Influence of Artificial Intelligence Tools on Customer Satisfaction, Engagement, and Brand Loyalty within Online Brand Communities in Tunisia

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Abstract

Grounded in the Technology Acceptance Model (TAM) and Social Exchange Theory (SET), this study investigates how artificial intelligence (AI) tools affect customer satisfaction, engagement, and brand loyalty within online brand communities (OBCs) in the Tunisian cosmetics sector. The research employed a mixed-methods approach that involved netnography and a quantitative survey of 250 active members of a Facebook brand community. Structural equation modeling (SEM) indicated that customer satisfaction with AI-enabled features, including personalized recommendations, automated responses, and chatbots, significantly predicted community participation ($\beta = 0.68$, $p < 0.001$) and engagement ($\beta = 0.72$, $p < 0.001$). Both participation and engagement, in turn, enhance brand loyalty ($\beta = 0.61$ and $\beta = 0.66$, respectively) and mediate the satisfaction-loyalty relationship. Qualitative data reaffirmed these results, indicating that AI-generated personalisation builds trust, emotional connection, and engagement in community interaction. From a theoretical perspective, the study adds to OBC engagement models by exploring AI enabled interactivity as an antecedent to both satisfaction and loyalty, linking two topical research domains: technology adoption and relationship marketing. Pratically, it illustrates how firms in a developing market can utilize AI based personalisation and responsiveness as a method for improving consumer-brands relationship and protecting competitive advantage.

Keywords: Artificial Intelligence (AI); Online Brand Communities (OBCs); Customer Satisfaction; Customer Engagement; Brand Loyalty; Emerging Markets; Cosmetics Industry.

Introduction

Digital technologies are fundamentally altering how users communicate, collaborate, and connect. The Digital 2024 Global Overview Report indicates that more than 5.35 billion individuals are using the internet, meaning that 66.23% of people on the globe are connected to the internet, 4.95 billion are active on social media, and they spend an average of two hours and 23 minutes per day on social media (DataReportal, 2024). As a result, the level of connectivity experienced today has resulted in the emergence of online brand communities (OBCs) where consumers with similar interests exchange experiences, build social ties, and engage with brands (Kumar & Nayak, 2019; Muniz & O'Guinn, 2001). During the previous decade, firms have strategically leveraged OBCs as a means to engage

consumers in even more depth, resulting in increased satisfaction, brand commitment, and loyalty (Huang et al., 2021; Cuesta-Valiño et al., 2022).

In the cosmetics sector, OBCs carry significant weight in influencing consumer perceptions and purchase behaviors. Consumers are using OBCs to learn about peer advice, validate their purchase decisions, and co-create brand experiences (Hollebeek et al., 2019). Lee and Cho (2023) demonstrated that perceived interactivity and social presence in cosmetics brand communities positively influence engagement and loyalty. Furthermore, the speed of AI has changed the space as well. AI features like personalized recommendations, virtual try-ons, chatbots, and skin diagnostics foster immersive, real-time, and personalized experiences, which drastically modify engagement.

Recent investigations illustrate the expanding role of AI in marketing: AI-powered applications enhance customer satisfaction, generate emotional brand attachment (Rane et al., 2024), and customize experiences with fine detail and provide reassurance (Coelho & Imamović, 2025). However, while the literature on AI-mediated OBCs is gaining traction, most of the research is still fragmented and geographically limited to developed countries (e.g., Dai & Liu, 2024). There is a significant gap in the emerging market context, specifically in North Africa.

Tunisia presents an illustrative case in the context of this investigation. Regarding social media penetration, with 8.3 million active internet users (67.3% of the population) in Tunisia, Facebook has the largest number of users (DataReportal Tunisia, 2024). The cosmetics industry, and particularly the natural and organic cosmetics industry, is rapidly growing, with projected revenue of USD 415 million by 2025 (Statista, 2023). Consumers are increasingly asking for validation and personalized recommendations before making purchase decisions online and are using Facebook OBCs as a source of reassurance. However, we still have limited empirical research on how Tunisian brands use AI-powered applications, since they have a great opportunity to enhance customer satisfaction, engagement, and loyalty, but are often limited by research.

The recent literature highlights the necessity of better understanding culture, technology, and infrastructural factors of AI on consumer brand engagement in developing markets (Mbonigaba, 2024; Witts, 2024). In response, the study investigates the effect of AI tools present in Facebook brand communities on customer satisfaction and engagement in the Tunisian sector of cosmetics, and ultimately, brand loyalty.

The study makes two primary contributions. First, it extends current OBC engagement models by including AI-enabled features as antecedents to satisfaction and loyalty. Second, the piece addresses a significant geographical void by providing insights from North Africa, a region that lacks digital marketing research. Practically, it provides actionable insights to marketers and brand managers on how to utilize AI tools in social media communities to build stronger customer relationships and a competitive advantage in the cosmetics market.

