# Problem Statement Validation Research Template

**Document Title:** Problem Statement Validation Research  
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## 1. Description of the Activity

This activity involved researching the prevalence and impact of fake reviews in e-commerce platforms, assessing the viability and necessity of an automated solution to detect and remove fraudulent reviews using Natural Language Processing (NLP) and metadata analysis. The goal is to validate whether the problem has practical and business relevance, thereby justifying the development effort.

## 2. Problem Statement

E-commerce platforms face a growing issue with fake or spam product reviews that mislead customers and harm brand trust. These reviews can be generated by bots, paid users, or malicious actors aiming to manipulate product ratings. The objective is to build an automated solution using NLP and user metadata analysis to identify and filter out fraudulent reviews in real time, thereby improving the integrity of online reviews and enhancing customer decision-making.

## 3. Sources Used

### **Datasets:**

**Amazon Product Reviews (by saurav9786)**<https://www.kaggle.com/datasets/saurav9786/amazon-product-reviews>

**Amazon Fake Reviews (by shivamb)**

<https://www.kaggle.com/datasets/shivamb/amazon-fake-reviews>

**Fake Reviews Dataset (by thearijitdas)**

<https://www.kaggle.com/datasets/thearijitdas/fake-reviews-dataset>

**Amazon Review Spam and Non-Spam Dataset (by naveedhn)**

[https://www.kaggle.com/datasets/naveedhn/amazon-product-review-spam-and-non-spa](https://www.kaggle.com/datasets/naveedhn/amazon-product-review-spam-and-non-spam)m

**Yelp-Reviews-Dataset (by omkarsabnis)**

<https://www.kaggle.com/datasets/omkarsabnis/yelp-reviews-dataset>

### **Research Papers:**

**Fake Reviews Detection: A Survey – ResearchGate**

<https://www.researchgate.net/publication/351065731_Fake_Reviews_Detection_A_Survey>

**Detecting Review Spam – UIC Technical Report**<https://www2.cs.uh.edu/~arjun/papers/UIC-CS-TR-yelp-spam.pdf>

**Fake Reviews Detection Using Machine Learning and NLP – ScienceDirect**<https://www.sciencedirect.com/science/article/pii/S1319157821001993>

**Research on false review detection Methods: A state-of-the-art review** – **ScienceDirect**

https://www.sciencedirect.com/science/article/pii/S1319157821001993

## 4. Key Findings

**Finding 1:** According to industry reports, an estimated **30%** **of** **online** **reviews** **are** **fake** **or** **manipulated**. Bots, incentivized users, or reputation management agencies often generate these fabricated reviews.

**Finding 2:** Fake reviews distort buyer perceptions, leading to misinformed purchases, eroding brand trust, and skewing product rankings and search results.

**Finding 3:** AI and NLP technologies enable effective detection by analyzing text sentiment, linguistic patterns , and reviewer behavior.

**Finding 4:** Integrating **user metadata**—such as account age, review frequency, and purchase verification—enhances detection accuracy beyond what text analysis alone can provide.

**Finding 5:** Global regulatory actions, like the **EU’s Omnibus Directive**, are now mandating transparency in review practices, pushing platforms to implement systems that verify review authenticity and disclose review handling mechanisms.

## 5. Remarks / Notes

Any additional thoughts, contradictions found, or insights that didn’t fit above.

* Implementing machine learning-based detection models (e.g., Random Forest, LSTMs, or Transformers) may improve fraud detection accuracy.
* Combining text analysis with user behavior patterns can enhance system reliability.
* Need to consider scalability and real-time detection challenges for large-scale platforms.
* Ensure ongoing user feedback is integrated to continuously refine the AI model and reduce misclassification.
* Incorporate explainability features so users can understand how the system distinguishes genuine from fake reviews.
* Regularly update detection algorithms with real-time data to stay ahead of evolving fraud tactics.
* Assumes availability of historical review logs to analyze long-term user behavior.