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RESEARCH PAPER

Commerce-oriented revenue models for content providers: an experimental study of commerciality's effect on credibility

Benedikt Berger [1]

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Abstract If content providers want to build successful businesses on the Internet, they have to establish viable revenue models online. Because selling content or ads is less profitable online than offline, content providers have begun to generate revenues by selling products or services related to their content. However, this incentivizes content providers to increase sales by manipulating their content and thus may harm the content's credibility. We conducted a vignette-based online experiment to test the effect of content providers' revenue models on the credibility of two different types of content. Although our results revealed significant differences between revenue models for one of the content types, we did not find evidence that users distrust content providers employing commerce-oriented revenue models. Our findings shed light on the relationship between credibility and monetization of content on the Internet and provide helpful insights for practitioners in the media industry regarding optimal revenue generation strategies.

Keywords Content credibility · Content providers · Revenue models · Affiliate marketing · Content-driven commerce

JEL classification M15 M31

Responsible Editors: Ioanna Constantiou and Hans-Dieter Zimmermann

✉ Benedikt Berger
benedikt.berger@bwl.lmu.de

[1] Institute for Information Systems and New Media, Ludwig-Maximilians-Universität München, Ludwigstraße 28 VG, 80539 Munich, Germany

Introduction

Over the last decades, the market environment for content providers has deeply changed. Content providers are companies that create, bundle, and distribute professionally generated content (Hess 2014). The advancement of information technologies has substantially decreased the costs and increased the speed of content processing. However, these technologies also altered recipients' content consumption behavior. First, the willingness to pay for content provided in online formats is lower than for content provided in offline formats (Berger et al. 2015). Second, the simplicity of copying and sharing digitized content has given rise to the availability of free (and sometimes illegal) alternatives (Smith and Telang 2009). As a result, it has become more difficult for content providers to sell their content. Depending on the industry, content providers have tried to mitigate this problem in different ways. While the music and the movie industry by now rely on subscription-based streaming services (Dörr et al. 2013), many publishers have decided to refrain from charging for their content to maximize advertising revenues instead (Pauwels and Weiss 2008). However, the advertising market on the Internet is dominated by platforms such as Facebook and Google and publishers have not been able to compensate the declining income from print media with digital ad revenues (Pew Research Center 2015).

In search of new revenue sources on the Internet, more and more publishers seek to profit from sales of non-content items (Forrester Consulting 2012; Niedzwiadek 2016; Abnett 2015). To do so, they either refer their readers to a merchant's store in return for a commission, as is the case in affiliate marketing, or they sell non-content items themselves, which is called content-driven commerce (Berger and Hess 2015; Gallaugher et al. 2001). These commerce-oriented revenue models are particularly attractive for publishers of

special interest content (e.g. fashion, travelling, or motoring), which is consumed prior to purchase decisions and offers a good surrounding to place product offers. We can distinguish between two kinds of content in this regard (Alexander and Parsehian 2014): product-related content (PRC) such as reviews or images of a specific product to be sold and context-related content (CRC), which concerns whole product categories or use cases of offered products (e.g. shopping guides or how-to videos).

Apart from the revenue opportunities revealed by commerce-oriented revenue models, concerns have been raised regarding the credibility of content used to induce sales (Firnkes 2014). Because content providers are generally perceived as more credible than other product information sources, they have a high influence on consumers' attitudes (Cheng et al. 2014; Flanagin and Metzger 2007; Wang 2005). Content providers employing commerce-oriented revenue models could be expected to take advantage of this position and to manipulate their content to drive sales. Such an inference may be drawn in particular for providers of PRC due to the close link between source of income and content. This may decrease the providers' credibility and thus ultimately their profitability, since credibility is an important predictor of popularity among Internet users (Du 2014). Previous studies have investigated differences in credibility perceptions between commercial and independent sources (Flanagin and Metzger 2007; Lee et al. 2011), advertising formats (Lord and Putrevu 1998; Tutaj and van Reijmersdal 2012), and sources of product recommendations (Luo et al. 2013; Willemsen et al. 2012). However, the credibility of professionally generated content monetized by commerce-oriented revenue models has not been examined yet. Furthermore, it remains unknown whether revenue models affect the credibility of different kinds of content in the same way. To close this research gap, we want to answer the following research question:

> *RQ: How do commerce-oriented revenue models affect the credibility of product and context-related content?*

In response to our research question, we conducted a vignette-based online experiment. In the basic version of the experiment, which has been reported on by Berger (2016), participants were randomly assigned to three groups and shown a screenshot of a website with a professional notebook review (i.e. PRC). The revenue model of the website publisher was manipulated and differed between each group. After reading the notebook review, respondents were asked to rate its credibility. This study presents the extended version of the experiment including another three groups, which were shown a shopping guide for notebooks (i.e. CRC) instead of the notebook review. The revenue model manipulation between these groups was the same as between the groups seeing the PRC. Overall, the extended experiment allowed us to assess the effect of media companies' revenue models on the credibility of different kinds of content.

The hypotheses underlying our experimental design were derived from source credibility theory and credibility evaluation models from communication science. Our study is the first to examine the relationship between these concepts and media revenue models. Linking communication and information systems (IS) research, we contribute to a better understanding of content credibility evaluation on the Internet. Furthermore, our findings have important implications for practitioners regarding the balance between commercial interests and the perceived trustworthiness of content providers.

Theoretical foundation

Credibility concepts

The concept of credibility has been subject to manifold investigations in persuasion research, IS, and media science. In the literature on persuasion, credibility is perceived as a source-related concept. Accordingly, O'Keefe (2002, p. 181) defines credibility as "the judgement made by a perceiver (e.g. a message recipient) concerning the believability of a communicator." Source credibility is commonly understood as a multidimensional construct and several factor-analytic studies have tried to establish measurement scales for source credibility (Ohanian 1990). There is a consensus that the dimensions expertise and trustworthiness identified by Hovland et al. (1953) are the main source credibility components. Both are attributes ascribed to the communicator by the receivers. Specifically, trustworthiness describes the source's motivation to communicate truthfully, whereas expertise is determined by the source's ability to make valid assertions.

Despite their importance in digital communication, the investigation of credibility concepts in IS is mostly limited to the contexts of decision support systems, recommendation agents, and website design (Lowry et al. 2014; Xiao and Benbasat 2007; Rieh and Danielson 2007). This is also because the concept of trust is much more widely applied. Though some scholars use trust and credibility interchangeably (e.g. Kohring and Matthes 2007), we agree with Tseng and Fogg (1999) in that trust describes the overall dependability of a person or an information system, whereas credibility is concerned with the believability of the information. In fact, source credibility has been shown to be an important predictor of trust in online environments (Lowry et al. 2014).

