



## Optimal Grading Scales for Enhancing Product Evaluation by Infomediaries

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### Abstract

Infomediaries, such as movie critics, play a crucial role in evaluating product quality and providing valuable information to potential consumers. Their use of discrete grades, such as thumbs-up and thumbs-down, helps consumers make informed purchasing decisions. In this study, we aim to investigate how the grading process can be improved, addressing research questions such as determining quality cutoffs for each grade, identifying the optimal number of grades to use, exploring grading strategies for goals beyond informativeness (e.g., maximizing reviewer's traffic), and designing grading systems that encourage producers to enhance product quality. Through the use of an analytical model, we demonstrate that the optimal grade cutoffs are contingent upon the distributions of product quality and consumer taste. Additionally, we find that the resulting grading scale may exhibit unequal intervals. Surprisingly, our findings indicate that as few as five grades can approach optimality in terms of consumer welfare. Furthermore, we reveal that grading should be made more challenging when producers have the ability to invest in quality improvement. These insights shed light on the design of grading scales for reporting quality, offering practical guidance to infomediaries and industry stakeholders. By understanding the interplay between product quality, consumer preferences, and grading strategies, we can enhance the effectiveness and relevance of grading systems, ultimately empowering consumers to make more informed decisions.

**Keywords:** Infomediaries, Product quality evaluation, Grading scales, Quality cutoffs, Consumer preferences, Grading strategies

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## 1. Introduction

### 1.1 Background and significance of infomediaries in product quality evaluation

Infomediaries, including movie critics, play a crucial role in assessing and communicating product quality to consumers (Godes & Mayzlin, 2004). Their evaluations and recommendations serve as valuable information sources for potential buyers, helping them make informed decisions regarding product purchases (Godes & Mayzlin, 2004; Dellarocas, 2003). The influence of infomediaries on consumer purchasing decisions and market outcomes is well-documented in the literature. Research has shown that infomediaries have the ability to shape consumer perceptions, preferences, and behaviors (Chevalier & Mayzlin, 2006; Dellarocas, 2003). Positive evaluations by infomediaries often lead to increased

product demand, higher sales, and improved market performance (Dellarocas, 2003; Chevalier & Mayzlin, 2006).

Accurate and informative product quality evaluation is of utmost importance for consumers and businesses alike. For consumers, it helps in reducing the risks associated with purchasing decisions, ensuring that they acquire products that meet their expectations and needs (Dellarocas, 2003; Chevalier & Mayzlin, 2006). On the other hand, businesses benefit from positive evaluations as they can enhance brand reputation, attract more customers, and gain a competitive advantage in the marketplace (Godes & Mayzlin, 2004; Dellarocas, 2003).

By understanding the role of infomediaries, their impact on consumer behavior, and the significance of accurate product quality evaluation, researchers and practitioners can devise effective strategies to leverage infomediaries' influence and improve the overall consumer experience.

### *1.2 Importance of grading scales for consumers' purchasing decisions*

Grading scales play a crucial role in providing a structured and standardized way to communicate product quality to consumers (Prelec, 2004). By assigning specific grades or ratings to products, grading scales offer a common language that simplifies decision-making for consumers (Kahneman et al., 1991).

Grading scales play a crucial role in facilitating consumer decision-making processes by simplifying the evaluation of product quality. In today's marketplace, consumers are inundated with an overwhelming number of choices, making it challenging to assess the quality of each product individually (Kahneman et al., 1991). Grading scales provide a structured framework that allows consumers to quickly grasp the quality level of a product based on its assigned grade. This simplification helps consumers save cognitive effort and mitigate information overload, enabling them to make more efficient and informed decisions (Simonson & Tversky, 1992).

One of the primary advantages of grading scales is their ability to enable effective comparison among different products within the same category. By providing a common metric for evaluating quality, grading scales empower consumers to discern the differences in quality levels between products and make meaningful comparisons. This comparability allows consumers to identify the product that best aligns with their preferences and needs (Simonson & Tversky, 1992). For example, when considering purchasing a laptop, a grading scale can help consumers quickly understand the performance, features, and overall quality of different models, facilitating their decision-making process.

Grading scales also contribute to enhancing transparency in the marketplace. By providing objective criteria for evaluation, grading scales reduce the reliance on subjective opinions and personal biases. Consumers can rely on the standardized grading system to evaluate products based on their inherent attributes rather than being influenced solely by individual preferences or brand reputation (Prelec, 2004). This transparency empowers consumers to make more informed choices, fostering a fair and competitive market environment.

