

Mobile Tagging in German Magazines: A One-Year Study of QR Code Usage in Top-Selling Mass Market Publications

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Abstract In the last decade, media consumption has shifted from traditional printed publications towards online media. This is why publishing companies are forced to develop innovative cross- and multi-channel strategies to protect revenues and to prevent further customer churn. Such strategies can be implemented on the basis of mobile tagging. Mobile tags such as QR codes have been used in German mass market publications for quite some time. Although the general usage and user acceptance of mobile tagging has already been subject to research, studies are still lacking on company use of mobile tags in mass market publications. Against this background, this paper presents a longitudinal study on the application of QR code technology in the 2012 issues of ten top-selling German popular magazines. The results of the study indicate that company usage of QR codes increased by 140 percent in 2012. The application of QR codes is dominated by commercial purposes such as advertisements. Editorial usage is mostly limited to popular news magazines but seems to have an impact on the usage intensity of commercial tagging. Best practices for QR codes integration, such as the usage of deep links, were observed for the majority of the analysed case studies. On the other hand, the study has revealed room for improvement.

Keywords Mobile Tagging, QR codes, Cross Media Strategies, Popular Magazines

1. Introduction

The print media industry is currently being challenged by emerging technologies, demographic change and a shift in media consumption from print to online technologies. Digitization of media and ubiquitous access to the Internet have established new channels for content distribution and caused an ongoing expansion of online content [1–3]. As a result, usage of traditional media, such as TV, radio and print media, is dwindling. This decline also affects the circulation figures of newspapers and magazines which have been sinking continuously for years. The decrease in circulation, in turn, leads to a drop in sales revenue from advertising, which had until recently constituted 40 to 60% of overall revenue of such print products [4]. In the face of these developments, newspaper and magazine publishers have been forced to rethink their existing formats and business models and are already reacting by gradually integrating online and mobile channels into their business models. One approach is “Cross Media Publishing”, by which contents are delivered using various channels and by including the use of new technologies [5, 6]. The use of

such technologies also enables the transition from classic print and offline worlds to modern online platforms. Mobile tagging is an approach which creates such a link between print and online and is thereby able to bridge the gap between magazines and additional online information.

Mobile tags are two-dimensional (2D) barcodes that can be decoded with camera-equipped mobile devices [7, 8]. These tags can be added to newspapers and magazines to provide access to supplementary editorial or commercial content. In print media, so-called Quick Response (QR) codes are commonly used for this purpose [9]. These codes are decoded using a special reader software and a smartphone camera. If a link (i.e., a URL) is embedded in a QR code, access to further information on the Internet can be provided via the reader’s smartphone.

Mobile tagging thereby enables publishers to develop new cross media publishing strategies and to offer added-value for the target groups of readers and advertisers which can be put to commercial use. The advantages of static print versions (sensory appeal, structured presentation and mobility) can be combined with the wealth of information, topicality and interactivity of the Internet. In terms of editorial content for example, usage of QR codes makes it possible to offer new and additional information to articles even if they have already been printed and published. The tags can also be used to provide additional information for which there was insufficient space in the

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print article or to enrich an article with multimedia contents. Based on these capabilities of mobile tags, the publishers can integrate new media elements and implement a value driven customer retention strategy for their traditional print publications. Besides linking the QR codes with editorial content, there is also potential for commercial use. This ranges from an online extension of traditional print advertisements to advanced customer acquisition and retention strategies (e.g. voucher campaigns) and finally to linking advertising to concrete purchase and ordering options in mobile commerce.

In this regard, QR codes can be seen as an interactive mobile advertising tool: They enable a greater degree of connectivity to the customers and thus can strengthen the customer relationship. Offline audiences can be converted into online relationships or active buyers by using mobile tags as a call to action for immediate response towards the advertising message. In addition, QR codes offer advanced opportunities to evaluate consumer interests and response rates of advertising campaigns [10]. Regardless of their technical capabilities, QR codes can also be used as a “Key Visual” with the objective of transporting an innovative brand image. However, if the QR code is not linked to real added value, such effects will be short-lived or even turn out to be counterproductive in the long term.

Mobile tagging as described above has been used for quite some time in German magazines and its dissemination in the print industry has increased over the last few years. In general, according to a recent study among German companies, 88 percent of large German enterprises have already used mobile tagging and 64 percent have been using this technology for two years or less. The lack of experience with mobile tagging is probably also one of the reasons for the fact that only 6 percent of this study’s respondents stated that mobile tagging was of high importance for their companies and only 4 percent had a defined mobile tagging strategy [11]. Recent studies on the user acceptance of mobile tagging indicate that most smartphone users are aware of QR codes but only a minority is using this technology on a regular basis [12]. In international literature, the use of QR codes in magazines has been studied [13, 14], but more comprehensive analysis on the German market is still missing so far.