In contrast to persuasion research and IS, which treat credibility as a prerequisite for persuasiveness or trust, media science is interested in the credibility of communication per se. Apart from source credibility, two further credibility concepts have evolved in this research area. First, media credibility

refers to the relative degree of trust that people have in different mass media such as newspapers, magazines or television (Metzger et al. 2003). Second, message credibility "is an individual's judgement of the veracity of the content of communication" (Appelman and Sundar 2016, p. 5). All in all, we can distinguish between credibility concepts at three different levels: source, medium, and message (Lucassen and Schraagen 2012; Metzger et al. 2003). Because our paper deals with online content, which does not differ by medium, we focused on source and message credibility. In accordance with our research question, we framed the content communicated on a website as the message and the company running the website as the source of this message.

Credibility evaluation

The existence of credibility concepts at different levels raises the question which of these receivers actually evaluate. The most prominent frameworks that explain credibility assessment are the Elaboration Likelihood Model of Persuasion (ELM) by Cacioppo and Petty (1984) and the Heuristic-Systematic Model (HSM) by Chaiken (1980). In spite of differences in the details, both models propose that the processing of communication can be described by a continuum between two routes. On the central route, receivers spend a lot of cognitive effort evaluating the message's arguments and their validity. The resultant attitudes are supposed to be relatively persistent and predictive of the receivers' subsequent behavior. On the peripheral route, receivers derive their attitudes from non-content cues and heuristics. These attitudes are less stable over time and exert less influence on the receivers' actions. Whether receivers tend to the central/systematic or the peripheral/heuristic route depends on their motivation and cognitive ability to process the reasoning of a message, which is called elaboration likelihood. The elaboration likelihood is influenced by several factors such as the receivers' prior knowledge about the topic of the message, its personal relevance to the receivers, or distractions during its processing.

In online environments, the receivers' burden of credibility evaluation has increased because much of the information published on the Internet bypasses professional gatekeeping processes and therefore lacks traditional authority indicators (Metzger and Flanagin 2013). In conjunction with the short time that users spend at a website and their limited cognitive capacity, this probably leads to an increased application of heuristics. Thus, theories that specifically describe online information processing have been put forward. Wathen and Burkell (2002) suggest that users first assess the surface characteristics of a website based on its appearance, usability, and organization, before judging the credibility of its source and content. Only if these evaluations are positive, will users actively deal with the information provided. Fogg's (2003) Prominence-Interpretation Theory states that the perceived credibility of a website depends on which of its elements are actually noticed by the users (prominence) and how they evaluate these elements (interpretation). Since credibility assessment plays a focal role in our experiment, we drew upon these models and theories when formulating our hypotheses.

Revenue models for media companies

In comparison to credibility concepts, revenue models are widely discussed in IS literature. A revenue model is part of a company's whole business model and describes how a company's value creation activities lead to earnings (Amit and Zott 2001; Osterwalder et al. 2005). The value creation of media companies evolves around the organization of public communication (Hess 2014). Media companies can employ two different types of business models. On the one hand, they can create, bundle, and distribute content themselves. We refer to these media companies as content providers. On the other hand, media companies can provide platforms, which allow third parties, including users, to offer their content. Media companies following this approach are called platform operators (Hess 2014). Because platform operators do not create content themselves, their revenue model is unlikely to affect the content credibility. Thus, our study focuses on content providers.

To monetize their value creation activities, content providers can employ two kinds of revenue models. Direct revenue models are based on payments by users of the content and include subscriptions, usage-related fees, licensing, and content syndication (Gallaugher et al. 2001; Ha and Ganahl 2004; Zerdick et al. 2000). In contrast, advertising and affiliate marketing are indirect revenue models, in which content providing is financed by third parties paying for access to recipients. Advertising rates were traditionally calculated based on reach or impressions, but on the Internet cost-per-click pricing is possible as well (Kursad et al. 2012). In affiliate marketing, the content provider is reimbursed depending on the actions a user takes after being transferred to a merchant's website via an affiliate link or banner. Several compensation models including cost-per-conversion (if users become customers) or revenue sharing may be employed (Gallaugher et al. 2001; Libai et al. 2003).

Instead of referring users to external websites, content providers may also sell non-content items on their own, which is referred to as content-driven commerce (Berger and Hess 2015). Condé Nast, for example, has decided to transform its editorial website Style.com into an e-commerce platform (Abnett 2015). Although it is not the content that is paid for, content-driven commerce is a direct revenue model as the revenues stem from the recipients rather than third parties. One might argue that content-driven commerce actually constitutes a whole new business model type, because the

integration of commerce alters the value creation of the content provider. Nevertheless, we summarize affiliate marketing and content-driven commerce under the term commerce-oriented revenue models.

Whereas affiliate marketing and advertising have in common that content providers refer users to third parties, affiliate marketing and content-driven commerce share the dependence of the content providers' earnings on profitable customer actions. These profitable customer actions are more likely if the offered products match the recipients' interests. Therefore, commerce-oriented revenue models require a fit between the content that attracts customers and the products to be sold. Content and products can be related in two different ways (Alexander and Parsehian 2014). First, the products themselves can be the subject of the content such as in product reviews, tests, or demonstrations. We refer to this content as PRC (Karande et al. 2006). PRC typically contains information about products' technical specifications and outward characteristics (Goh et al. 2013). Second, the products and the content can be related by a common context without the products being the specific subject of the content. An example for this relationship could be a sports news website selling sportswear. The website's content does not contain information about the sportswear itself but is still likely to meet the interest of potential customers because the content and the products both appeal to people interested in sports. We describe content that shares a common context with certain products but does not contain specific information about these with the term CRC. Our study investigates whether the credibility of PRC and CRC differs depending on its monetization.

Development of hypotheses

The effect of revenue model on source credibility

Early experiments in persuasion research showed that a forewarning of the persuasive intent of a message reduces its persuasiveness owing to increased counterargumentation (Hovland et al. 1953; Petty and Cacioppo 1979). Consequently, sources that are suspected to be manipulative are judged as less credible. This persuasive intent heuristic also holds in online environments and can be triggered by commerciality cues. Flanagin and Metzger (2007) found that providers of commercial websites were rated significantly less credible than those of news websites. Xiao and Benbasat (2007) proposed that users will trust product recommendation agents offered by independent providers more than those offered by vendors. Participants in qualitative studies regularly expressed concerns regarding the credibility of commercial sources either (Hilligoss and Rieh 2008; Metzger et al. 2010).

The high credibility ascribed to most content providers is rooted in their perception as independent third parties (Flanagin and Metzger 2007). They are supposed and believed to pursue an objective stance and keep editorial content free from commercial interests. The independence of content providers from vested interests is a prerequisite for their trustworthiness (Moore et al. 1989). However, if content providers employ commerce-oriented revenue models, their income depends on the sales induced through their content. This incentivizes them to create editorial content that is supposed to increase the number of sales. Therefore, their motivation to communicate truthfully is lowered. Given that recipients are able to discern this conflict of interest, the perceived trustworthiness of content providers as information sources may be affected (Folkes 1988; Escalas 2007). Specifically, the content providers' trustworthiness should be the lower, the higher their interest in realizing sales is. This interest should be higher for content providers relying on commerce-oriented revenue models than for those relying on advertising, which generates revenues that are independent of sales. Among the commerce-oriented revenue models, content-driven commerce should elicit a higher commercial interest than affiliate marketing, because the sales risk lies with the content provider instead of an external merchant.

