I. INTRODUCTION

In recent years, especially in 2022, the skincare market in Indonesia has experienced significant growth, driven by shifts in market trends, consumption patterns, consumer preferences, and technological advances[1]. Increasing awareness has triggered various local skincare brands to compete in meeting consumer needs. Currently, the social media Platform X has emerged as a primary platform for people to express thoughts and sentiments regarding products and services. According to the We Are Social report[2], as of October 2023, Indonesia has approximately 27.5 million Platform X users. This makes reviews on platform X a crucial source of data for analyzing public sentiment and a valuable tool for companies to derive insights for marketing strategies and product development.

Sentiment analysis is a field of science that studies opinions, attitudes, and feelings toward a particular entity, such as a person, event, or topic [3]. This analysis is essential on social media platforms due to their high volume of comments, making traditional techniques often less relevant. In the context of local skincare products, sentiment analysis can provide in-depth insights into consumer preferences. In this research, sentiment analysis was conducted on Platform X data in the Indonesian language using IndoBERT as a word embedding model for feature extraction, which helps capture the meaning of words in Indonesian more accurately. Two GNN architectures, Graph Attention Network (GAT) and Graph Convolutional Network (GCN) were applied to the IndoBERT feature extraction results to process complex graph data.

Various studies have presented the success of deep learning methods such as GNN in sentiment analysis. For example, the combination of GNN and LSTM achieved excellent results on Weibo comments, with 95.25% accuracy and F1-score of 95.22%[4]. IndoBERT and LSTM effectively analyzed Indonesian skincare product reviews, achieving 92.6% accuracy[5]. The Sentic GCN model, which uses the SenticNet knowledge base, improved aspect-based sentiment analysis with 84.03% accuracy and a 75.38% F1-score[6]. On Reddit data, a stacking model combining RoBERTa and GAT achieved 82.5% for both accuracy and F1-score, showing the advantages of combining different methods[7]. The SSGCN model also improved sentiment analysis for declarative sentences by incorporating language structure information[8]. In analyzing Indonesian beauty product reviews, mBERT outperformed IndoBERT, although data imbalance limited its results[9]. A CNN-BERT-GCN model achieved 85.25% accuracy by effectively capturing contextual information[10]. Studies comparing GCN and GRN methods for sentiment analysis found GRN to perform better, with an F1-score of 97.14%[11]. In another study[12], an enhanced IndoBERT model could classify Indonesian slang, but its accuracy was limited to 60.35%. Lastly, for YouTube educational videos, techniques like oversampling and SMOTE helped models like SVC and RF reach up to 96% accuracy. These studies demonstrate the importance of combining different methods and addressing data imbalances to achieve better sentiment analysis results.

The goal of this study is to analyze consumer sentiment towards local skincare products. The GNN method was chosen for its ability to process graph data structures, which are suitable for capturing

relations between words in review texts. Meanwhile, IndoBERT is used as a feature extraction method to understand the context of the Indonesian language more accurately. This study compares two method combinations, GCN-IndoBERT and GAT-IndoBERT, to identify the most effective approach for sentiment classification.