Against this background, a longitudinal study on the application of QR code technology by German publishers was conducted in the paper at hand to answer the following research questions:

1. What is the status quo and the trend for QR code integration in German popular magazines?
2. What is the purpose of QR code integration?
3. What type of content is linked with the codes?
4. Does the integration of QR codes comply with common best practices?

The analysis was based on the 2012 issues of the ten top-selling German popular magazines. Our research paper has five sections. Following this introduction, Section 2

discusses the research background with regard to the situation in the German magazine market and best practices for the application of QR codes in print media. The research objectives and methodology of the longitudinal study are presented in Section 3. The article continues with some selected findings of our study and its interpretation in Section 4. The article concludes with a summary of the findings and implications for further research in Section 5.

2. Research Background

2.1. Situation of the German Magazine Market

The term “print media” is commonly used to describe media whose final product is made of paper and includes books, newspapers and magazines. Popular periodical print media for the mass market are newspapers and magazines. Newspapers are those publications which appear at least twice a week. The content represents current topics, not limited to a specific issue, so that the categories politics, economics, culture, entertainment, current events and sport always exist independently of the specific newspaper.

Magazines, on the other hand, are those publications, which appear at least four times a year and therefore do not have to be published in a weekly cycle. The topicality of the represented information is less than that of the newspaper. In addition, magazines cover specific target groups and focus on content to meet the interests of the respective readership [4]. Magazines that address mass markets within the segment of non-professionals and aim to satisfy readers’ needs for information, entertainment and recreation are referred to as popular magazines (“Publikumszeitschriften”) [15]. These popular magazines can be divided into general interest and special interest titles. While the former are aimed at a very wide audience and typically include information on politics, economics, current events, culture, entertainment and sport, the latter focus on easily understandable information and entertainment elements for a more specific topic or narrower target group.

Popular magazines are also affected by the general decline of print media discussed in the introduction. Between the fourth quarters of 2003 and 2013, the average monthly circulation of popular magazines in Germany fell from 125 to 105 million, thereby declining by around 16 percent [16]. In contrast, the number of popular magazine titles in Germany has increased continuously over the last few years. Between 2003 and 2013, the number of magazines with at least quarterly publication increased by 321 titles. This development was particularly driven by the rising number of special interest titles. It can be assumed that this was a strategy the publishers followed to strengthen their position in the market by better covering the readers’ need for information on specialised topics and also offering advertisers media in order to address their relevant target groups more effectively [17, 18].

Readers of popular magazines are already accustomed to using the digital versions of the magazines. According to a

2012 study of the German magazine publishers' association VDZ, popular magazines have already attained the widest coverage in terms of own online and mobile services compared to newspapers, radio and TV [18]. As far as mobile media technologies are concerned, the integration of mobile tagging or QR codes in popular magazines is certainly its most clearly visible implementation, besides image recognition and augmented reality apps. Despite this fact however, hardly any research or empirical studies have been carried out yet in order to investigate the use of QR codes in this magazine segment in more detail.

2.2. Best Practices of QR Code Integration

Despite the wide range of possible uses, the increasing number of smartphones and the widespread coverage for mobile Internet as a basic infrastructure, mobile tagging in Germany is currently still nowhere near achieving a breakthrough into the mass market [12]. As discussed before, the usage of QR codes is significantly smaller than the awareness and presence of QR codes in public areas and the number of users equipped with suitable mobile devices. This is due to barriers to usage such as the fact that reader software is not usually pre-installed on smartphones or that the benefits of scanning QR codes are often not immediately recognisable for users [19]. In addition, unsatisfactory usage experiences may also hamper the further development of mobile tagging. This is because the use of QR codes is often not sufficiently thought out, and, as mentioned earlier, is often aimed at offering an innovative design element rather than using this technology in a way which adds value for the users. In these cases, QR codes are connected to websites which have not been optimised for mobile devices for example or which only offer redundant information already contained in the corresponding print medium.