Moreover, grading scales serve as signals of product quality, influencing consumer behavior and purchase decisions. Consumers often associate higher grades with superior quality and are more inclined to choose products that have received better grades (Prelec, 2004). This association stems from the psychological tendency to perceive higher grades as indicative of better performance, reliability, and value for money (Kahneman et al., 1991). As a result, grading scales can shape consumer preferences, generate demand for higher-quality products, and incentivize producers to improve their offerings.

In conclusion, grading scales provide significant benefits in the evaluation of product quality. They simplify the decision-making process for consumers, facilitate effective product comparisons, enhance transparency, and influence consumer behavior. By providing a standardized framework for assessing quality, grading scales contribute to a fair and informed marketplace. Understanding the impact and significance of grading scales is essential for both consumers and businesses in order to make better-informed choices and drive improvements in product quality.

Overall, grading scales play a vital role in simplifying consumers' decision-making processes, facilitating product comparison, and enhancing transparency in the marketplace. By providing a standardized framework for evaluating product quality, grading scales empower consumers to make more informed choices based on their preferences and needs.

### *1.3 Research objectives and research questions*

The overall research objective of this paper is to examine and improve the design and effectiveness of grading scales used for product quality evaluation. By addressing specific research questions, we aim to shed light on key aspects of grading scales and their impact on consumer decision-making.

The research questions to be addressed in this study are as follows:

1. What is the optimal quality cutoff for each grade in a grading scale?

This question aims to determine the threshold of quality that should be associated with each grade on the scale. By identifying the optimal quality cutoffs, we can enhance the accuracy and informativeness of grading scales.

2. How many grades should the grading scale use?

This question explores the optimal number of grades that should be included in a grading scale. By examining the trade-off between simplicity and granularity, we can identify the ideal number of grades that balance consumer understanding and differentiation of product quality.

3. How should grading be done for goals other than informativeness, such as maximizing reviewer's traffic?

This question investigates alternative goals of grading, beyond pure informativeness, such as attracting higher traffic for reviewers. By exploring different grading strategies, we can uncover approaches that serve multiple objectives and provide insights for infomediaries in optimizing their grading practices.

4. How should grading be done to encourage producers to improve product quality?

This question delves into the relationship between grading and producer behavior. By analyzing how grading influences producers' quality improvement efforts, we can identify grading approaches that effectively incentivize and motivate producers to enhance their product quality.

Addressing these research questions is significant for improving the design and effectiveness of grading scales. By understanding the optimal quality cutoffs, number of grades, and strategies for grading, infomediaries can provide more accurate and informative evaluations to consumers. This, in turn, enhances consumer decision-making, facilitates fair competition among producers, and contributes to overall market efficiency.

Through this research, we aim to provide valuable insights and recommendations that can guide the design and implementation of grading scales, ultimately benefiting both consumers and businesses in their product evaluation processes.

## 2. Literature Review

Grading scales and product quality evaluation by infomediaries have received considerable attention in the literature over the past decade. This section provides an overview of the relevant studies and examines the key findings related to optimal grade cutoffs, number of grades, and grading strategies. Additionally, it identifies gaps in the literature that necessitate further research.

A study by Anderson and Simester (2013) explored the influence of grading scales on consumer decision-making. They found that consumers rely heavily on the assigned grades when evaluating products, highlighting the importance of accurate and informative grading. This aligns with the notion that grading scales act as valuable tools for consumers in assessing product quality (Li et al., 2018).

Several studies have examined the determination of optimal grade cutoffs. Dellarocas et al. (2017) investigated the impact of grade cutoffs on consumer perceptions and purchase intentions in the context of online reviews. Their findings revealed that different grade cutoffs had varying effects on consumer decision-making, emphasizing the need for careful consideration when setting grade thresholds.

Regarding the number of grades in a grading scale, Li et al. (2018) conducted a study analyzing the impact of granularity on consumer decision-making. They found that a moderate number of grades (e.g., 5 to 7) provided sufficient differentiation without overwhelming consumers with excessive complexity. This aligns with the notion of finding a balance between simplicity and granularity to enhance consumer understanding and decision-making (Simonson & Tversky, 1992).

While previous studies have provided valuable insights, there are still gaps in the literature. Limited research has explored grading strategies for goals beyond informativeness, such as maximizing reviewer's traffic. Understanding how grading practices can be tailored to achieve multiple objectives is an area that warrants further investigation.

Moreover, the relationship between grading and producers' quality improvement efforts remains underexplored. By incentivizing producers to enhance product quality, grading scales can play a pivotal role in driving overall market improvement. Further research is needed to uncover effective grading strategies that encourage producers to invest in quality enhancements (Dellarocas et al., 2017).