The remainder of the article is structured as follows: Section 2 reviews theoretical foundations and relevant literature; Section 3 describes the mixed method (netnography

and survey) design; Section 4 presents findings; Section 5 discusses theoretical and managerial implications; Section 6 concludes, and Section 7 concludes with limitations and future research avenues.

Theoretical Background and Literature Review
Brand Community

Muniz and O'Guinn (2001) defined a brand community as "a structured set of social relationships that is not geographically bound, based on a shared interest in a brand." This definition indicates that a brand community is more than an encounter of economic exchange, but rather it creates emotional and social connections between its members, and a brand community leads to committed loyalty.

Research has also demonstrated that brand communities increase brand-related commitments and encourage more consumer-to-consumer interactions (which supports consumer-brand relationships and trust and satisfaction) (Huang et al., 2021). In addition to the encouraged engagement behind community identity, which increases the brand community can also create oppositional loyalty, which is how members can protect their preferred brand against competitors (Constantin et al., 2014), leading to deepening their commitment and allowing them to try different products offered by the brand.

With the advances made in AI, the benefits of a brand community have gone beyond the prior or traditional engagement. AI has the same benefits Uber and other companies offer as hyper-personalized engagement within the community, automated response, predictive data analytics, and real-time adjustments (Davenport et al., 2020). For instance, intelligent recommendation systems that provide product suggestions based on behavioral data, or chatbots to help resolve issues, providing real-time information, which increases the lifetime value in not just satisfaction and engagement of the member in the community (Kumar et al, 2023).

Rane et al. (2024) assert that the incorporation of AI in OBCs enhances community dynamics by enhancing the relevancy and personalization of consumer-brand engagement. AI is able to notice behavior patterns and communicate with consumers who have high engagement levels while also adapting messages. This directly contributes to the valuation and loyalty perceived by the consumer.

In this sense, the evolution of brand communities and AI may be viewed as a step function regarding the evolution of digital marketing. Technology is not simply being utilized for better processes-it is facilitating emotional and social ties between the brand and consumer. This necessitates further consideration in the context of the brand consumer relationship as it relates to emerging markets, where there is increased connectivity, but social and cultural contexts may provide different engagement behaviors.

Customer Satisfaction

Customer satisfaction is widely understood as either an emotional or a cognitive appraisal of a consumer's overall experience with a product, service, or brand (Oliver, 1997; Huang et al., 2021). This can be established through the degree to which performance meets or exceeds previous expectations and can include both emotional responses and cognitive evaluation. Within service contexts, customer satisfaction is overall a function of perceived service quality and becomes a predictor of future behavioral intentions (Martin, 2016). Meanwhile, with online brand communities, customer satisfaction comes from perceived value from participation (Jin, Cheong & Pan, 2007). This value may be functional (i.e., information acquisition or problem-solving support), emotional (i.e., a sense of belonging and social support), and social (i.e., making connections with like-minded consumers) (Mandung et al., 2023).

AI-driven technologies have evolved the methods of generating satisfaction in OBCs. Generative AI can facilitate personalized product recommendations to consumers in addition to smart chatbots, virtual around-the-world try-ons, and predictive analysis that can help brands deliver a proactive personalized experience that often exceeds consumer expectations (Lee & Cho, 2023). These elements create satisfaction levels by enriching perceived interactivity and service quality (Rane et al., 2024).

AI is able to develop trust through a proactive service experience instead of reacting to a consumer's request. For instance, in beauty applications, the recommendation of skincare solutions by the use of AI technologies makes it easy to generate personalized recommendations at scale and ultimately increase satisfaction and develop very strong brand–consumer relationships.

Satisfaction created from AI engagement leads to cumulative marketing outcomes, such as increased retention, trust, advocacy, and consumer co-creation with the brand (Huang et al., 2021). In industries like beauty that are highly competitive and have low to no differentiation, AI engagement regarding marketing is an increasingly important strategic asset to retain consumer brand communities and create long-term advantage in competition.

Determinants of Satisfaction with Online Brand Communities

Customer satisfaction within OBCs emerges from multiple experiential dimensions, notably functional, social, and entertainment value (Wu et al., 2010). The Functional value stems from practical benefits such as AI-powered product recommendations that simplify purchasing decisions. Algorithms analyze consumer behavior and preferences to deliver relevant, timely, and personalized content, thereby streamlining engagement (Kumar et al., 2023). The Social value reflects the affective and relational aspects of participation. Through peer interaction and support, members develop a sense of belonging and shared identity (Mandung et al., 2023). AI tools-such as chatbots and virtual assistants- enhance these dynamics by enabling real-time, personalized support and fostering trust within the community (Costa et al., 2022; Rane et al., 2024). The Entertainment value relates to

enjoyment and immersive experiences. Features such as AR and AI-powered virtual try-on allow consumers to visualize cosmetic products before purchasing, reducing uncertainty and positively shaping post-purchase evaluations (Huang et al., 2021; Lee & Cho, 2023).