These problems can be avoided, however, if some basic rules or "Best Practices" are considered. These recommendations are simple technical and content-related rules for the application of QR codes and can be assumed to be generally known in professional circles involved in Mobile Tagging. This is reflected in the variety of best practice guidelines available online (e.g., [20–23]) which includes the important recommendations compiled below:

- *Mobile optimised targets*: QR codes must link to content that is optimised for mobile devices.
- *Usage of deep links*: Encoded links must lead directly to the relevant information.
- *Add value*: The user must be able to recognise an immediate benefit after scanning the code.
- *Call to action*: The user needs to know what to expect after scanning the codes.
- *Allow for quick scanning*: Reduce code complexity by minimising the number of encoded characters.
- *Proper positioning*: The code must be placed in the print medium, to allow for convenient scanning.
- *Adequate sizing*: The scaling of the QR code has to

take normal magazine reading distance into consideration.

- *Preserve robustness*: Avoid unnecessary design changes of QR codes (e.g., logo, rounded corners).
- *Test code integration*: Testing of the integrated QR codes in the page layout based on a page proof.
- *Code tracking*: Analyse server requests triggered by code scans to determine response rates.

The first four criteria are directly connected to customer value and the user experience. Scanning the code only makes sense if the user can directly retrieve the linked contents on the mobile device and if this procedure adds value in the context of mobile usage. As this is not immediately recognisable via the image of the QR code alone, additional instructions for use are necessary, which point out the expected results of the scanning process and communicate the resulting added benefits in order to motivate the user (e.g., "scan the code to watch the video").

The following four criteria are more related to technical features of the QR codes and influence the usability of mobile tagging. These criteria are often ignored when QR codes are merely being used as a design element in print media. If, for example, more than 60 characters are embedded in a QR code, the rate and speed of recognition may be significantly impacted, depending on the mobile device. Therefore, redirects and URL shorteners should be used in order to reduce the number of characters. QR codes should be positioned in the layout of the print media to ensure recognisability and to facilitate scanning. Furthermore, the positioning of the medium itself in terms of scan distance and angle as well as lighting conditions and network coverage availability has to be considered. As far as the sizing of the QR code is concerned, the relation between the scan distance and the required size of the QR code must be taken into consideration. As a rule of thumb, the ratio of scan distance to code size can be taken as being 10:1 [24]. A scan distance of 20 cm therefore results in a QR code size of around 2 cm. Correspondingly, a QR code on a poster or placard must be larger, as we must assume a much larger scan distance. Similarly to the integration of a large number of characters, a change in the QR codes' design can significantly impact the robustness of the codes. The error correction mechanisms integrated within QR codes allow for redesigning and even partial coverage of the code by logos etc. Excessive redesign due to logos, rounding of corners or choice of colours, however, can cause decoding to become impossible or limited, depending on the mobile device used.

The last two recommendations are process oriented criteria. Testing is essential for the success of QR code integration in print media. One reason is to ensure good usability of the code in the context of its positioning within the final layout of the print media. In this context it has to be considered, for example, that the QR code as a graphical element might be subject to post processing, i.e., affected by subsequent production stages within the media

production chain. For example, margins of QR codes to the surrounding page content must be respected in order to ensure readability and the code should not be distorted.

Since QR codes are a cross-media technology, changes with regard to the linked online content can be another source of failure and must be considered during testing. For example, if the QR code is linked to targets in a content management system, it has to be ensured that the web addresses remain unchanged for the duration of the campaign to avoid broken links resulting in error pages in the browser. Equally as important as the testing before printing is the tracking of usage after publication of the magazine. Typically, the reception of content in print media cannot be measured directly. In contrast, information retrieval triggered by a QR code scan can be analysed and monitored. This can be done to measure the response rate of a QR code campaign or to evaluate performance differences if the QR code campaign is printed in different media or at different locations (i.e., posters with individualised QR codes).

3. Research Methodology

The preceding chapters have demonstrated that QR codes can be a technology that enables publishers to implement cross media publishing strategies. A basic requirement for success of these strategies is the appropriate integration of these codes in magazines considering the aforementioned best practices. However, due to the lack of studies in this area, little is yet known about the status quo of QR code application in this area.