The rationale that commerce-oriented revenue models create incentives for content providers to twist their content to increase product sales revenues holds only if the content can actually be manipulated towards this goal. By definition, PRC is easy to manipulate in favor of a product. However, it seems unlikely that recipients perceive the providers of CRC as less trustworthy because they sell related products. Based on this reasoning and the previous research findings we hypothesize that the credibility of PRC providers varies depending on their revenue model owing to changes in their trustworthiness while the credibility of CRC providers does not. Accordingly, we propose the following hypotheses:

H1a: Providers of PRC employing affiliate marketing are less trustworthy than those employing advertising as a revenue model.

H1b: Providers of PRC employing content-driven commerce are less trustworthy than those employing affiliate marketing as a revenue model.

H2: The trustworthiness of providers of CRC is not affected by their revenue model.

Whereas we expect providers of PRC to be less trustworthy with increasing commercial interest, we do not have a reason to believe that commerce-oriented revenue models affect their expertise. Only few studies have yet investigated influences on a sources' perceived expertise because most researchers employ it as an independent variable and measure its effect on message credibility or persuasion (Pornpitakpan 2004). Till and Busler (1998) found that celebrity endorsers' expertise is perceived to be higher if there is a fit between the celebrities'

profession and the endorsed products. Similarly, the websites of established media brands have a higher perceived expertise in news topics than websites from independent online-only news sources or search engines (Chung et al. 2012). These findings point to the fact that expertise is a domain-specific concept that indicates the possession of certain knowledge, experience, or skills (Lord and Putrevu 2009). Accordingly, content providers' ability to share valid insights with their recipients depends on the employees' experience and knowledge in the domain covered by the content (Ohanian 1990). As long as a change in content providers' revenue model does not alter this domain, it should not have an effect on the content providers' perceived expertise. Thus, we hypothesize:

H3: The expertise of PRC providers is not affected by their revenue model.
H4:The expertise of CRC providers is not affected by their revenue model.

The effect of revenue model on content credibility

The literature uniformly confirms the central role played by source credibility in the interpretation and evaluation of messages (McCroskey and Teven 1999). Information from highly trustworthy sources is generally perceived as more reliable and credible than information from sources regarded as low in trustworthiness (Pornpitakpan 2004). This relationship has been proved to hold in multiple contexts: the persuasiveness of a message advocating a political stance is higher if it stems from a credible communicator (Hovland et al. 1953); consumers respond more favorably to promotional information if the sources appear less commercial (Lord and Putrevu 1998; Salmon et al. 1985; Tutaj and van Reijmersdal 2012; van Reijmersdal et al. 2005); and at work, advice from a colleague is perceived as more useful if this colleague is credible (Watts Sussman and Schneier Siegal 2003).

The degree to which source credibility influences the perception of a message depends on its processing by the receiver. In the end, source credibility serves as a nominal cue that allows to assess information based on a simple heuristic (Sundar 2008). According to ELM and HSM, the lower the receiver's elaboration likelihood, the more influential this heuristic will be. Because content consumption on the Internet is rather cursory, the receiver's motivation and ability to systematically process content online is likely to be low (Fogg 2003). Thus, Internet users will draw inferences about the content from cues that are immediately available to them. Several researchers have noted that the source of content on the Internet may be hard to determine for receivers, since content can easily be shared and credentials are often missing (Metzger and Flanagin 2013; Sundar 2008). Nevertheless, first studies on the evaluation of message credibility in online environments found evidence for the reliance on source cues (Flanagin and Metzger 2007; Lucassen and Schraagen 2012; Xu 2013).

In the light of these results it is reasonable to assume that credibility of content on the Internet is affected by the credibility of the provider. Following Fogg (2003) and Wathen and Burkell (2002), recipients will probably integrate the provider's revenue model as a commerciality cue in their evaluation of the content, because advertisements, affiliate banners or product offerings are usually placed within or next to the actual content on a website. Following our previous argumentation, this cue should exhibit a negative affect on the credibility of PRC but no effect on the credibility of CRC. Therefore, we derive the following hypotheses:

H5a: PRC monetized by affiliate marketing is less credible than PRC monetized by advertising.
H5b: PRC monetized by content-driven commerce is less credible than PRC monetized by affiliate marketing.
H6: The credibility of CRC is not affected by the provider's revenue model.

The mediating role of source trustworthiness

Although the influence of source credibility on the perception of information has been demonstrated by many experimental studies, little is known about the simultaneous effects of external cues on both source and content credibility as well as the interaction between these. This might be due to a lack of measures to assess content credibility as a separate construct from source credibility (Appelman and Sundar 2016). Flanagin and Metzger (2007) found a joint effect of website genre on website, message, and source credibility, but did not investigate the interaction between those. In their study on online recommendations, Luo et al. (2013) modelled source credibility as a moderator between the characteristics and the credibility of a recommendation. In contrast, we evaluate the credibility of content independently from its specific characteristics. Because revenue models are a source-related concept, it is reasonable to suggest that their influence on content credibility will be mediated by source trustworthiness. Previous findings by Lucassen and Schraagen (2012) and Willemsen et al. (2012) support this rationale. Following this reasoning, our final hypothesis is:

H7: The effect of commerce-oriented revenue models on the credibility of PRC is mediated by source trustworthiness.

Research model

To summarize our hypotheses, we built a research model, which is depicted in Fig. 1. Overall, we can distinguish three

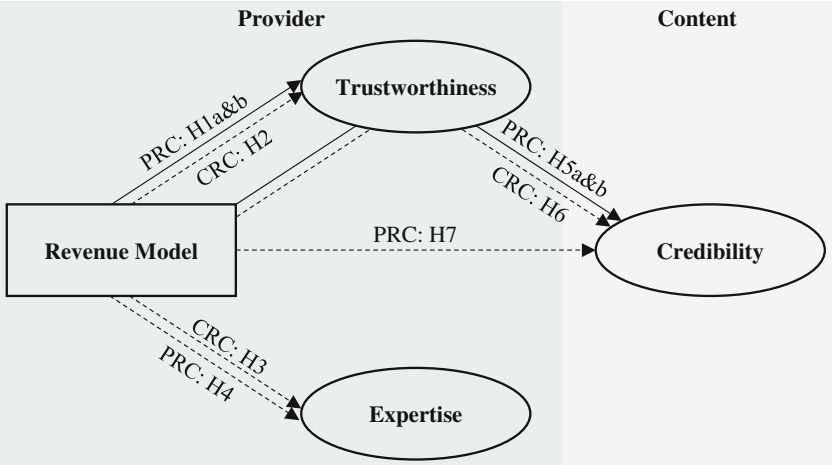

Fig. 1 Research model

Note: Dashed lines represent hypotheses suggesting the absence of a (direct) effect.

source-related concepts (the providers' revenue model, trustworthiness, and expertise) and content credibility as message-related dependent variable. Our hypotheses suggest that for PRC providers a change in revenue model influences the providers' trustworthiness and thereby the credibility of the content, whereas the providers' expertise remains unaffected. In contrast, a change in revenue model for CRC providers is hypothesized to have no effect at all on the investigated constructs. It is important to note that the depicted model does not contain any information regarding the direction of the hypothesized effects because it does not differentiate between the three revenue models.