AI technologies enhance these value dimensions by offering real-time, hyper-personalized interactions and data-driven insights that anticipate consumer needs (Davenport et al., 2020). Empirical evidence supports this: Dai and Liu (2024) found that AI tools significantly influence both affective and cognitive experiences in virtual brand communities, increasing satisfaction and loyalty. Similarly, Coelho and Imamović (2025) demonstrated that interactive technologies and generative AI elevate emotional engagement and satisfaction in online retail contexts.

In summary, customer satisfaction in OBCs is multidimensional and deeply shaped by AI integration. By amplifying functional, social, and entertainment value, AI technologies strengthen consumer–brand relationships and foster more engaged, loyal communities.

Brand Loyalty

Brand loyalty refers to a consumer's enduring commitment to repurchase or continue using a preferred brand, regardless of external factors such as competitor marketing or situational influences (Hwang et al., 2021). This loyalty encompasses not only behavioral intentions (repeat purchase) but also emotional attachment and positive attitudes (Oliver, 1997). Together, these elements form the foundation for long-term customer retention and business sustainability (Dick & Basu, 1994). Loyal customers typically demonstrate lower price sensitivity, are more forgiving of service failures, and act as brand advocates, influencing potential buyers through word-of-mouth and recommendations (Kumar & Reinartz, 2016). From a strategic perspective, brand loyalty is a critical driver of brand equity, profitability, and competitive advantage (Prihartono et al., 2012; Brodie et al., 2013). Loyal customers reduce marketing costs, provide predictable revenue streams, and enhance long-term profitability (Reichheld & Sasser, 1990). In sectors such as cosmetics, where product differentiation is narrow and competition is intense, brand loyalty becomes a central determinant of market share and sustained growth (Huang et al., 2021).

The rise of AI has opened new pathways for cultivating loyalty. AI tools enable brands to deliver hyper-personalized experiences, anticipate customer needs through predictive analytics, and provide seamless service via chatbots and virtual assistants. These interactions foster trust and emotional bonds, key antecedents of loyalty (Costa et al., 2022). For instance, AI-based recommendation engines not only increase product relevance but also signal to customers that the brand understands their preferences and values, thereby strengthening loyalty intentions (Lemon & Verhoef, 2016). Empirical studies support this connection. Rane et al. (2024) demonstrate that AI-enabled personalization sustains trust and engagement, leading to measurable loyalty outcomes. Kumar et al. (2023) highlight that AI's ability to shorten response times and provide tailored solutions increases attachment and repeat patronage. Within OBCs, loyalty extends beyond

purchasing behavior. It encompasses active advocacy, defending the brand, recommending products, and co-creating brand meaning (Muniz & O'Guinn, 2001; Huang et al., 2021). AI tools further amplify these behaviors by personalizing member interactions and facilitating meaningful engagement experiences.

In short, brand loyalty represents a sustainable source of competitive advantage, particularly in emotion-driven industries such as cosmetics. By fostering trust, personalization, and connection, AI technologies strengthen both the functional and emotional dimensions of loyalty within digital brand communities.

Impact of Customer Satisfaction and AI Tools on Brand Loyalty

The relationship between **customer satisfaction** and **brand loyalty** is complex and multidimensional, encompassing psychological, behavioral, and technological processes. Within OBCs, **participation** and **engagement** act as key mediators that translate satisfaction into enduring loyalty behaviors. AI technologies play a crucial enabling role in this process by enhancing interactivity, personalization, and emotional connection.

Consequences of Customer Satisfaction

Community Participation

Satisfied customers are more likely to participate actively in brand communities, investing time, attention, and energy to contribute to discussions and peer exchanges (Huang et al., 2021). They perceive emotional, informational, and social value from these interactions, reinforcing their sense of belonging. AI tools enhance participation by reducing barriers to entry and enriching the user experience. Features such as AI-driven gamification (e.g., challenges, badges, leaderboards) sustain activity and reward involvement (Hamari et al., 2014). AI chatbots offer immediate feedback and guidance, supporting new or less active members and encouraging more frequent contributions (Shahzad et al., 2024). By facilitating seamless interactions, AI tools foster a participatory culture that strengthens loyalty pathways.

