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Understanding online product ratings: A customer satisfaction model



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ABSTRACT

Online product ratings have become a major information source for customers, retailers, and manufacturers. Both practitioners and researchers predominantly interpret them as a reflection of product quality. We argue that they in fact represent the customer's satisfaction with the product. Accordingly, we present a customer satisfaction model of online product ratings which incorporates the customer's pre-purchase expectations and actual product performance as determinants of ratings. We validate our model by applying it to two datasets collected at the German website of Amazon.com. The results indicate that both factors have a significant influence on online product ratings, supporting the proposed interpretation of ratings.

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1. Introduction

Along with the growing diffusion of e-commerce, online product reviews have become a major information source for customers, retailers, and manufacturers. On the one hand, reviews and ratings contributed by online shop customers provide product information for prospective consumers, thereby reducing their uncertainty about the product (Chen and Xie, 2008). Consistently, research has shown that they affect sales in various contexts (e.g., Chevalier and Mayzlin, 2006; Lin et al., 2011; Park et al., 2007). On the other hand, online retailers and manufacturers increasingly rely on customer feedback to enrich their marketing strategy (Chen and Xie, 2008; Cui et al. 2012), to adjust product listings (e.g. via relevance sorting), and to create additional revenue streams (Mudambi and Schuff, 2010). For these reasons, it is not surprising that nearly all major online retailers such as Amazon. com or Ebay.com have implemented product rating functionalities.

Researchers, mainly from the fields of marketing and information systems, have adopted the topic and not only started to study the effects of online product ratings (e.g., on sales) but also their nature and determining factors. A common assumption of prior studies in the latter stream is that the baseline of a product's online ratings reflects its true quality. Various biases such as social dynamics or cultural influences were introduced to account for the unexplained part of the variance. However, empirical evidence suggests that online ratings do not accurately reflect a product's

true quality (e.g., Hu et al., 2006; Koh et al., 2010). Since the influence of ratings on sales remains unaffected, retailers are left in an uncomfortable situation: it is difficult for them to adjust marketing strategies on the basis of online product ratings without knowing what they actually reflect.

Hence, the objective of this study is to find out what really builds the baseline of online product ratings and thereby refine their current interpretation. We argue that the weak explanatory power of product quality for online reviews is not only caused by actual biases: it is mainly caused by product ratings reflecting customer satisfaction than being a valid measure for product quality. This approach does not solely rely on product quality as the baseline for the rating but also integrates the customer's expectation of the product in the pre-purchase phase. Correspondingly, we present a customer satisfaction model of online product ratings based on the considerations of Fornell (1992) and Westbrook and Reilly (1983). We model the customer's pre-purchase expectation of the product and the actual performance as predictors of online ratings using structured equations. We validate our model by applying it to two datasets (digital cameras and televisions) collected from the German website of Amazon.com. The results indicate that both a customer's expectation of a product and the actual performance significantly influence the ratings customers assign to a product, supporting the proposed interpretation of online product ratings.

Several other observations in the datasets can help to get a more comprehensive view of online product ratings and are worth mentioning. First, we find that online ratings carry some percentage of unobservable information that cannot be predicted (using metrics from the website). Second, the data shows indications for confirmation, acquisition, and under-reporting biases.

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Fig. 1. Word cloud of Amazon review (the bigger the word, the more frequent it was used in the reviews).

In the next section, we review the extant literature on product ratings. In Section 4.1.1, we elaborate on the theoretical background of customer satisfaction and present our research model. In Section 4.2.1, we discuss the measurement of the latent constructs and describe the collection of data. There, we also present the results of our analysis, which are discussed in Section 5. In Section 5, we conclude this paper by explaining its implications for practice and research, its limitations, and possible directions for future research.

