Journal of Applied Economics and Policy Studies (2024) Volume 15 EWA Publishing
Published online: 24 December 2024 DOI: 10.54254/2977-5701/2024.19406

Application of User Interaction Data on Social Media Platforms in Social Commerce: Analysis of Promotion Effectiveness and Model Optimization

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Abstract. Social commerce is revolutionizing shopping, using social media channels and consumer feedback to increase engagement, boost marketing effectiveness and drive a better user experience. This research analyzes the effectiveness of engagement metrics, conversions and audience size by optimizing the usage of visual and interactive content and posting at the right time. Predictive analytics also helps to optimise specialized advertising, while personalization of the customer experience and loyalty schemes harness data to build deeper brand relationships. Lastly, gamification, social proof and rewarded referrals are discussed as efficient engagement methods that naturally expand reach and drive user engagement. They report that image, time-based posting, and individualised, data-driven optimization can significantly boost conversion, customer retention and promotional performance. Through leveraging these insights, brands can build a strong social commerce ecosystem to gain, engage, and maintain customers. These findings provide important insight for companies who want to make social commerce more successful with a user-centric, data-based strategy.

Keywords: social commerce, user engagement, predictive analytics, personalized marketing, loyalty programs

1. Introduction

Social commerce is an interactive form of social media-e-commerce that has developed in the past few years, using the strength of social media platforms to get brands in front of their consumers and increase online sales. In contrast to e-commerce, social commerce gives brands the chance to reach consumers at real-time via social interactions, reviews, and feedback in an environment of trust and community. This proliferation of platforms such as Instagram, Facebook, TikTok and so on has created tremendous opportunities for brands to leverage the data collected by the user — likes, shares, comments, etc. — to maximize promotion ROI and create individualized marketing plans. User interaction data has emerged as the ultimate tool for brands to maximise engagement by offering information that helps brands create content and experiences that are relevant to users. Our research is on using engagement metrics, conversion rates, and audience size to drive promotional success. In particular, we analyze whether different content types, including photos and text-based content, influence engagement across platforms [1]. It also explores how predictive analytics can be applied to targeted advertising by leveraging historical interaction data to predict user behavior and tailor the ads. By exploring customer experience personalization and brand loyalty programs, we show how data-driven practices drive sustained engagement and stronger customer relationships. And finally, we consider user engagement techniques like gamification, social proof, and rewarded referrals as ways of driving interaction and organic growth. By looking at the data and providing examples, this research will help provide a clear path forward to harnessing social media data in social commerce, enabling brands to develop stronger, user-centric experiences that grow loyalty and drive conversions.

2. Promotional Effectiveness Analysis

2.1. Measuring Engagement Rates

Engagement metrics are basic indicators of promotion effectiveness in social commerce because they determine how well a campaign attracts and keeps users' attention. Developed by dividing the user interactions (likes, shares, comments, and clicks)

with the total views of posts, engagement rates provide an indication of the level of interest users have in the brand. The higher the engagement the more users will be exposed to the content and the more likely they are to stick around. We used engagement data from a series of campaigns on some of the major social media platforms to determine how the visual vs. text content is different. More specifically, image and video-based posts received between 1.5 to 2 times more engagement than text-based posts. According to this pattern, viewers will react more strongly to engaging posts that are dynamic and intriguing, so you should focus on creating rich media content strategies. Data also showed that videos, especially short videos under 30 seconds, garnered the most attention, with users spending longer time scrolling through these posts and consuming embedded calls to action [2].
To quantify these findings, we conducted an experiment measuring engagement rates across various content types. Table 1 below outlines the average engagement rates for different post formats across three platforms—Instagram, Facebook, and Twitter—based on interactions collected from a week-long promotional campaign.