Table 1. Popular Magazines Included in the Study [25]

Popular Magazine	Sales and Advertising Turnover 2012 [in million EUR]	Frequency of Publication	Analysed Issues
Der Spiegel	289.857	Weekly	1-52/2012
Stern	220.035	Weekly	1-52/2012
Focus	174.162	Weekly	1-52/2012
Hörzu	139.080	Weekly	1-52/2012
Bunte	132.360	Weekly	1-52/2012
TV Digital Unity Media	130.424	Fortnightly	1-26/2012
TV Movie	117.430	Fortnightly	1-27/2012
Bild der Frau	107.879	Weekly	1-52/2012
Brigitte	106.931	Fortnightly	1-26/2012
TV 14	102.981	Fortnightly	1-26/2012

Against this background, a one year study on QR code application in German popular magazines was conducted. The data were collected between 1st January 2012 and 31st December 2012. The data pool consisted of the ten popular magazines with the highest circulation volume in Germany

as shown in Table 1 and all the issues published during the said period were analysed. In order to identify the QR codes in the magazines, all the issues were viewed and examined page after page. Taking into account that some of the magazines have a weekly publishing frequency and considering the number of pages of each issue, it is evident that data collection was a very time consuming process. To avoid errors and for quality assurance reasons, the data collected were randomly reviewed by multiple people.

During the course of data collection, all cases of QR code integration in the analysed popular magazines were identified and entered into a database according to certain characteristics. On the basis of these criteria, the type of integration of the QR codes was described and the technical characteristics of the printed QR codes as well as the linked contents were investigated. These data were then analysed with the aim of answering the research questions presented in Section 1.

In the following, some selected results of the study are presented. It should be noted that the analysis is only based on the aforementioned sample of magazine titles and that this sample contains very diverse magazine formats. However, the sales and advertising turnover shown in Table 1 suggest that these magazines are relevant to and might have a significant influence on the industry. The analysis of an entire year's issues of these magazines also enables us to identify certain trends and developments.

4. Study Findings

As mentioned in the introduction, the first objective of the study was to identify the status quo and the frequency of QR code usage in German popular magazines. In total, 2,591 of these codes were found in the magazine sample. When looking at the four quarters of the year 2012, we see that the number of printed QR codes considerably increased during this time. The number of codes rose by 140 percent from the first to the fourth quarter. The trend line shown in Figure 1 suggests we can expect further growth.

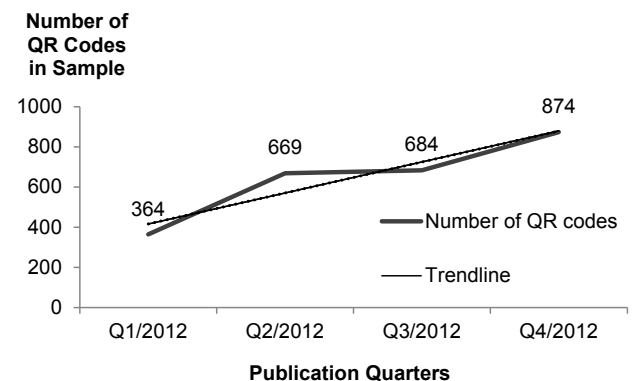


Figure 1. Number of QR Codes in the Sample of the Study

These findings are in line with the increasing number of QR codes in print magazines as observed by studies of other national markets. *Nellymoser*, a mobile marketing and

technology service provider, analysed the top 100 U.S. magazines from Q2 2011 to Q2 2012 and identified a growth of 107 percent in the number of mobile action codes (including QR codes) [14].

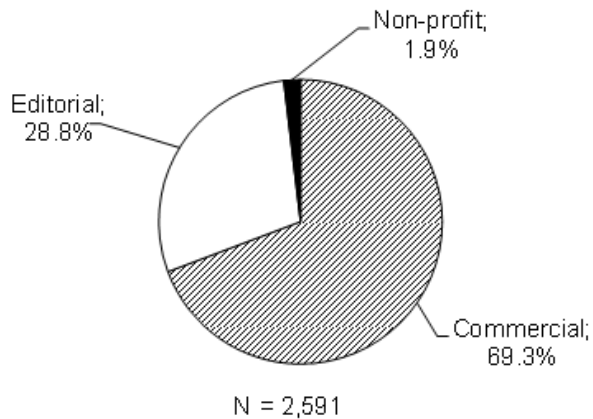


Figure 2. QR Code Usage by Content Category

As mentioned in the introduction, mobile tags can be linked to various targets. Depending on the contents they are linked to, we can differentiate between integration types with editorial, commercial (e.g. advertising, product information, and company information), and non-profit (e.g. information by non-profit organisations) content. Figure 2 shows the distribution of the QR codes in these categories by the annual average over all magazines in the sample. Hence, the QR codes analysed in the study were mostly in the commercial category.