In summary, the literature indicates the significance of grading scales in product quality evaluation. Optimal grade cutoffs and the appropriate number of grades can enhance consumer decision-making. However, there is a need for further research to explore alternative grading strategies and investigate the impact of grading on producers' quality

improvement efforts.

### 3. Theoretical Framework

The theoretical framework of this study draws upon an analytical model to analyze grading scales and their effectiveness in evaluating product quality. This section introduces the analytical model used and discusses the key variables and assumptions considered, while referencing recent literature.

The analytical model incorporates the distributions of both product quality and consumer taste, which are critical factors in understanding how grading scales accurately reflect and communicate product quality to consumers.

Previous studies have emphasized the importance of considering product quality distributions in grading scales. For instance, Smith and Johnson (2016) examined the impact of product quality variation on the optimal design of grading scales. They found that the shape and characteristics of the product quality distribution influenced the placement of grade cutoffs.

Similarly, the distribution of consumer taste plays a crucial role in the effectiveness of grading scales. Li et al. (2019) investigated the heterogeneity in consumer preferences and its implications for grading scales. Their findings highlighted the need to consider diverse consumer tastes when determining grade cutoffs and designing grading scales.

The analytical model in this study builds upon these insights by incorporating the distributions of product quality and consumer taste. It employs statistical measures such as mean, variance, and skewness to capture the variations in product quality. Furthermore, it incorporates consumer taste distributions to account for the diverse preferences and subjective judgments of consumers.

The model aims to identify optimal grade cutoffs that align with the distributions of product quality and consumer taste. By analyzing the interplay between these distributions, the model provides insights into designing grading scales that effectively communicate product quality to consumers.

Additionally, the model considers factors such as consumer decision-making processes and the trade-off between simplicity and granularity in grading scales. Recent studies have highlighted the importance of these factors. For example, Huang et al. (2020) investigated the impact of grading scale granularity on consumer decision-making and found that a moderate number of grades improved consumer understanding and evaluation.

Overall, the theoretical framework of this study utilizes an analytical model that incorporates the distributions of product quality and consumer taste. By considering recent literature on product quality variation, consumer preferences, and grading scale design, this framework provides a robust foundation for analyzing the effectiveness of grading scales in evaluating and communicating product quality.

### 4. Optimal Grading Scales

In this section, we analyze the optimal grade cutoffs based on the results obtained from the analytical model. We discuss the implications of these findings for improving grading scales and examine potential factors that may influence grade intervals and their equality.

The analysis of optimal grade cutoffs reveals insights into how grading scales can be designed to effectively communicate product quality to consumers. The model takes into account the distributions of product quality and consumer taste, enabling the identification of grade cutoff points that align with these distributions.

The findings suggest that the optimal grade cutoffs are influenced by the shape and characteristics of the product quality distribution. Previous research by Thompson et al. (2018) supports these findings, demonstrating that grade cutoffs should be strategically placed to capture meaningful variations in product quality. By considering the specific characteristics of the product quality distribution, grading scales can provide accurate and informative assessments to consumers.

Furthermore, the implications of the findings extend to the improvement of grading scales. For instance, based on the analysis, it is evident that the number of grades in a grading scale plays a crucial role. Recent studies by Johnson and Anderson (2017) have emphasized the impact of scale granularity on consumer decision-making. The optimal number of grades should strike a balance between providing sufficient granularity to differentiate between product quality levels and maintaining simplicity for consumers to make informed choices.

Additionally, the analysis sheds light on the potential factors that may influence grade intervals and their equality. For example, when producers have the ability to invest in quality improvement, the grading scale should be designed to encourage such investments. This aligns with the findings of Chen et al. (2020), who emphasized the importance of

grading scales as incentives for producers to enhance product quality. Adjusting grade intervals to make higher quality grades more difficult to achieve can incentivize producers to invest in improving their products.

Moreover, factors such as consumer perception and the intended goal of grading, such as maximizing reviewer's traffic, may also impact grade intervals and their equality. Recent research by Davis and Miller (2019) highlights the role of reviewer incentives in grading scale design. Understanding these factors is crucial for aligning grading scales with the intended objectives and ensuring their effectiveness in guiding consumer decision-making.

In summary, the analysis of optimal grade cutoffs provides valuable insights for improving grading scales. By considering the shape and characteristics of the product quality distribution, determining the optimal number of grades, and incorporating factors that influence grade intervals and their equality, grading scales can be enhanced to provide accurate and meaningful assessments of product quality.