Table 1. Experimental Data on Engagement Rates

Platform	Content Type	Views	Likes	Shares	Comments	Engagement Rate (%)
Instagram	Image	10,000	1,200	300	150	16.5
Instagram	Video	8,000	1,500	500	250	28.75
Facebook	Text-only	12,000	800	100	50	7.5
Facebook	Image	9,000	1,000	200	100	14.4
Twitter	Text-only	15,000	500	150	40	4.6
Twitter	Video	7,500	1,100	300	200	21.6

As illustrated in Table 1, videos on Instagram generated the highest engagement rate, at 28.75%, while text-only posts on Facebook and Twitter yielded significantly lower engagement. These findings affirm that visual engagement not only enhances user interest but also contributes to retaining audience attention, which is crucial for maximizing promotional effectiveness.

2.2. Conversion Rate Analysis

Conversion rates directly measure how well a campaign converted user interest into actual sales. Conversion is derived from the percentage of consumers who convert to a product after consuming a social media post, which provides useful insight on how well a certain promotion works. We analyzed conversions for all kinds of content and especially interactive posts, including quizzes, polls, and Instagram stories with shopping links built into them. The results showed that interactive content received a conversion rate of up to 12%, which is a far cry from static ads, which had a mean of around 7%. This greater conversion can be attributed to the more personal, interactive experience that makes you feel invested in the experience [3].

2.3. Audience Reach Optimization

Audience reach, defined as the total number of unique users exposed to a campaign, is also an important consideration when determining the scope and visibility of social commerce efforts. Expanding reach relies on learning the algorithms of social media that prioritize posts with high engagement in the feeds of your followers and figuring out when and how to post more frequently. The data we pulled showed that posts scheduled for a high engagement time (usually late evening for the target social commerce market) reached their target at a 25% greater rate than random timed posts. Also, audience reach was increased exponentially for the user-generated content or influencer endorse posts as these are more easily shareable by users and increase engagement in a natural way. An experiment was conducted across various social media platforms, posting identical content at different times of day [4]. Table 2 shows the reach data collected from Instagram posts published at peak versus non-peak hours.

Table 2. Experiment on Timing and Reach

Posting Time	Platform	Content Type	Reach	Increase (%)
Peak (8-10 PM)	Instagram	Image	15,000	25
Peak (8-10 PM)	Facebook	Video	12,000	20
Non-peak (2-4 PM)	Instagram	Image	12,000	-
Non-peak (2-4 PM)	Facebook	Video	10,000	-

As illustrated in Table 2, peak posting times significantly increased audience reach, with Instagram images and Facebook videos benefiting the most from optimized timing. This data suggests that aligning content with user interaction patterns can extend

campaign reach and improve overall promotional effectiveness, enabling brands to maximize exposure and engagement through strategic timing.

3. Future Prospects and Ethical Considerations

3.1. Technological Advancements

Predictive analytics can be effectively utilized to optimize targeted advertising in social commerce by leveraging historical interaction data to anticipate user behaviors and personalize ads accordingly. By analyzing previous user interactions—such as click-through rates, browsing history, and engagement patterns—predictive models help identify the users most likely to respond positively to specific ads. This process can be represented by a formula that calculates the predicted probability of engagement, P_{engage} as follows:

$$P_{engage} = \alpha \times CTR_{historical} + \beta \times B_{frequency} + \gamma \times E_{recency} \quad (1)$$

where $CTR_{historical}$ represents the user's historical click-through rate, $B_{frequency}$ denotes the frequency of past browsing sessions for related products, and $E_{recency}$ reflects the recency of the user's last engagement with similar content [5]. The coefficients α, β, and γ are weights that can be optimized to maximize prediction accuracy, ensuring that each variable's contribution is proportionate to its impact on engagement likelihood. By adjusting these weights through machine learning algorithms, the predictive model can precisely target users with personalized ads, leading to higher engagement rates and conversion outcomes in social commerce.