Method

Experimental design

To investigate the hypothesized effects of commerce-related revenue models on the trustworthiness of content providers and the credibility of their content, we conducted a vignette-based online experiment. In vignette studies, participants are confronted with fictitious scenarios or objects (vignettes) before being asked to make judgements or decisions in reaction to these vignettes (Aguinis and Bradley 2014). Our vignettes consisted of carefully arranged screenshots of a fictitious website. These were preceded by a short textual description of that website's provider. This methodology was fit for the purpose of our study for two reasons. First, we were able to exclude unwanted influences on the participants' credibility evaluation process (e.g. from website appearance or organization), by creating screenshots that were identical except for the content to be judged and the hints of the content provider's revenue model. This allowed us to examine precisely the effects we hypothesized and ensured internal validity. Second, presenting a website screenshot in an online survey, which participants answered on their devices within their regular environment, closely mimics actual content consumption and thus should lead to higher external validity than laboratory experiments. While this comes at the cost of a hypothetical setting and a simplified representation of a website in the form of a screenshot, previous research has shown that individuals' reactions to scenarios induced by vignettes are similar to those constructed in laboratory experiments (Dennis et al. 2011; Shaw et al. 2003) and that screenshots can serve as realistic vignettes (Jeong and Kwon 2012; Lowry et al. 2014).

Our online experiment had a between-subject design with manipulation of revenue model (advertising vs. affiliate marketing vs. content-driven commerce) and was conducted for both PRC and CRC. The questionnaire was answered by German students and comprised the following steps: On the first page, participants were welcomed and instructed to answer all questions thoroughly. The subjects were then randomly assigned to one of the experimental groups and introduced to their vignette scenario. A short text asked the participants to imagine that they would be searching for a new notebook on the Internet. During this search they had encountered the website 'Bits&Bytes', which publishes content on consumer electronics such as professional product reviews, rankings, or shopping advices. 'Bits&Bytes' was supposed to have been established for several years and accordingly well-known. The participants were then told they would be shown a screenshot of that website on the next page and asked to read the article depicted in that screenshot carefully. To ensure a minimum amount of engagement with the screenshot, participants were required to stay on the page with the screenshot for at least one minute. After leaving this page, the post-experimental survey began. Returning to any of the previous pages of the questionnaire including the vignettes was not possible. The survey proceeded in the following order: dependent variables, specific control variables, and demographics. We chose a between-subject design for our experiment to

prevent confounding effects between the treatments (Charness et al. 2012), to keep the vignette setting as realistic as possible, and because the participants were not supposed to know the questions of the post-experimental survey before being exposed to the vignettes.

Vignette design and manipulation

The screenshots of the 'Bits&Bytes' website were modelled after existing consumer electronic websites and contained header, center column, right-hand column, and footer (see Fig. 2). A self-created 'Bits&Bytes' logo, the navigation bar, and a login link made up the header. Several boxes with elements typical for consumer electronics websites were placed in the right-hand column. The footer consisted of a reduced sitemap and the common links to the website's imprint, privacy policy, and terms of use. All aforementioned parts of the website, i.e. those with grey frame and white background in Fig. 2, were exactly the same in each of the screenshots.

In contrast, the article that the participants were supposed to read differed between two groups of vignettes: PRC and CRC vignettes. In the PRC vignettes, the website contained a review of a specific notebook. Besides the article text, it featured a short abstract, a small box with a summary of the review results, and images of the notebook from several angles. In the CRC vignettes, the screenshots showed a shopping guide for students searching for a notebook. The shopping guide provided information about the components that influence a notebook's performance and the criteria these components should meet for study purposes. We inserted stock photos of students using notebooks on campus in the shopping guide to ensure a visual experience that is comparable to the PRC vignettes. In both groups of vignettes, the article was displayed in the center column of the website.[1]

Within each group, we manipulated the website by indicating different revenue models in the area below the article in the center column and the top box of the right-hand column. In the advertising scenarios, two ads of a German bank were presented at these positions. We opted for a bank as advertiser because the company is well-known and obviously not related to the content of the articles. Thus, participants had no reason to believe that the articles might be biased. In place of the bank advertisements, offers from three different online shops to buy the notebook reviewed in the product-related article were pictured in the affiliate marketing vignettes. Both manipulated

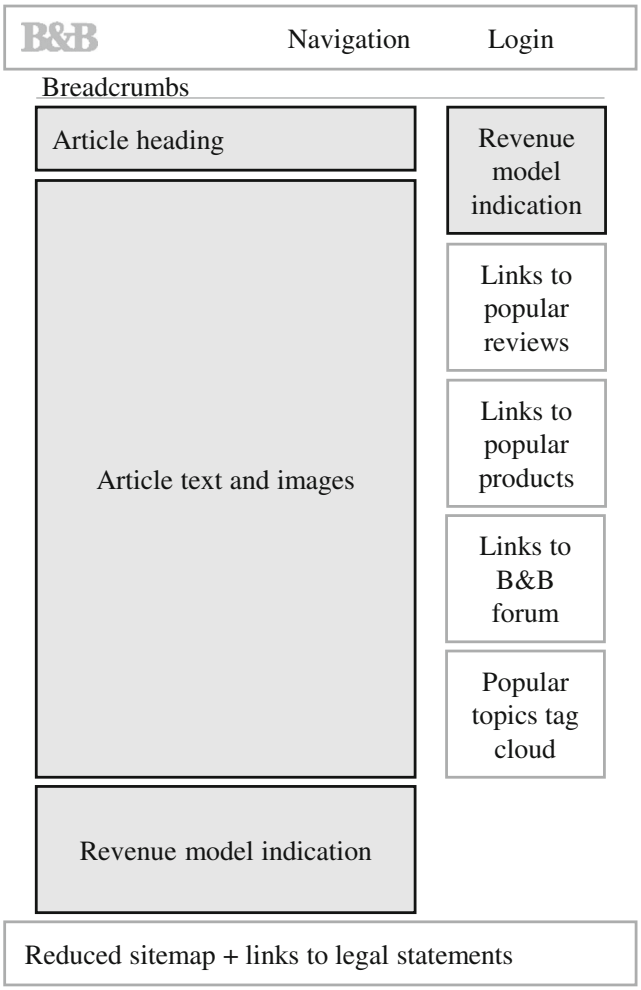

Fig. 2 Structure of the website shown in the vignettes

areas contained the logos of the three online shops, their price quotes, and three buttons labelled 'To the Shop'. Above the affiliate offers were headings that recommended these offers in the name of 'Bits&Bytes'. Finally, the vignettes for the content-driven commerce scenarios depicted the option to order the notebook from 'Bits&Bytes'. Similar to the affiliate vignettes, we placed a heading suggesting to buy the notebook from 'Bits&Bytes' at the top of each manipulated area. A price quote and an 'Add to Shopping Cart' button were prominently positioned below in both manipulated areas. Furthermore, information on shipping costs and availability was provided. In the center column, we added key facts of the hardware specifications, as is done by most online shops selling consumer electronics.