Over the course of the year, these percentages fluctuated considerably. It was clearly recognisable, however, that the total amount of editorial content linked to QR codes increased over the course of the year 2012. While in the first quarter of 2012 only 18 percent of the analysed QR codes applied to editorial content, editorial usage increased to 28 percent across all magazines in the fourth quarter of 2012. If we analyse the kind of integration for each magazine we can also see that only four of the magazines included in the study even used QR codes at all to add editorial content to their articles in 2012 as presented in Figure 3.

Magazine Titles

(Number of QR Codes in 2012)

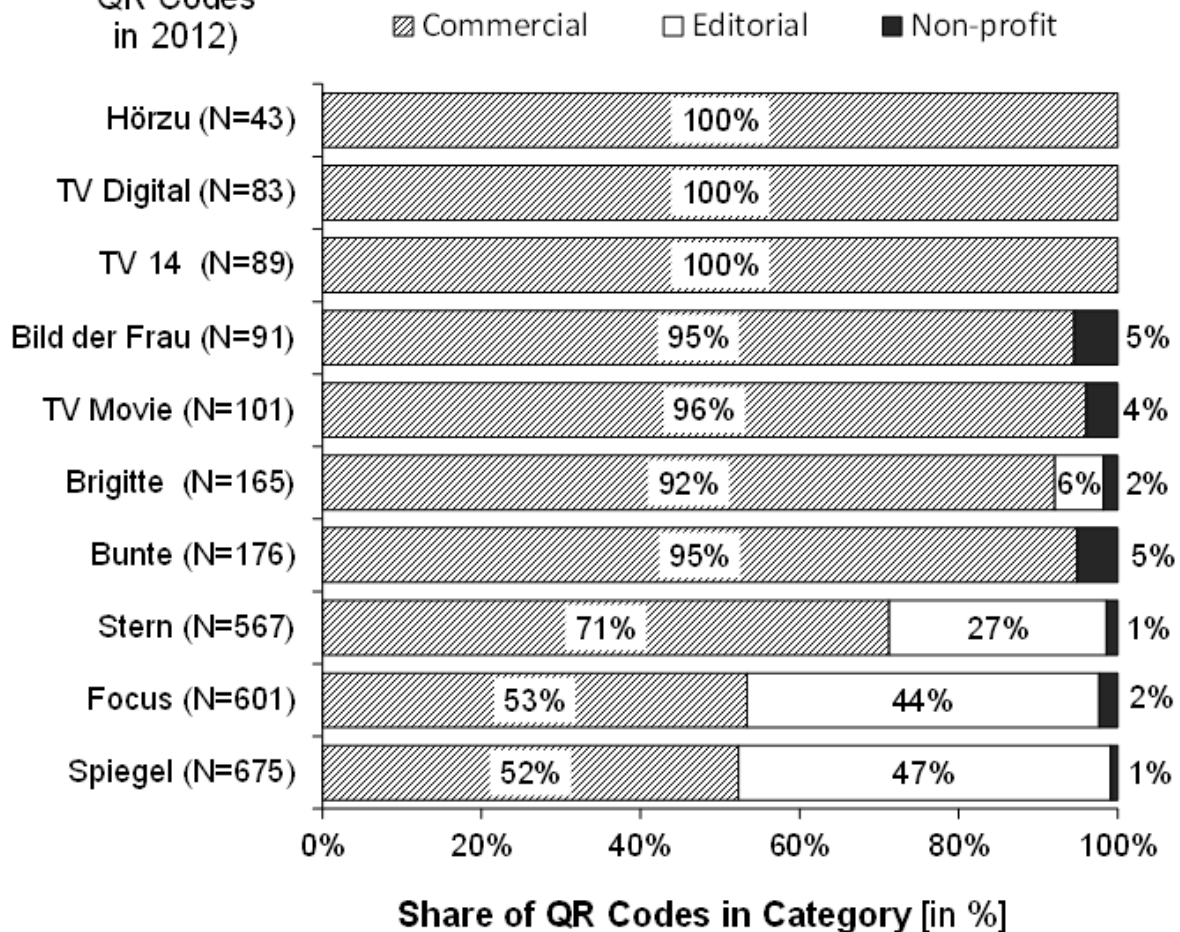


Figure 3. QR Code Usage by Category and Magazine Titles

All of the titles with a more distinct editorial usage of QR Codes are weekly news magazines (Spiegel, Focus, Stern). These three magazine titles also count for 71 percent of all the QR codes registered in the analysed sample. Therefore it can be concluded that a connection between the editorial and commercial usage of QR codes exists. If the magazine's editorial office integrates QR codes in the articles, the readers become aware of and familiar with this technology. This in turn could stimulate additional commercial use of QR codes aiming to participate from readers accustomed to QR codes. The strong editorial QR code usage by news magazines only could be explained by the actuality of their content which readers are eager to get more information about and the broad availability and easy access to news related content in alternative multimedia formats.