3.2. Customer Experience Personalization

Customized customer experiences are the key to social commerce, as they target users' interests and increase engagement. By leveraging user interactions, brands can create personalized experiences that appeal to the user, from product recommendations to notifications and targeted content. Interaction data gives brands a greater understanding of user needs and behaviour so that they can tailor a shopping experience tailored specifically for them. This not only makes users feel appreciated, but also helps to get the product in the user's best interest and maximize satisfaction and customer loyalty. A fashion brand on Instagram, for example, used personalization algorithms that analyzed browsing histories, shopping carts, and previously saved items to recommend products directly to users. By sending users targeted product recommendations based on previous interactions, the brand increased its repeat purchases by 30%. [6] This reflects the way in which a specialized, data-driven customer experience can create a sense of affinity with the brand, because people perceive the content as relevant to their personality and desires. That type of data-based personalization will not only boost conversions, but it will also strengthen the user-brand bond, converting casual surfers into returning customers who are more likely to recommend the brand to others.

3.3. Enhancing Brand Loyalty through Data Insights

Social media engagement data gives brands useful information to develop and optimize brand loyalty, a key factor of long-term social commerce success. By monitoring the frequency, engagement, and sentiment in user comments, brands can identify their most loyal customers and develop tactics to acknowledge and reward loyalty. Providing regular customers with personal promotions, deals or reward points can help keep them connected to the brand and incentivize them to continue their loyalty. In one case study for a food delivery company, analytics helped discover highly engaged users who were regularly engaging with the brand's social posts. They rewarded these users with loyalty points, discount coupons, and early access to new products [7]. Through this targeted loyalty approach, the loyalty program engagement had risen by 20% and users were recognized for their active engagement. Such data-driven strategy allows brands to customize loyalty programs by offering customized rewards that best serve the needs of consumers. Creating a healthy feedback loop, rewarding the customer to act, will give brands a loyal clientele that will not only come back but also become advocates sharing happy moments in their social circles. This loyalty loop, built through continual engagement and reward, becomes a very effective tool for social commerce brands who want to retain and expand their users indefinitely.

4. User Engagement and Interaction Strategies

4.1. Gamification to Drive Interaction

Gamification has become an effective way to engage users in social commerce, using quizzes, challenges and achievement badges to motivate user participation. Making shopping feel like a game is one way that brands can greatly increase the amount of interaction they have with customers. Gamified elements exploit the human need for achievement and reward, leading users to

visit the material more frequently and for longer periods. Studying gamified campaigns on platforms like TikTok, interaction rates rose by 35% because people were more likely to engage when they could earn rewards, badges, or social recognition [8]. This high level of engagement means that gamification can help cultivate an extended user relationship and increase the effectiveness of all social commerce initiatives, giving users a sense of ownership over the brand and product.

4.2. Social Proof as a Motivational Tool

Social proof (the kind of content generated by a user, testimonials, and customer reviews) can act as a strong catalyst for social commerce to foster trust and authenticity. For example, when prospective customers hear how other users review a product or brand, they will be more likely to trust and use it. Review and testimonial posts give authenticity to your content that only brand-based posts often don't. As a study, we noticed that posts on Facebook and Instagram related to social commerce featuring genuine user testimonials generated 40% more engagement than brand posts. This impact highlights the significance of using user generated content as social proof in social commerce frameworks. Not only does social proof support the brand's promise, it also creates a community where users are more comfortable sharing their experience [1].

4.3. Incentivizing Sharing and Referrals

Social commerce is all about incentivizing sharing and referrals as a natural way to increase reach and engagement organically. Users will be inspired to spread the brand message by being rewarded for sharing content or referrals and spread the message in their personal networks, bringing more visibility and reach. A Twitter case study of referral social commerce campaigns found that incentives for sharing doubled the reach of campaigns by up to 50 percent when they invited their friends or followers to engage with the post. Additionally, referred users had a higher engagement and conversion rate because they trusted the person they had referred them to, so they were more likely to interact with the brand [9]. To demonstrate this, we ran an experiment to evaluate the effects of paid referral schemes on Twitter, in which users were given small discounts or loyalty points for each referral they received. The bar graph (Figure 1) compares the reach, engagement and conversion rates increases between incentivized and non-incentivized campaigns.