We chose a notebook purchase as the context of the vignettes for several reasons. First, we wanted to ensure that all participants in the experiment were familiar with the product category and had a basic level of knowledge about it. This is very likely to be the case for notebooks because nowadays almost every student owns a notebook for study purposes. Second, given that students have limited budgets, buying a

[1] We want to emphasize that the type of content is not treated as an independent variable in our experiment but is used to build two separate vignette groups. This is also reflected in the formulation of our hypotheses. The reason for this design is that it is not feasible to create articles that are identical in every aspect but their relation towards notebooks. In fact, the two articles used in our experiment may not only differ with respect to this aspect but also in style or understandability, for instance. Therefore, we conducted our experiment within these two groups but did not compare the results between these directly.

new notebook is a large investment for them. Therefore, decision involvement is high and the purchase is likely to be preceded by an information search on eligible products as suggested in our scenario. With this in mind, we selected a mid-priced notebook to be reviewed in the product-related article and offered in the commerce-oriented revenue model vignettes. Third, as many students will have encountered the situation of buying a notebook in the past or are likely to do so in the future, the realism of the scenario and the participants' motivation to immerse themselves in the task should be high. Summing up, both the choice of notebooks as focal topic of our vignettes as well as the use of a student sample were appropriate for our study.

Measures

In the post-vignette survey of our questionnaire we drew upon previously established constructs and adapted these to the context of our online experiment. For our three dependent variables source trustworthiness (TRUS), expertise (EXPE), and content credibility (CRED) we adopted the trustworthiness and expertise dimensions from Ohanian's (1990) widely cited source credibility scale and the reflective items from the recently developed message credibility construct by Appelman and Sundar (2016). Besides, we implemented several control variables. Because topic involvement and knowledge can affect how the credibility of a message is evaluated (Cacioppo and Petty 1984), we controlled for product involvement (Zaichkowsky 1994) as well as for product class knowledge (Smith and Park 1992). Similarly, we examined the participants' propensity to trust (Mayer and Davis 1999) and perceived intrusiveness of online ads based on the scale by Li et al. (2002). Whereas source trustworthiness, expertise, and product involvement were measured by seven-point semantic differential scales, the items of the remaining constructs were rated on seven-point Likert-type scales anchored at 1 (strongly disagree) and 7 (strongly agree). For our group comparisons we used summated scales based on the average scores of each multi-item construct (Zhu et al. 2012). All items were carefully translated into German. A back-translation by a person unrelated to the research project ensured that the meaning of the items was not altered. Apart from the constructs, we asked participants how much time they spend on the Internet for personal purposes on an average day and how often they order something online for personal use. Participants' age, gender, education, occupation, and income were also collected in order to control for a homogeneous distribution with regard to these demographics across the experimental groups.

Data collection

Before the experiment was carried out, we conducted a pretest to ensure that the vignettes were manipulated according to the experimental design and to ensure the comprehensiveness of the questionnaire. We obtained feedback from twelve respondents including practitioners, researchers, and students. Based on this feedback, we revised the vignettes as well as the wording of the questionnaire. The final experiment took place at the beginning of 2016. Since we wanted to obtain a student sample, we invited participants by mailing 5722 students of a large public university in Germany and by posting the survey link in university groups on Facebook. As an incentive, five shopping vouchers worth €30 each were announced to be drawn in a lottery among all participants. Overall, 463 subjects entered the survey. 371 of these were invited by mail and 146 were referred from Facebook. Out of this sample we received 364 completed questionnaires. Seven of these had to be excluded from analysis because their answers did not show any variance or because the participants had finished the survey in less than four minutes (the average time was around six and a half minutes). The average age of the remaining 357 respondents was 24.47 (SD = 6.42) years, 65% of them were female, more than 90% held a high school diploma, and 88% were students. The average reported personal Internet use per day was 2:55 (SD = 1:44) hours and 66% of the subjects stated to shop online at least once a month. More detailed demographic characteristics of the vignette groups and the overall sample are provided in Table 1. Further information the distribution of the participants across the experimental treatments is provided in Table 7 and Table 8 in the appendix.

Results

Control variables

To test whether subjects were distributed homogeneously with respect to the categorical demographic and control variables across the two groups of vignettes and the experimental manipulations, we applied Fisher's exact test. We did not find significant differences ($p > 0.1$) between gender, education, occupation, income, and online shopping frequency. Furthermore, a series of one-way analyses of variance (ANOVA) revealed no significant differences ($p > 0.1$) in terms of age or the continuous control variables propensity to trust, ad intrusiveness, and Internet use. However, product involvement and product class knowledge were significantly higher ($p < 0.05$) for respondents in the context-related content vignette group than in the product-related one. These differences were likely induced by the different types of the articles (product review vs. shopping guide). We did not find any significant differences ($p > 0.1$) in product involvement and product class knowledge across the revenue model scenarios within each group of vignettes. Because our hypotheses are concerned with differences between revenue models and not with differences between the two types of content, we can

Table 1 Frequency distribution of demographic variables in vignette groups and overall sample

Variable		PRC vignette group	CRC vignette group	Total
Gender	Female	113	119	232
	Male	68	57	125
Age	18–29	157	163	320
	30–39	20	7	27
	40–49	2	3	5
	50–59	0	2	2
	60+	2	1	3
Education	Elementary school	1	0	1
	Apprenticeship	1	0	1
	High school	98	90	188
	Vocational education	7	3	10
	Bachelor's degree	46	46	92
	Diploma/Master's degree	26	34	60
	Doctoral degree	2	3	5
Occupation	Student	161	153	314
	Employed	13	18	31
	Self-employed	4	3	7
	Unemployed	2	1	3
	Other	1	1	2
Income	<500	70	58	128
	500–1000	54	58	112
	1000–1500	20	23	43
	1500–2000	10	9	19
	2000+	7	8	15
	Not answered	20	20	40

conclude that our experimental setup was not confounded by group differences in demographics or task-relevant attitudes. Table 9 and Table 10 in the appendix contain the means and standard deviations of all continuous control variables for each of the experimental groups.