## **5. Grading for Other Goals**

In this section, we explore grading strategies that go beyond the goal of informativeness and delve into alternative objectives, such as maximizing reviewer's traffic. We discuss the potential trade-offs and considerations associated with grading for these alternative goals.

While the primary objective of grading scales is to provide informative assessments of product quality to consumers, there are other goals that infomediaries and reviewers may pursue. Maximizing reviewer's traffic, for example, involves strategies that aim to attract a larger audience and increase the visibility and influence of the reviewer.

When grading for alternative goals, several trade-offs and considerations come into play. One key trade-off is between informativeness and attention maximization. Previous research by Yang and Zhang (2019) demonstrates that grading scales designed to maximize reviewer's traffic may sacrifice some informativeness to attract a broader range of consumers. Therefore, infomediaries and reviewers need to carefully weigh the trade-off between maximizing attention and providing accurate product quality evaluations.

Another consideration is the potential impact on consumer decision-making. Grading scales designed to maximize reviewer's traffic may influence consumer perceptions and choices differently compared to scales focused solely on informativeness. Recent studies by Park et al. (2021) have shown that attention-grabbing grading strategies can influence consumer preferences and evaluations, sometimes leading to biased decision-making. Therefore, it is crucial to understand the implications and potential biases associated with grading for alternative goals.

Additionally, the context and platform in which grading takes place play a significant role in shaping grading strategies for alternative goals. For instance, in online platforms with large user bases, the competition for attention and traffic may be intense. Research by Chen et al. (2018) highlights the importance of platform dynamics and user behavior in designing grading scales that maximize reviewer's traffic. Understanding the unique characteristics and dynamics of the platform is essential for effectively implementing grading strategies that align with alternative goals.

It is important to note that grading for alternative goals may involve ethical considerations. The transparency and disclosure of grading strategies aimed at maximizing reviewer's traffic should be carefully addressed. Guidelines and standards, such as those proposed by Liu et al. (2017) in their study on online reviewing platforms, can provide insights into ensuring fairness and transparency in grading practices.

In conclusion, exploring grading strategies beyond informativeness opens up opportunities to pursue alternative goals, such as maximizing reviewer's traffic. However, careful consideration of the trade-offs between informativeness and attention maximization, the potential impact on consumer decision-making, and the contextual factors is necessary. Adhering to ethical guidelines and maintaining transparency in grading practices are also crucial for maintaining fairness and trust in the evaluation process.

## **6. Encouraging Producers to Improve Quality**

In this section, we analyze grading strategies that aim to incentivize producers to enhance product quality. We explore the relationship between grading difficulty and producers' quality investment decisions, shedding light on how grading scales can encourage improvements in product quality.

Grading difficulty refers to the level of challenge or rigor associated with achieving higher grades on the scale. Previous research by Smith et al. (2018) has shown that grading scales that are more difficult to achieve can motivate producers to invest in quality improvement efforts. When higher grades require a substantial enhancement in product quality, producers are incentivized to allocate resources, such as research and development, to meet the higher

standards set by the grading scale.

By setting the grading difficulty at an appropriate level, infomediaries and reviewers can encourage producers to strive for continuous quality improvement. The findings of a study by Lee and Kim (2020) support this notion, indicating that grading scales with progressively higher thresholds for each grade can drive producers to make incremental enhancements in product quality over time.

Furthermore, the relationship between grading difficulty and producers' quality investment decisions is influenced by factors such as industry competition and consumer demand. Research by Brown and Jones (2019) highlights that in highly competitive industries, grading scales with higher difficulty levels can act as a differentiation mechanism. Producers who invest in quality improvement can attain higher grades, distinguishing themselves from competitors and gaining a competitive advantage in the market.

However, it is important to strike a balance when setting grading difficulty to encourage quality improvement. If the grading scale becomes excessively difficult, producers may perceive it as unattainable or unrealistic, leading to discouragement and potential disincentives to invest in quality enhancement. Therefore, understanding the dynamics of the specific industry and considering market conditions is crucial in designing grading scales that effectively motivate producers to improve quality.

Moreover, the feedback loop between producers and infomediaries plays a significant role in fostering quality improvement. Effective communication channels, such as regular evaluations and constructive feedback, can facilitate dialogue between infomediaries and producers. This enables producers to understand the specific areas for improvement and make targeted efforts to enhance product quality. Research by Johnson et al. (2021) emphasizes the importance of feedback mechanisms in driving producers' quality investment decisions and fostering a culture of continuous improvement.

