As a result, most of the job ads were tested by four or five participants. This is a small number, due to the study's limitations with regards to time and budget. In this context, it has to be considered that group sizes of five participants are often sufficient to find (on average) more than 80 percent of the usability problems [33] and that the purpose of this study is not to find all usability problems in the job ads but to compare their level of mobile-friendliness.

The walkthrough was based on some simple predefined tasks to standardize the usability testing. The participants had to find answers for questions like: By which date is the vacancy to be filled? What education is required? Who can be contacted for questions? Each test lasted an average of 15 minutes. At the beginning, each participant was given a brief

introduction to the task. Once the participants were ready, the first job ad was presented on a smartphone and the participants were asked to complete the given tasks while thinking aloud. This procedure was performed for each job ad within the test users' subsample. All statements of usability problems were documented and consolidated after testing.

Most of the usability problems were caused by the fact that the information in the job ad was not adapted to the limitations of mobile devices ("Interaction elements are hidden, too small and so barely usable.", "Too much zooming and scrolling required to access the content") or the mobile usage context (e.g., "Registration process to apply via mobile is inconvenient.", "It is distracting to be forced to switch to the desktop site to apply for the job.")

The testing of job ads differs from the evaluation of other user interfaces. The design of the job ads varied widely from simple textual web pages with some text links to microsites with comprehensive information and a sophisticated navigation structure. Due to the aforementioned variation in complexity (text page vs. microsite), the number of usability problems did not seem to be an adequate indicator of the mobile fitness of the different job ads. This is why the number of interactions (e.g., touch gestures to click or scroll the screen) were measured instead. A lower average number of interactions to complete the tasks is interpreted as a higher level of mobile-optimization. Additionally, the participants were asked to make positive statements on the mobile-friendliness of the job ad when thinking aloud. The total number of positive user comments and the average number of interactions to solve the tasks for each job ad are presented in Table IV.

After completing the walkthrough, each of the study participants was asked to express his/her level of satisfaction with the provided usage experience by ranking the job ads within the tested subset (1 indicates the best ranking and the highest level of user satisfaction). Based on the rankings assigned to the job ads, an average ranking was calculated. If the participants had fewer than five job ads in their test sample the ranking was normalized. This was to ensure that the average ranking always varies between 1 and 5. The results of this ranking are also shown in Table IV and complete the findings of the second phase of the study.

The results presented in Table IV differ in detail. There is no direct relationship between the number of interactions, positive comments and the average user ranking. Some of the job ads received a high number of positive comments but also a relatively high average regarding the required number of interactions to complete the given tasks (e.g., job ad #12). The reason for this is that some of those job ads have a mobile-optimized design but also some usability problems hindering the users from efficiently completing the given task with a low number of interactions (e.g., buttons optimized for touch screens with unclear labeling). This supports the observation from the first phase that mobile-optimization cannot be achieved by technical transformation only but requires some additional adaptation of the content with regard to the mobile usage context. The results presented in Table IV also indicate that there is a strong correlation between the average number of interactions to complete a task and the user satisfaction as indicated by the average user ranking of the job ad.

TABLE IV. DETAILED RESULTS OF PHASE 2

Job ID	Number of Interactions (Average)	Positive Comments (Total)	User Ranking (1 to 5)
1	2.33	6	3.00
2	2.47	5	3.50
3	2.00	8	1.25
4	2.20	0	2.67
5	1.43	2	2.67
6	1.30	6	2.50
7	2.37	5	3.00
8	2.70	5	2.25
9	1.60	4	1.25
10	2.33	5	3.25
11	2.70	1	3.25
12	3.57	7	4.50
13	1.93	18	1.60

Figure 6 shows a scatter plot of these two variables. The Pearson correlation is 0.679 and significant at the 0.05 level (p=0.011) whereas there is no significant correlation between the number of positive comments and user satisfaction expressed by the user ranking (Pearson r= -0.312, p=0.299).

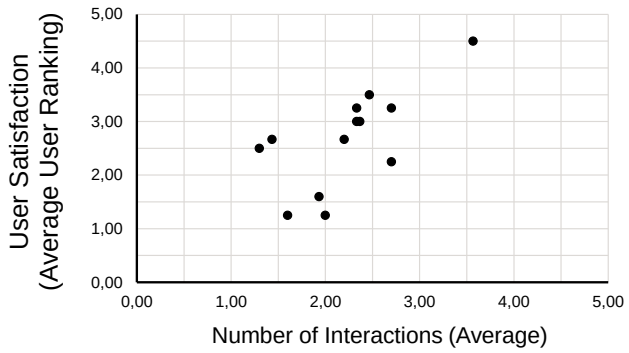

Figure 6. User Satisfaction vs. Number of Interactions

The findings of this phase suggest that when mobile-optimizing job ads, the minimization of the required number of interactions should be focused on. This requirement is consistent with the statement of [34] that "ease of use is paramount", i.e., that mobile design has to cope with distractions, background noise and interruptions as well as device constraints that require a minimization of user input.