Measurement validation

Since TRUS, EXPE, and CRED had been established by previous research, we conducted a confirmatory factor analysis (CFA) in SmartPLS 3 to validate our scales (Levine 2005; Ringle et al. 2015). The results of the reliability assessment are provided in Table 2. Internal consistency reliability was evaluated using Cronbach's alpha (Cronbach 1951) and composite reliability. In both cases, values above 0.7 are satisfactory (Nunnally and Bernstein 1994). The alphas and composite reliabilities of our constructs exceeded 0.8 and 0.9 respectively. The items are regarded as reliable if their standardized factor loadings are higher than 0.7 (Hair et al. 2011). The lowest observed factor loading in our data was 0.848. Thus, all constructs were reliable.

Moreover, we evaluated the validity of our constructs. The average variance extracted (AVE) was used as a measure for convergent validity. The AVE values of all constructs exceeded 0.5 by far, which means that the variance in the indicators accounted for by their constructs was larger than the variance due to measurement error (see Table 3). Therefore, convergent validity was given. To assess

Table 2 Construct reliability assessment: factor loadings and internal consistency criteria

Latent Constructs	Items	Range of Factor Loadings	Cronbach's Alpha	Composite Reliability (ρ_c)
Source Trustworthiness (TRUS)	5	0.848–0.903	0.922	0.935
Source Expertise (EXPE)	5	0.857–0.947	0.953	0.964
Content Credibility (CRED)	3	0.874–0.940	0.895	0.935

Reported factor loadings are standardized. All factor loadings were significant at the $p < 0.01$ level

Table 3 Construct validity assessment: average variance extracted and correlation matrix

Latent Constructs	TRUS	EXPE	CRED	AVE
Source Trustworthiness (TRUS)	0.873			0.762
Source Expertise (EXPE)	0.766	0.917		0.841
Content Credibility (CRED)	0.647	0.589	0.910	0.828

Underlined diagonal elements in the correlation matrix are the square root of AVE. The Fornell-Larcker criterion requires these values to be higher than the off-diagonal inter-construct correlations

discriminant validity we drew upon the Fornell-Larcker criterion, which says that for each construct the square root of the AVE has to be larger than the variance shared with other constructs (Fornell and Larcker 1981). This condition was met in our data. As a result, the measurement of our constructs was valid.

Hypothesis testing

We tested H1 to H6 by conducting a series of one-way independent ANOVAs with planned contrast tests in IBM SPSS Statistics 23. Table 4 and Table 5 contain the results for the PRC and the CRC vignette groups respectively. Among the PRC vignettes, the tests revealed significant main effects of revenue model on TRUS ($F = 3.222$, $p < 0.05$), EXPE ($F = 3.949$, $p < 0.05$), and CRED ($F = 3.196$, $p < 0.05$). Specifically, participants judged the content provider's trustworthiness and expertise as well as the content's credibility significantly higher in the affiliate marketing scenario than in the advertising and in the content-driven commerce scenario. Hence, H1b and H5b were supported. In contrast to our hypotheses, the differences in TRUS and CRED between the advertising and the affiliate marketing scenario were positive instead of negative. Furthermore, the results for PRC also revealed significant effects of revenue model on EXPE. Accordingly, H1a, H3, and H5a were not supported. Within the group of CRC vignettes, neither the main effects nor the specific differences between revenue models were significant ($p > 0.1$). Consequently, H2, H4, and H6 were supported. We additionally compared the mean differences between the content-driven commerce and the advertising scenarios within both groups of vignettes for all dependent variables in a post hoc contrast analysis. No significant differences between these two groups were found regardless of content type.

In response to H7 and to generate further insights on the mechanism behind the effect of revenue model on content credibility, we conducted mediation analyses. To do so, we set up a partial least squares structural equation model in Smart PLS 3 (Ringle et al. 2015). A component-based structural equation modelling approach was preferred because in contrast to covariance-based approaches lower requirements on sample size and the distribution of the underlying data are imposed. Along with our theoretical considerations, the model included CRED, EXPE, and TRUST as dependent variables and revenue model as dichotomous independent variable (see Fig. 3). This allowed us to investigate the effect of a change in revenue model from advertising to affiliate marketing (left-hand side) as well as from affiliate marketing to content-driven commerce (right-hand side). Because no effect of revenue model on the credibility of CRC was found, we focused on the PRC vignette group in these analyses.

The reflective measurement model has already been evaluated in our CFA. We also assessed whether collinearity was an issue in our structural model. All variance inflation factor (VIF) values were far below the critical threshold value of 5 (Hair et al. 2011). To test the significance of path coefficients, we applied complete bootstrapping with 10,000 subsamples, bias correction, and two-tailed tests. We found significant paths from revenue model to TRUS and EXPE as well as from TRUS and EXPE to CRED in both path models. In contrast, the direct effects of revenue model on CRED were insignificant owing to the inclusion of TRUS and EXPE in the model. To determine whether a mediation was present, we assessed the total and the specific indirect effects of revenue model on CRED. Table 6 shows the results.

The results revealed significant ($p < 0.5$) total indirect effects of revenue model on CRED in both mediation analyses, thus suggesting an indirect-only mediation (Zhao et al. 2010).

Table 4 Differences in means between revenue models for PRC vignette groups

Dependent Variables	Mean Values for Groups			Mean Differences between Groups	
	Advertising (AD) $n = 61$	Affiliate Marketing (AF) $n = 61$	Content-driven Commerce (CO) $n = 59$	AF - AD	CO - AF
TRUS	5.007	5.433	4.993	0.426**	−0.440**
EXPE	5.282	5.754	5.258	0.472**	−0.497**
CRED	5.153	5.530	5.006	0.377*	−0.524**

***p < 0.01; **p < 0.05; *p < 0.1 (two-sided)

Table 5 Differences in means between revenue models for CRC vignette groups

Dependent Variables	Mean Values for Groups			Mean Differences between Groups	
	Advertising (AD) $n = 60$	Affiliate Marketing (AF) $n = 58$	Content-driven Commerce (CO) $n = 58$	AF - AD	CO - AF
TRUS	5.020	5.035	4.945	0.015	−0.090
EXPE	4.853	4.921	4.928	0.067	−0.007
CRED	5.183	5.305	5.155	0.121	−0.149

***p < 0.01; **p < 0.05; *p < 0.1 (two-sided)

Of the specific indirect effects, only the ones via TRUS were significant ($p < 0.1$ in the first and $p < 0.05$ in the second analysis). We can conclude that the effect of revenue model on CRED was mediated by TRUS and H7 was supported. With an adjusted R^2 for content credibility of 0.439 in the left-hand and 0.493 in the right-hand mediation analysis our model also exhibited a good predictive accuracy. In other words, using revenue model, TRUS, and EXPE as predictors, we were able to explain more than 40% of the variance in CRED.