The lack of editorial usage of QR codes in the other magazine titles could be due to the fact that the editors either have not familiarised themselves with QR code technology, have not yet recognised its potential, or that they consider QR codes to be an unsuitable approach for their reader target groups and therefore prefer to use traditional means to reference further information on the Web. "Bunte", for example, a popular German magazine with news, lifestyle, and celebrity information, referred to further information on the Internet in many of its articles by quoting the respective URL. Furthermore, some magazines also used technical alternatives to QR codes. The magazine "TV Movie", for example, offers a link to audio/video files via the image recognition app "Trailerview" [26]. Some publishing houses also have their own offers for tablets and smartphones in the form of paid content. Axel Springer AG, for example, uses its own mobile apps to market its digital versions of "Hörzu", "Bild der Frau" and "TV Digital" for iPhones [27]. Furthermore, these mobile apps can also be used to digitally extend specific sections of a magazine. "Kochen mit Bild der Frau" [Cooking with Bild der Frau] is such a paid mobile app that contains ideas for cooking recipes from the correspondent magazine title [28]. In these cases, the article-related use of QR codes to link to editorial content on mobile websites may then be seen as unnecessary or even as competition to their own fully digitalised service offerings.

With regard to the first two research questions posed in Section 1 it can be stated that: QR codes were used in all of the analysed top-selling German popular magazines. Intensity of usage differed greatly between the ten magazine titles. The usage increased during the course of the year 2012. Most of the QR codes were linked to commercial contents. Especially the popular news magazines, however, have already started using QR codes more intensively for editorial purposes. It can be assumed that there is a strong relationship between editorial and commercial usage.

A further aim of the study was to examine the targets connected to the use of QR codes in popular magazines and their optimisation for mobile devices. Non-profit contents were not included as they only accounted for a very small share of the integrated QR codes. Figure 4 shows that when used for editorial purposes, QR codes were mostly linked to

video contents. More than 86 percent of the 728 editorially used QR codes examined in this study refer to such targets. Most of the videos could be accessed from the website of the respective magazine. In addition, in around 23 percent of the cases, external video platforms such as *Vimeo* and *Youtube* were used. The magazine "Stern", for example, used the video cloud *Brightcove*. This universal delivery service also carries out the automatic adaptation to the specific features of the respective mobile device.

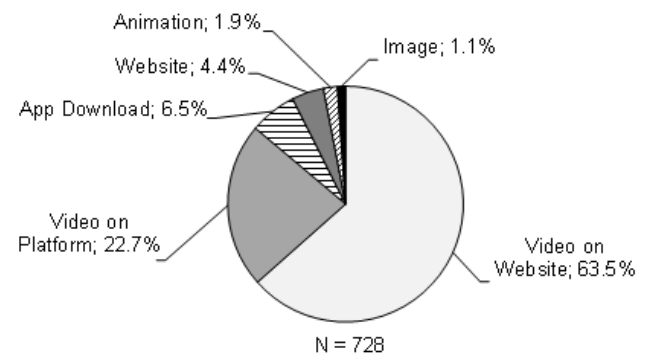


Figure 4. Linked Content of Editorial QR Codes

The targets in the commercial sector were more diversified but used fewer kinds of media. In total, 16 different kinds of targets were registered. Figure 5 shows those target categories which accounted for more than five percent of the commercial QR codes in all the popular magazines included in this study. More than 60 percent of the analysed 1,765 QR codes were linked to a website. Within this category most of the QR codes referred to a landing page which was related to the specific campaign or context of the published QR code (44.9 percent). The other codes (15.8 percent) within the website category were linked to a generic webpage with no direct relation to the context of the published QR code. This is rather counterproductive with regard to value-oriented usage of mobile tagging that depends on integration with regard to the mobile usage context.