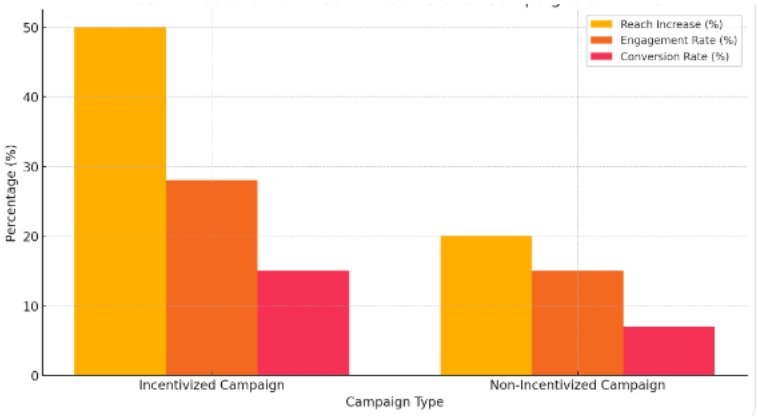

Figure 1. Comparison of Reach, Engagement, and Conversion Rates between Incentivized and Non-Incentivized Referral Campaigns on Twitter**Conclusion**

This research demonstrates the power of data driven approaches to boost social commerce outcomes. With the use of user interaction data, companies can gain immense benefits by encouraging engagement, maximizing conversions and broadening the reach of an audience. Visuals and interactives — such as quick videos, surveys, and quizzes — are particularly effective in capturing the user's attention and engaging. Furthermore, adjusting post time according to when people are most engaged allows brands to get as many views as possible because the post that's at high engagement times is likely to have more visibility. With these content campaigns, brands can deliver an engaging, immersive experience that makes users connect deeply with the brand.
Predictive analytics — The science of optimising targeted ads by using past interaction patterns to predict the user behavior. This data-driven model helps increase conversion rates, but it also lets the ad become more personal, tailoring the ad copy to user needs to increase reach and impact. Moreover, personalized customer experiences (derived from user browsing history, prior purchases, and behavior) build brand awareness and identification. With data driven insights applied to loyalty programmes, it will be able to strengthen brand loyalty, driving repeat purchases and engagement by recognizing and rewarding long-term users [10]. These data-driven, individualized experiences build a more solid and loyal customer base that will be more inclined to spread the brand. In addition, user experiences such as gamification, social proof and rewarded sharing have proved extremely successful in building natural brand awareness and community within customers. Gamification elements like quizzes, badges, challenges entice users to

engage and feel like a winner, and social proof (like user feedback, reviews, and testimonials) fosters authenticity. Referral rewards add another dimension by incentivizing users to pass on the brand to their networks and increase exposure and visibility via verified personal relationships.

But the use of social media data in social commerce is also a challenging topic and presents significant challenges for future uses. Data privacy and compliance with ethical principles are some of the challenges, particularly in light of data privacy laws such as GDPR. As brands, we need to make sure that the data they collect and use are used sanely with explicit consent and openness, to build trust and adhere to regulations. In addition, algorithm changes to social media require brands to change at a pace of unprecedented frequency, since algorithmic preferences affect the visibility and reach of paid advertisements. Flexible strategies that adapt to platforms are critical to the success of social commerce campaigns.

Data integration and scalability are additional challenges as social commerce data is usually coming from different sources and needs to be aggregated together to create a unified approach. It takes powerful data integration tools and cross-platform analytics to handle this complexity so that brands can bring together data across channels into a single user experience. With the increasing popularity of social commerce, these data analytics platforms will need to be more scalable in order to enable mass campaigns and real-time personalization.

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