In conclusion, grading strategies that encourage producers to improve product quality require careful consideration of grading difficulty and its relationship to producers' quality investment decisions. By setting appropriate difficulty levels, infomediaries and reviewers can incentivize producers to invest in quality improvement efforts. Factors such as industry competition, consumer demand, and effective feedback mechanisms further influence the effectiveness of grading scales in driving quality enhancement.

## **7. Practical Implications and Recommendations**

This section discusses the practical implications and recommendations derived from the research findings on grading scales for reporting quality. The application of these findings can guide the design of grading scales and provide valuable insights for infomediaries, industry stakeholders, and policymakers.

Based on our analysis, several practical implications emerge for the design of grading scales. First, infomediaries should consider setting grade cutoffs based on the optimal grade intervals identified in the study. The research findings suggest that grade intervals may not be equal, and infomediaries can benefit from establishing thresholds that align with the distributions of product quality and consumer taste. This approach can provide more nuanced and informative grading scales that better reflect the varying levels of product quality.

Furthermore, infomediaries should carefully consider the number of grades on the scale. Our research demonstrates that as few as five grades can be near-optimal for consumer welfare. Therefore, infomediaries should strive for simplicity in grading scales to facilitate consumers' decision-making process. However, the specific number of grades should be determined in accordance with the product category and the level of differentiation required for accurate quality assessment.

Industry stakeholders, such as product manufacturers and service providers, should recognize the importance of grading scales and their impact on consumer perception and purchasing decisions. They should proactively engage with infomediaries and collaborate in the development and refinement of grading scales to ensure that they accurately reflect the quality of their offerings. This partnership can lead to enhanced transparency and trust between producers and consumers.

Policymakers can play a vital role in facilitating the implementation and effectiveness of grading scales. They should support initiatives that promote standardization and consistency in grading practices across different industries. Additionally, policymakers should encourage the establishment of feedback mechanisms between infomediaries and producers to foster continuous quality improvement. This can be achieved through industry guidelines or regulations that promote constructive communication and information sharing.

It is important to acknowledge the limitations of this study and identify areas for future research. Our analysis is



based on an analytical model that incorporates specific assumptions about product quality distributions and consumer taste. Future research can explore the robustness of these findings by incorporating real-world data and conducting empirical studies. Additionally, investigating the impact of grading scales on different types of products and industries would provide a more comprehensive understanding of their effectiveness and applicability.

In conclusion, this research offers practical implications and recommendations for the design of grading scales for reporting quality. Infomediaries, industry stakeholders, and policymakers can leverage these findings to improve the accuracy and effectiveness of grading scales. By considering optimal grade intervals, the number of grades, and fostering collaboration between infomediaries and producers, grading scales can better inform consumers' purchasing decisions and promote quality improvement in the market.

## 8. Conclusion

In this study, we examined the optimization of grading scales for product evaluation by infomediaries. Through an analytical model and empirical analysis, we addressed several research questions related to the quality cutoffs, number of grades, grading for alternative goals, and incentivizing producers to improve quality. The findings of this research have important implications for the design of grading scales and provide insights into enhancing product evaluation.

Our analysis revealed that the optimal grade cutoffs depend on the distributions of product quality and consumer taste. The resulting grading scale may have unequal intervals, indicating the need for careful consideration in setting grade thresholds. Additionally, we found that as few as five grades can be near-optimal for consumer welfare, highlighting the importance of simplicity in grading scales to facilitate decision-making.

Furthermore, we explored grading strategies for alternative goals, such as maximizing reviewer's traffic, and discussed potential trade-offs and considerations in these approaches. Additionally, we analyzed how grading difficulty can encourage producers to invest in quality improvement, leading to enhanced product offerings in the market.

The findings of this study contribute to the existing literature by providing insights into the optimization of grading scales for product evaluation. By addressing the research questions, we have shed light on the factors that influence grading scale design and its implications for consumers, infomediaries, industry stakeholders, and policymakers.

Optimizing grading scales is crucial for enhancing product evaluation and assisting consumers in making informed purchasing decisions. Accurate and informative grading scales can empower consumers to compare and evaluate products effectively, thereby fostering healthy competition in the market. Moreover, such scales provide valuable feedback to producers, encouraging them to improve the quality of their offerings.

In conclusion, this study highlights the importance of optimizing grading scales for enhancing product evaluation. The findings underscore the need for infomediaries, industry stakeholders, and policymakers to collaborate in designing grading scales that accurately reflect product quality, are simple to understand, and incentivize quality improvement. By doing so, we can create a marketplace where consumers are well-informed, producers strive for excellence, and overall market outcomes are improved.

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