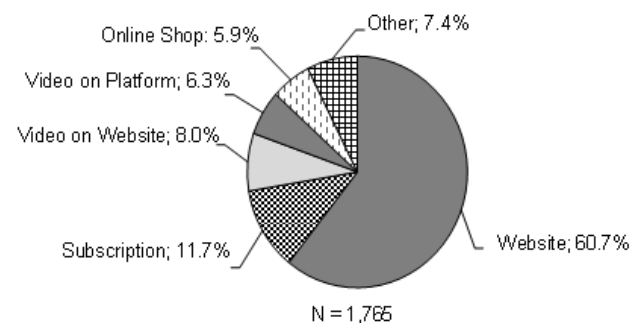


Figure 5. Linked Content of Commercial QR Codes

Another common field of application were subscriptions in which QR codes were used in order to gain new subscribers among the readers and to initiate such contracts online via a mobile device. Video platforms such as *Youtube* and *Vimeo*, however, which enable the customer to interact

via social media, were used on a considerably smaller scale than for the editorial use of the codes. Direct links to online shops were available, enabling readers to order the products advertised in the advertisements directly using their mobile devices, but currently only at a low rate of around 6 percent of the QR codes examined in this study. Although 71 percent of all German companies already had a Facebook page in 2012 [29], links to social media networks were not widespread and accounted for less than one percent of the targets in the category “Other”. Further link targets not commonly used were, for example, app downloads, podcasts, book page previews and animations. A possible reason for the strong focus on traditional websites among the QR codes with commercial content could again be the lack of awareness of the diverse opportunities of available digital contents.

The findings of our study are again in line with the observations published in other industry reports. According to the aforementioned study [14], video (40 percent) was the most common code content within the top 100 U.S. magazines analysed by *Nellymoser* in Q2 2012, followed by opt-ins/subscriptions/sweepstakes (19 percent), and social media (18 percent). However, there is a significant difference between the individual shares of the content types, which could also be due to divergent markets and methodologies – the U.S. study did not explicitly differentiate between editorial and commercial content. The identified usage of the QR codes in the magazines also seems to correspond to the user preferences when scanning the codes. In its Q1 2012 report, the mobile engagement platform *ScanLife* reported that the top QR code contents – according to the number of scanned codes – were video, app downloads, and product details [30].

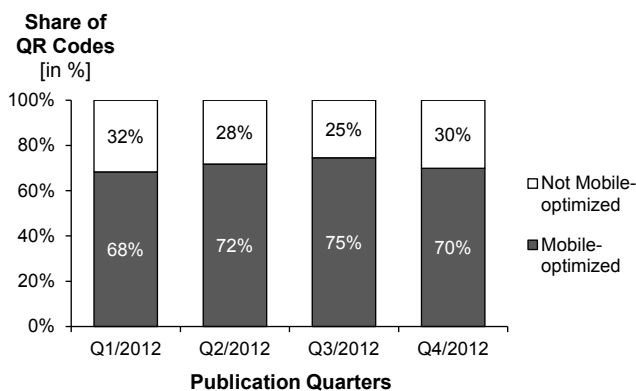


Figure 6. Mobile-Optimisation of QR Code Targets

A final research question formulated in Section 1 of the study referred to the implementation of and compliance with best practices when integrating QR codes in print media. In this section, results of the study on the subject of mobile-optimisation of the link targets, usage of deep links, as well as the number of characters encoded in QR codes will be presented. As discussed in the best practices section, linked websites and other targets of QR codes should be

optimised for mobile devices so as not to diminish the user experience. Figure 6 shows that more than two-thirds (annual mean: 71 percent) of the examined QR code targets were already optimised for mobile devices in 2012.

The lack of such an optimisation in more than one quarter of the analysed codes shows that there is still room for improvement. Missing mobile-optimisation can affect the user experience to varying degrees, depending on the device used. Performance and multi-touch gestures of modern smartphones can help to make even desktop content accessible to mobile devices but a suitable target is still the basic requirement for a meaningful and convenient use of mobile tagging. However, as can be seen in Figure 6, we could not observe a trend towards improvement in terms of optimisation for mobile devices over the course of 2012. The percentages remained largely unchanged. Usage of deep links was another recommendation of the best practices discussed in detail in Section 2. This is needed to link the user as directly as possible to relevant information. Surface links on the other hand, which present a link to the initial or main web page of a company website, i.e. a homepage, are fundamentally unsuitable, as they leave the user to navigate to the relevant information, which can be very time-consuming on mobile devices. In Figure 7, we see that surface links were present in 2012 but that these only accounted for a small share of 13 percent at the most. This share remained mostly unchanged over the course of the year. The area of popular magazines therefore appears to have recognised the need for links that lead directly to relevant contents.