2. Review of literature on product ratings

Online product ratings have been researched from various perspectives, which can be classified according to whether they investigate their antecedents or outcomes. The first category rather includes studies examining the influence of online product ratings on consumers' purchasing decisions. In most of these studies, a significant positive influence is found (e.g., Lin et al., 2011; Mauri and Minazzi, 2013; Park et al., 2007; Sun, 2011), although it may diminish over time (Hu et al., 2008). For a more detailed review we refer to Moe and Trusov, (2011) as this paper belongs to the second category that investigates the factors on which ratings depend.

Research on the antecedents of product ratings mainly focuses on different biases influencing the rating score. Wulff and Hardt, (2014) and Koh et al., (2010) find evidence of cultural differences among raters. The latter authors also find that product ratings do not reflect true (perceived) product quality, a result also obtained by Hu et al., (2006). Sridhar and Srinivasan, (2012) find that prior customer ratings weaken the effect of product experience but can either increase or turn around the effect of product failure, depending on how the latter is addressed. Moe and Schweidel, (2012) link a customer's rating to his decision to rate. They find that the influence of prior customers' ratings on a customer depends on how often this customer rates products.

However, most of these studies suffer from two major short-comings. First, the products which are analyzed are often books or movies. The individual ratings of these products can be assumed to depend strongly on personal taste and not on a common ground. Second, the true quality of a product is measured via surveys among non-experts. Therefore, they may not be well-suited to assess a quality effect in online product ratings, limiting the validity.

3. Hypothesis development

Previous research on online ratings has started from the premise that the baseline of online ratings represents the true quality of a product (cf. Hu et al., 2006; Moe and Trusov, 2011), including

statements such as "each posted online review is an assessment of a single individual's perceived quality of a product" (Koh et al., 2010, p. 374). The conclusion of these studies is that online ratings do not accurately reflect product quality. They attribute this fact to various biases instead of questioning their underlying premise. Since sales heavily depend on online ratings, misinterpreting their baseline can be the root of misguided actions of retailers and manufacturers.

We argue that online product ratings are rather an expression of customer satisfaction than a pure quality assessment. The construct customer satisfaction is a central concept in marketing research measuring individual-level satisfaction with products and services (Yi, 1991). It is defined as a function of the customer's expectation and product performance (Fornell, 1992; Fornell et al., 1996). Expectation is conceptualized as the perceived probabilities of what the consequences of a purchase will be (Oliver, 1980). Performance refers to the perceived quality of the product after the purchase. Instead of being tied to a purely post-purchase quality-centered perspective (as online product ratings are assumed to be in prior research), the definition of customer satisfaction adds the perspective of pre-purchase expectations. In the following, we outline why online product ratings reflect customer satisfaction with the product and thereby include the consideration of both: the customers' expectation of the respective product and the performance they perceive after buying it.

A strong indication that online product ratings reflect customer satisfaction was found by searching through the full-text reviews on Amazon.com. For this, we used Amazon review data consisting of reviews from 1996 until 2014 (McAuley et al., 2015). The complete dataset contains 7,834,166 reviews of products in the category electronics. We created a word cloud (Fig. 1) using a randomly selected subset (10% of the complete dataset) to better understand the meaning behind online reviews. Stop words were removed and same words in plural/singular or different tenses were consolidated to condense the findings into a cloud depicting the top 100 words.

Besides words describing the general experience with the product ("great" was found in 36.6% of the reviews), product parts and product categories (e.g., cable (11.2%), camera (18.8%)), the cloud includes evidence for the proposed interpretation of online ratings (e.g., expect (5.3%), price (17.8%), and reviews (5.0%)). Additionally, we searched the full dataset for "expect" (as a word or part of the words expected and expectation) and found that 571,939 reviews (7.3%) include this word. When compared to the search result for the word "quality" (1,167,525 reviews, 14.9%), these figures strongly indicate that expectation is not a marginal phenomenon in review texts. Since the score of individual online ratings is consistent with the corresponding text (Ganu et al., 2009), it is very likely that they are based on more than a pure assessment of product quality. Instead, the baseline effect of online ratings includes both, pre-purchase expectations and the post-

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