Discussion

According to the results of our experiment, participants relied, at least partially, upon a source heuristic to judge the credibility of the notebook review and considered the revenue model cues positioned next to the article in their source evaluation. This behavior is in line with existent models describing information processing on the Internet (Fogg 2003; Wathen and Burkell 2002). With respect to the credibility of PRC, we argued that commerce-oriented revenue models trigger concerns regarding the providers' interest in selling the product that is subject of the content. Following this rationale, we hypothesized that commerce-oriented revenue models would lower PRC providers' trustworthiness but not their expertise. Furthermore, we suggested that trustworthiness would be lowest, if PRC providers employed content-driven commerce, and highest, if they relied on ad revenues. However, neither of these assumptions was supported by our results, which questions the existence of a commerciality effect.

We consider it likely that the subjects of our experiment have not recognized or have ignored the website provider's conflict of interest between reviewing the notebook objectively and trying to promote its sales. If this is the case, the significant differences in TRUS, EXPE, and CRED between affiliate marketing and the other revenue models in the PRC scenarios would have to have a different cause. A higher trustworthiness of the content provider acting as an affiliate could be rooted in logos and prices of different online shops being displayed in the affiliate banner. Participants may have perceived this as an additional service in the sense of a price comparison. If this were true, the mere information conveyed by the affiliate banner would have dominated its call-to-action in the perception of the participants. This in turn may have strengthened, rather than weakened the impression that the content provider takes an objective stance when reviewing the products offered by the merchants. Two of our findings support this reasoning. First, the content provider's expertise was rated significantly higher in the affiliate marketing than in the other scenarios. We think that the information about offers from different vendors were perceived as expert knowledge. Thus, a website that provides this information is judged to be more expert than a website that does not. Second, the credibility differences between affiliate marketing and the other revenue models were not present in the CRC scenarios. This finding is unlikely to stem from commerciality concerns but from the price quotes for the notebook in the affiliate banner

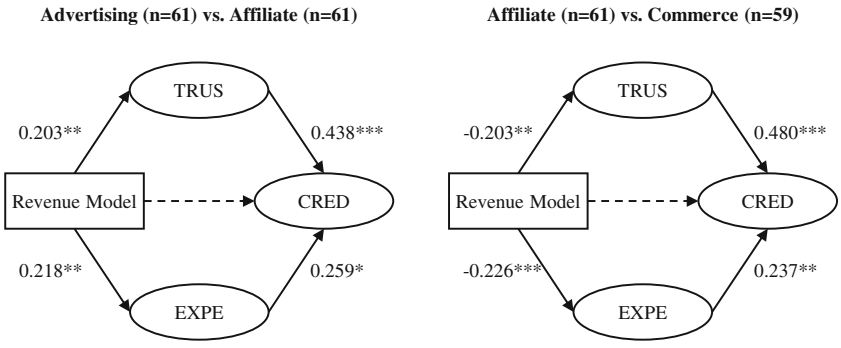

Fig. 3 Path models of mediation analyses for the effect of revenue model on content credibility

Note: Dashed lines indicate non-significant paths; ***p<0.01; **p<0.05; *p< 0.1

Table 6 Assessment of total and specific indirect effects of revenue model on CRED

Analyses	Specific Indirect Effects		Total Indirect Effects
	RV → TRUS → CRED	RV → EXPE → CRED	RV → CRED
Advertising vs. Affiliate	0.089*	0.057	0.145**
Affiliate vs. Commerce	−0.097**	−0.054	−0.151**

RV = revenue model; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$ (two-sided)

being more valuable for those reading about this specific notebook than for those reading about notebooks in general.

Contrasting our results with previous research reveals that there is no consensus regarding the existence of a commerciality effect in recipients' processing of information in online environments. Whereas qualitative studies (Hilligoss and Rieh 2008; Metzger et al. 2010) and the experiment by Flanagin and Metzger (2007) point towards this way of thinking, Senecal and Nantel (2004) were not able to detect such an effect. A possible explanation for these contradictory findings could lie in the differences between the manipulations of the experimental treatments, which were quite explicit in the study by Flanagin and Metzger (2007) and more subtle in our and in Senecal and Nantel's (2004) experiments. Thus, consumers might indeed be critical of content from more commercial sources but do not necessarily become aware of the commerciality of a source when evaluating content credibility.

Conclusion and implications

The present study had two goals. The first was to determine whether commerce-oriented revenue models have a negative effect on the credibility of content providers and their content. The second was to investigate whether this effect is present regardless of the relationship between the content and the products to be sold. As expected, our findings did not indicate an effect of content providers' revenue models on CRC (represented by a shopping guide) but confirmed such an effect for PRC (represented by a product review). This effect was mediated by the content provider's trustworthiness. However, the effect was unlikely to be caused by commerciality concerns, because content credibility was higher in the affiliate marketing scenario than in the advertising scenario.

The results of our study have important implications for both practitioners and researchers. From a theoretical perspective, we were able to show that the credibility of content providers and their content can vary depending on their revenue models. However, these variations in credibility do not seem to be caused by concerns about the content providers' commercial interests but more likely depend on the additional value that the revenue models provide for the users. Furthermore, our findings show that whether an effect on content credibility is present also depends on the relationship between the content and the revenue model. Apart from demonstrating the presence of this effect, we were able to show that it operates through the providers' trustworthiness. Therefore, our study first enhances the understanding of the interaction between the well-established source credibility and the more recently explicated message credibility construct. Second, we forged an interdisciplinary link between these credibility concepts from communication science and the revenue model concept, which originates from the IS literature. Future research may draw upon these findings as a foundation for further theoretical development.

Likewise, the insights generated in this paper are valuable for decision makers in the media industry. Taking the advertising revenue model as a baseline, we showed that content providers do not have to fear becoming less credible if employing commerce-oriented revenue models. Since we did not find any evidence for a commerciality effect in the credibility assessment of online content, affiliate marketing and content-driven commerce offer promising solutions for the content providers' lack of viable revenue models on the Internet. Therefore, our results should encourage providers of special interest content facing insufficient revenues from advertising to evaluate the implementation of commerce-oriented revenue models. In fact, content providers may even raise their credibility by becoming affiliates. Which revenue model for content providers is most profitable in the end depends on the margins that can be realized and the occurring costs. Both are presumably higher in content-driven commerce than in affiliate marketing. Moreover, different types of content and topics may be more or less suitable for one revenue model or the other. Apart from these considerations, content-driven commerce has the advantage for content providers that they can strengthen the relationship with their users by converting them into customers, which also offers the possibility to gather additional insights about them. However, if commercial interests of a source do not affect credibility, content providers may face increasing competition from e-commerce companies investing in content for marketing purposes. Consequently, content providers should consider retailers as potential business partners and as potential competitors when analyzing their market environment. Lastly, we want to emphasize that our results only hold for the case that the content itself remains unaffected by the revenue model. Our findings suggest a very strong link between source

trustworthiness and content credibility. Trying to push users into buying products by overselling them in the content can harm this trustworthiness and have detrimental long-term effects on content providers' business.