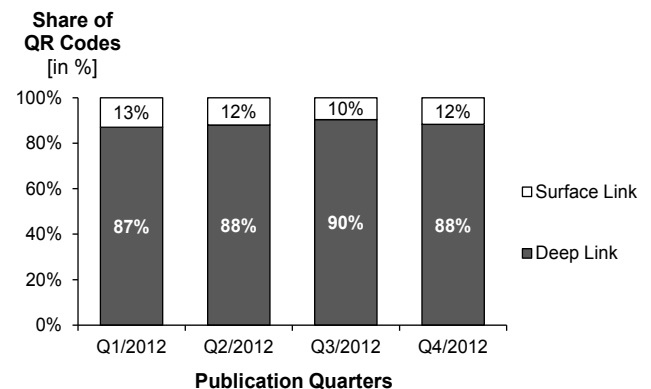


Figure 7. Deep Links and Surface Links in the QR Codes

The number of characters embedded in a QR code was already discussed in Section 2 as being an important criterion which can influence the quality of the user experience and the usability of QR codes. If too many characters are used in such a code, this can unnecessarily complicate and slow down the scanning and decoding process, depending on the mobile device used. Taking this into account, we can take the number of around 60 as a recommended benchmark for the number of characters to be embedded. The QR codes included in the study were therefore also examined with reference to the number of embedded characters. In order to

allow for the presence of redirects, the calculated results only show the number of characters in the code itself and not those of the final target which the QR code is linked to. As Figure 8 shows, around 94 percent of the QR codes were within the range of 1 to 60 characters. Only around 6 percent exceeded the number of 60 characters. We can therefore also assume that here, too, the respective best practices are known and observed.

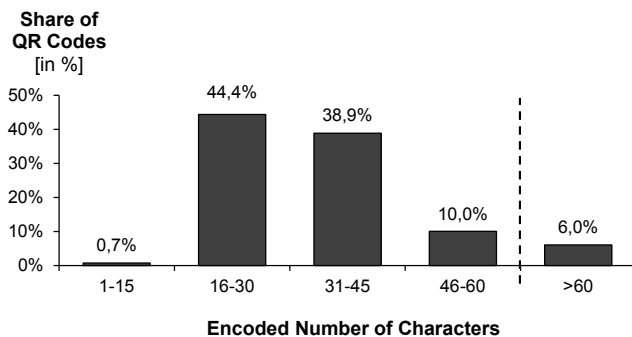


Figure 8. Number of Characters Encoded in the QR Codes

5. Conclusions

In 2012, QR codes were already implemented comprehensively in the ten popular magazines with the highest turnover in Germany. Moreover, the frequency of use increased significantly over the course of the year. QR codes were mainly applied for commercial purposes; here mostly with reference to websites and homepages, although many other contents were linked via the mobile tags. An integration of QR codes for editorial purposes, however, was only implemented by a few magazines. Here, links were most frequently made to multimedia contents or video contents. 71 percent of the link targets were already optimised for mobile devices in 2012. Important best practice guidelines were also observed when integrating codes, which means that mostly deep links were used and the number of characters in the QR codes was kept to a minimum. The criteria mentioned above are, however, the essential basis for meaningful and successful use of QR codes, which means that if they are not observed to the full, room for improvement immediately occurs. In addition, it should be emphasised that most of the codes are linked to supplementary information. A more sophisticated integration in the direction of the aforementioned advanced customer acquisition and retention strategies or interactive mobile advertising is still rather rare. Thus it appears that the potential of QR codes to realise new cross publishing strategies has not yet been fully exploited.

The study at hand gives some first insights on QR code usage in German popular magazines. However, some limitations of the study have to be considered when interpreting the results. Only one single year and a limited sample of magazines could be examined due to time and budget restrictions. In addition, insights on the perception

and usage of the QR codes from the magazine readers' perspective have not been analysed. For this reason, long-term analyses with larger samples and an inclusion of the user perception must be subject to further research.

However, this is only possible if the appropriate data are made available by popular magazines and advertisers. Up to now, there are hardly any findings and only few data have been published on the response rates or effectiveness of QR code use [e.g. 14]. Thus the study at hand cannot answer the question whether the rising number of QR codes observed is caused by sustainable benefits for the publishing houses or is just a temporary result of a bandwagon effect whereby the omnipresence of the codes provokes imitators and an increasing usage by advertisers and publishing houses. This illustrates the need to establish effective usage and response tracking and share this knowledge in the industry to be able to provide benchmarks and to advance QR code usage in print media.

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