C. Eye-Tracking and Recall Testing

The third phase of the study started with an eye-tracking analysis. All 13 jobs were tested by 15 participants. As a prerequisite, slides with screenshots of the job ads were produced and merged into a slideshow project. The slides

contained the area of the smartphone screen, which can be seen on a smartphone (iPhone 4S) without any scrolling. No interaction with the screen was considered in this testing. The participants received a short briefing and were asked to identify the employer, job title and elements that distinguish the job ads from others. All the slides were presented to the participants with a duration of 15 seconds for each. The presentation of the ads was carried out on a desktop-based eye-tracking system to allow for group consolidation. Thus, the smartphone screens were not presented in the original size on the desktop screen. The size was adjusted for the viewing distance of approximately 60 cm between desktop screen and participant to simulate the smartphone user experience.

Based on the eye-tracking analysis of the slideshows, heatmaps were generated as shown in Figure 7. The heatmaps represent the consolidated group data by visualizing the aggregated eye fixations of all participants for the job ad. Hotspots within those maps are interpreted as areas of high attention and interest.

Figure 7. Eye-Tracking Analysis Example

The aggregated heatmaps were used in our study to derive qualitative findings on how to improve the visual design of the job ads and how to optimize the positioning of the different job ad elements on the smartphone screen.

To gain some additional quantitative data from the tests, the generation of heatmaps was complemented by an area of interest (AOI) analysis [35]. Here, the eye-tracking software was used to define areas within the screen where the employer logo and the job description were located for each job ad as shown in Figure 7. The eye-tracking data collects data such as the time to first fixation, the number of fixations, or the fixation duration for each of those defined areas.

The results of the third phase of the study are shown in Table V. Each job ad is listed with the total time to first fixation for the employer logo and the job title that were defined as areas of interest and analyzed with the eye-tracking software. In some of the screenshot slides, a logo was not available (marked as n.a.) – either because the companies had decided not to use a logo or the logo was not visible without scrolling. Subsequent to eye-tracking, a cued recall test was conducted with all the participants. The participants were asked if they remembered the employers and the job titles of the presented job ads. The percentages of the participants who were able to recall the employers and the job titles are shown in Table V. The recall rate for the employer was very low for job ads without the integration of a logo. Therefore, the findings indicate that an employer logo needs to be integrated in the job ads and has to be visible without scrolling.

TABLE V. DETAILED RESULTS OF PHASE 3

	Employer (Logo)		Job Title	
Job ID	TtFF [s]	Recall	TtFF [s]	Recall
1	4.074	47%	3.009	7%
2	2.239	53%	3.194	20%
3	2.837	33%	4.147	7%
4	1.005	27%	3.160	0%
5	n.a.	7%	2.825	0%
6	n.a.	7%	0.485	0%
7	0.597	67%	3.884	0%
8	2.135	60%	1.123	7%
9	3.654	67%	2.704	7%
10	n.a.	7%	2.363	0%
11	2.768	80%	3.558	20%
12	0.919	27%	2.338	33%
13	3.565	20%	0.557	7%

Note: TtFF = Time to First Fixation

However, there was no significant correlation between the time to first fixation and the recall rates. A possible explanation might be that the job ad design was not systematically modified but based on a random sample and other design or content factors influenced the recall results. Another source of bias might be the attitudes and preferences of the

study participants. In retrospect, it was found to be inappropriate for the recall tests to use a random sample of real job ads. This is because the selected employers differ significantly in their brand awareness, which means that the recall results depended more on the brand awareness than the mobile-optimized positioning of the employer logo on the screen. Additionally, the popularity and understandability as well as the extent to which the personal interests of the study participants matched the job titles varied too much within the random sample (e.g., bus driver vs. public relations trainee for healthcare communication).

V. Conclusions and Implications

The objective of this research was to use a multi-method approach to gain some best practice guidelines for the mobile-optimized design of a job ad. As a first step, a random sample of real job ads from a job board were analyzed. The study at hand has some limitations (e.g., small sample size and small number of test users). However, the study revealed some methodological problems and areas for further research with regards to mobile usability of job ads and mobile usability in general:

a) First of all there is a *lack of applicable and commonly accepted mobile usability criteria/metrics*. Some of the existing metrics focus too much on feature phone characteristics and do not incorporate the capabilities of modern smartphones.

b) As a result the *popular validators for mobile fitness are outdated* as well and not appropriate for the content presented on modern smartphones. In addition, based on the results of the study, it may be doubted that a rating of mobile-optimization gained by the usage of those validator tools is meaningful at all. Mobile-optimization requires a high level of adaptation of the user interface design and the presented content towards the intended mobile usage context. This aim cannot be achieved by just adapting the code to comply with the constraints of mobile devices. Thus, the scope of the validator tools is rather limited as far as the identification of technically related usability problems is concerned.

c) The job ad rankings varied very much between the different methods used for the analysis. This is because *mobile-friendliness is a multi-dimensional construct* with some trade-offs between the individual dimensions that need to be optimized for mobile usage. Thus, it is not sufficient to rely on one single method when aiming for mobile-optimization. Usability aspects have to be analyzed in line with the functional requirements and other limitations such as user habits and expectations as well as corporate design restrictions.

d) The study has shown that quantitative analysis is of limited use in finding a generalizable mobile-optimized design pattern. This underlines the *necessity of obtaining qualitative user feedback* and of involving users from the target group in the development process of the user interface design.

