AI-driven sentiment analysis on servitization business model: A Twitter Based Study

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In today's dynamic market landscape, servitization, the transformation of products into services, has emerged as a prominent strategy for businesses to enhance value proposition and foster long-term customer relationships. Understanding public perception and sentiment towards servitization is crucial for companies aiming to capitalize on this paradigm shift.

This research leverages natural language processing (NLP) techniques, social media platforms and machine learning technology to gain a deeper understanding of public opinion on servitization, thereby informing strategic decision-making and enhancing competitive advantage in the marketplace. In particular, we propose an AI-driven sentiment analysis technique to automatically categorize a given Twitter post as positive, negative, or neutral about servitization. To this end, we collected more 100,000 tweets related to servitization, in two different periods (March 2023 and February 2024). We used 12 targeted keywords and hashtags, such as Servitization, Productasaservice, and Serviceselling. Leveraging NLP techniques, we preprocessed the collected data to remove noise, tokenize text, and extract relevant features, leaving a total of 73,549 preprocessed tweets for further analysis.

The manual annotation of such large data was extremely difficult, for this we used a popular sentiment annotation method, namely RoBERTa (A Robustly Optimized BERT Pretraining Approach), to calculate the intensity of the sentiment as either positive, neutral, or negative. The labelled tweets were then used to train a series of machine learning and deep learning algorithms to automatically detect the sentiment of social media tweets in relation to servitization. To this end, we experimented with popular machine learning algorithms including Naïve Byte, Logical Regression, and Stochastic Gradient Descent classifiers, providing accuracies of 66%, 78 %, and 75%, respectively. Furthermore, we evaluated the performance of three deep learning methods, namely Long-Short Term Memory (LSTM), Bidirectional-LSTM (Bi-LSTM), and Hybrid Bi-LSTM, providing accuracies of 80%, 79%, and 79 %, respectively. Our results revealed that LSTM outperformed all the studied algorithms in classifying tweets into positive, negative, or neutral sentiments.

Our research utilizes topic modeling techniques to identify key themes within the positive, negative and neutral tweets related to servitization. This allowed us to gain deeper insights into the drivers and barriers influencing public perception of servitization. Results revealed that people's attitude in response to service offerings on the Twitter platform is generally positive, with percentage of 47%. Our analysis indicates that positive tweets predominantly focus on topics related to time optimization, use technology, and service accessibility. This suggests that users perceive service-based products, aided by technology, as efficient time-savers and more accessible alternatives compared to traditional product purchases. Additionally, positive tweets comprised topics related to sales offers and discounts on services, indicating a positive association between cost-saving opportunities and user satisfaction. On the other hand, negative tweets (32% of data) highlighted keywords such as "expensive," "cancel," "remind," and "monthly subscription." These findings suggest that negative sentiment is often linked to concerns about high costs, subscription-related issues, and reminders, potentially indicating dissatisfaction with pricing models, subscription plans or billing practices.

Our work highlights the role of NLP and machine learning technologies in extracting and analysing social media content related to servitization to extract valuable insights for businesses seeking to gauge market sentiment and tailor servitization offerings to meet customer needs and preferences.

Our results reveal that while users generally embrace the convenience and accessibility of service offerings, concerns about cost and subscription terms can lead to negative sentiment among users.