Limitations and suggestions for further research

Our research is subject to several limitations, which offer starting points for future studies. First, we used a search good as product offered in the commerce-oriented revenue models and topic of the vignette article. Previous research has shown that consumers process information about search and experience goods differently (Jain and Posavac 2001). Consequently, future research might investigate whether the effect of revenue models on the credibility of PRC also holds for experience goods. Second, notebooks can be considered as high involvement products. We chose a high involvement product for our experiment because consumers are more likely to consult information from editorial sources prior to a purchase if product involvement is high. However, following ELM, the high product involvement (see Table 9 and Table 10 in the appendix) might have lowered the influence of source cues in the credibility evaluation of the content. Although our results nonetheless suggest an influence of these cues in the PRC scenarios, further experiments might investigate whether this influence increases for low involvement products. To provide preliminary insights into this question we tested product involvement's influence on content credibility in a post-hoc one-way independent ANOVA based on a median split in both vignette groups. We did not find significant differences ($p > 0.05$) in content credibility between participants in the low and the high product involvement groups. Third, the results of our study might have been influenced by the specific design of the revenue model cues. It would be especially interesting to see whether affiliate marketing exhibits a different effect on content credibility if the offer of a single merchant is displayed. This would allow for further theorizing about the rationales guiding recipients' judgement of a content provider's trustworthiness. Fourth, the participants in our experiment interacted with the stimuli only for a limited time. While the respondents did not recognize a conflict between the content's objectivity and its monetization within this short timeframe, this might well be the case if users visit a website more often or for longer periods. Investigating this issue will require research designs other than experiments such as diary or observational studies. Finally, our study is limited to the credibility evaluation of professionally created content, though user-generated content also plays an important role in product evaluation. Therefore, future studies may address the credibility of platform operators employing commerce-oriented revenue models and contributors of user-generated content. Previous research examining the helpfulness of online product reviews based on secondary data may serve as a valuable starting point towards this direction (Trenz and Berger 2013). Overall, we hope that our study encourages researchers to further investigate the role of revenue models and commercial interests in the evaluation of content credibility.

Appendix

Table 7 Frequency distribution of demographic variables and online shopping for PRC vignette group

Variable		Advertising	Affiliate	Commerce	Total
Gender	Female	40	34	39	113
	Male	21	27	20	68
Age	18–29	55	51	51	157
	30–39	6	7	7	20
	40–49	0	2	0	2
	50–59	0	0	0	0
	60+	0	1	1	2
Education	Elementary school	1	0	0	1
	Apprenticeship	1	0	0	1
	High school	29	32	37	98
	Vocational education	3	2	2	7
	Bachelor's degree	17	16	13	46
	Diploma/Master's degree	9	10	7	26
	Doctoral degree	1	1	0	2
Occupation	Student	54	55	52	161

Table 7 (continued)

Variable		Advertising	Affiliate	Commerce	Total
	Employed	6	2	5	13
	Self-employed	1	2	1	4
	Unemployed	0	2	0	2
	Other	0	0	1	1
Income	<500	26	23	21	70
	500–1000	16	17	21	54
	1000–1500	7	9	4	20
	1500–2000	4	3	3	10
	2000+	4	0	3	7
	Not answered	4	9	7	20
Online Shopping Frequency	(Almost) every day	0	2	1	3
	At least once a week	4	10	7	21
	At least once a month	39	28	28	95
	At least every six months	15	18	21	54
	Less than every six months	3	3	2	8

Table 8 Frequency distribution of demographic variables and online shopping for CRC vignette group

Variable		Advertising	Affiliate	Commerce	Total
Gender	Female	40	39	40	119
	Male	20	19	18	57
Age	18–29	54	55	54	163
	30–39	4	1	2	7
	40–49	2	1	0	3
	50–59	0	0	1	2
	60+	0	1	0	1
Education	Elementary school	0	0	0	0
	Apprenticeship	0	0	0	0
	High school	33	28	29	90
	Vocational education	0	0	3	3
	Bachelor's degree	13	18	15	46
	Diploma/Master's degree	13	12	9	34
	Doctoral degree	1	0	2	3
Occupation	Student	52	52	49	153
	Employed	6	5	7	18
	Self-employed	2	0	1	3
	Unemployed	0	1	0	1
	Other	0	0	1	1
Income	<500	23	17	18	58
	500–1000	18	20	20	58
	1000–1500	7	11	5	23
	1500–2000	3	2	4	9
	2000+	4	3	1	8
	Not answered	5	5	10	20
Online Shopping Frequency	(Almost) every day	1	0	0	1
	At least once a week	7	2	5	14
	At least once a month	29	43	30	102
	At least every six months	19	12	19	50
	Less than every six months	4	1	4	9

Table 9 Means and standard deviations of control variables for PRC vignette group

Variable		Advertising	Affiliate	Commerce	Total
Product Involvement	Mean	5.64	5.79	5.73	5.72
	Standard Deviation	0.85	0.81	0.84	0.83
Product Class Knowledge	Mean	3.67	4.04	3.94	3.88
	Standard Deviation	1.51	1.51	1.40	1.47
Propensity to Trust	Mean	4.03	4.12	4.02	4.06
	Standard Deviation	0.07	0.09	0.08	0.05
Perceived Online Ad Intrusiveness	Mean	5.67	5.69	5.85	5.74
	Standard Deviation	1.06	1.09	0.95	1.03
Daily Internet Use (in hours:minutes)	Mean	2:48	2:49	2:41	2:46
	Standard Deviation	1:27	1:43	1:21	1:30

Except for daily internet use, the statistics are based on summated Likert-type scales from 1 to 7

Table 10 Means and standard deviations of control variables for CRC vignette group

Variable		Advertising	Affiliate	Commerce	Total
Product Involvement	Mean	5.92	5.89	5.96	5.93
	Standard Deviation	0.89	0.77	0.98	0.88
Product Class Knowledge	Mean	4.17	4.50	4.01	4.22
	Standard Deviation	1.46	1.23	1.39	1.37
Propensity to Trust	Mean	4.04	4.18	4.13	4.12
	Standard Deviation	0.71	0.79	061	0.70
Perceived Online Ad Intrusiveness	Mean	5.71	5.65	5.55	5.64
	Standard Deviation	1.01	1.22	1.17	1.13
Daily Internet Use(in hours:minutes)	Mean	3:26	2:55	2:50	3:04
	Standard Deviation	2:18	1:28	1:55	1:56

Except for daily internet use, the statistics are based on summated Likert-type scales from 1 to 7

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