Besides the conclusions discussed above, the study revealed some first learnings on the design requirements of mobile-optimized job ads. These findings are still far from providing a consistent and scientifically proven design guide. However, the following recommendation can be a starting point to optimize the job ad design and the resulting candidate experience within the mobile recruiting process.

A first recommendation is based on the observation that the feature phone-based optimization approach is not sufficient to optimize user experience on modern mobile devices:

- *Cross-platform compatibility* is a design prerequisite due to the high fragmentation of mobile devices that accompanies continuous technical progress. There are different types of devices (e.g., feature phones, smartphones, tablets) and even the devices of the same type can differ significantly with regard to their technical capabilities and constraints (e.g., screen size). Thus, job ads should be realized by using common web technologies to provide cross-platform compatibility. Responsive web design technologies and frameworks can help to optimize the user experience across platforms and devices.

The following recommendations are based on the quantitative findings as well as the qualitative feedback gained in the multi-method study presented above:

- *Company name and logo are key visuals* and thus need to be placed at the top of the page to be visible without any scrolling. Especially companies with strong employer brands can use these elements to directly draw attention to the job offering.
- *Job title, start date, requirements and location* are other important elements that need to be positioned in the upper screen area. These elements should be accessible without the need to scroll, browse through the content, or navigate to linked pages.
- *Sparse use of pictures and graphical elements* to enable the users to focus on the key elements of the job ads even when the job ad is viewed in a mobile usage context with a high level of distractions, background noise and interruptions.
- *Single column formatting* is required to prevent users from having to scroll vertically and horizontally to browse through the content.
- *Supplementary information* on job details, company and the location can be provided by linking to external but mobile-optimized content. Content such as mobile video should be preferred to excessively long texts that will not be read in mobile usage contexts characterized by short attention spans.
- *Touch-optimized buttons* should be used all over the job ad instead of text- and image-based links.
- *Contact details* should be presented on the first page of the job ad and provide direct access to the appropriate features of the mobile devices without the need to re-enter the contact details.

Figure 8 shows an example design of a job ad that is based on the recommendations above. As mentioned earlier, this generic design has to be adapted to the company's needs (e.g., corporate design).

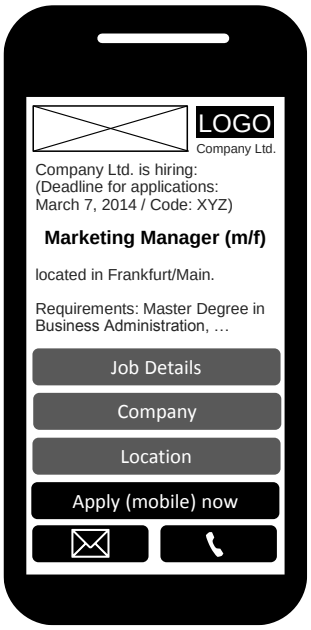

Figure 8. Mobile-optimized Job Ad Example

Usage of the more advanced features to apply for a job via mobile device as shown in Figure 8 ("Apply now") will depend on the appropriate preparation and transformation of the underling recruiting processes and backend systems as already discussed in Section I.

VI. Limitations and Future Work

Further research is required to gain more insights on the impact of the suggested design recommendations on user experience and user acceptance. As mentioned before, the usage of a random sample of job ads may have biased the study results and also have limited the applicability of qualitative methods.

For this reason, subsequent studies should focus on a more systematical variation and combination of design elements. For this purpose, A/B testing could be applied. Within the so-called A/B testing, various user interface design alternatives are analyzed to obtain design recommendations, i.e., design best practices. To gain insights, single design attributes (like typeface or button design) are varied and the resulting design variants are evaluated against each other. Analysis of the different versions can either be done in a live setting by, e.g., tracking conversion rates of design alternatives or within an experimental laboratory environment [36]. An experimental setup with a combination of A/B testing with other types of analysis, e.g., eye-tracking or recall testing, could then be used to gain a better understanding of user interaction and visual perception of the presented job ad [28].

Another important research question is the analysis of the reasons why the job ad providers have not adapted their ads to mobile environments yet. Reasons could be manifold, e.g., technical, lack of budget, or insufficient knowledge of user needs and usage shift to mobile devices. As the focus of the study at hand was to derive recommendations on mobile-optimization, this topic could not be investigated here but may be the subject of further research.

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