Community Engagement

Unlike participation, engagement reflects a deeper psychological state, involving emotional attachment, cognitive involvement, and behavioral commitment (Martínez-López et al., 2021). Customers who are satisfied with their community experience display higher engagement, perceiving the community as relevant, responsive, and personalized. AI-enabled community features such as AR or VR try-ons offer immersive experiences, increasing emotional connection and confidence in cosmetic purchases (Coelho & Imamović, 2025). AI analytics further enable brands to monitor sentiment and adapt communication in real time, creating an environment that sustains engagement. Moreover, AI can support peer-to-peer matching (e.g., users with similar skin types), reinforcing a sense of belonging and micro-community identity (McAlexander et al., 2002).

Community Participation and Brand Loyalty

Active participation enhances both relational experiences and brand trust (Brodie et al., 2013; Muñiz & O'Guinn, 2001). Hollebeek et al. (2014) argue that participation fosters attitudinal loyalty (positive word-of-mouth, psychological attachment) and behavioral loyalty (repeat purchases). In cosmetics communities, exchanging personal experiences and usage tips reduces perceived risk (Touzani & Temessek, 2009), increases trust, and strengthens advocacy behaviors (Algesheimer et al., 2005).

Community Engagement and Brand Loyalty

Community engagement is one of the strongest precursors of brand loyalty in OBCs (Hollebeek et al., 2014; Vivek et al., 2012). Engaged consumers act as co-creators of value, shaping brand reputation and driving community vitality (Brodie et al., 2013; Omran, 2021). Engagement fosters a sense of belonging and shared brand passion, which can transform ordinary customers into brand champions (McAlexander et al., 2002).

AI technologies reinforce engagement through hyper-personalized, interactive experiences. AI recommender systems tailor content and product suggestions, increasing emotional attachment and perceived authenticity (Ricci et al., 2015; Costa et al., 2022). Chatbots offer instant, context-aware assistance, removing friction points in the consumer journey (Rane et al., 2024). Immersive tools such as AR try-ons gamify consumption, blending play and utility (Huang & Liao, 2015; Pantano & Servidio, 2012).

AI also supports user-generated content dynamics and micro-influencer activation (Gensler et al., 2013), amplifying social proof and trust, key drivers of cosmetics purchases (Hollebeek et al., 2019).

Mediating Role of Participation and Engagement

Although satisfaction with AI-enabled features can directly influence loyalty, research increasingly shows that participation and engagement mediate this relationship (Brodie et al., 2013; Hollebeek et al., 2014). From a value co-creation perspective (Prahalad & Ramaswamy, 2004), active involvement deepens brand attachment. Personalized AI features (e.g., chatbots, recommendations, customized feeds) lower participation barriers, facilitate meaningful exchanges, and foster identification with the community (Shahzad et al., 2024; Laroche et al., 2013). Engaged members internalize the community identity, translating satisfaction into loyalty behaviors such as repeat purchase and positive advocacy (Algesheimer et al., 2005; Kumar & Nayak, 2019). AI thus acts as a catalyst, strengthening the psychological and behavioral pathways from satisfaction to loyalty in online cosmetics brand communities.

Theoretical Framework and Conceptual Model

Drawing upon the literature reviewed above, this study proposes a theoretical framework that positions the perceived use of AI-enabled features as a key antecedent of customer satisfaction, which in turn influences community participation, community engagement, and ultimately brand loyalty within online brand communities. The model is grounded in the satisfaction–engagement–loyalty paradigm (Huang et al., 2021; Omran, 2021) and builds on research emphasizing the role of AI-enabled personalization and interactivity in shaping consumer experiences (Vikalef et al., 2023; Rane et al., 2024).

Perceived AI features, such as personalized recommendations, chatbot interactions, and virtual consultations, are expected to enhance customer satisfaction by offering personalized, seamless, and efficient brand interactions. In turn, satisfaction acts as a precursor to active participation in the community (Lee & Cho, 2023), which fosters deeper engagement (Martínez-López et al., 2021). Engaged community members are more likely to develop strong emotional connections and behavioral loyalty, including repeat purchases and advocacy behaviors (Islam & Rahman, 2017; Raies & Gavard-Perret, 2011).

The framework highlights the mediating roles of participation and engagement in the relationship between customer satisfaction with AI-enabled features and brand loyalty. This aligns with Brodie et al. (2011), who emphasized that engagement is a multidimensional construct shaped by when, how, and where consumers interact with brands. AI technologies can enhance these interactions by providing personalized, context-relevant, and immersive experiences, thereby reinforcing trust and loyalty (Costa et al., 2022; Rane et al., 2024).

This conceptual model contributes to existing theoretical developments by integrating technological enablers into established satisfaction–engagement–loyalty pathways. It provides a comprehensive view of how AI tools can enhance customer experience, participation, and engagement in online brand communities, ultimately driving brand loyalty. Importantly, this framework is particularly relevant to emerging markets, such as Tunisia, where the adoption of AI technologies is growing but remains underexplored in academic research.
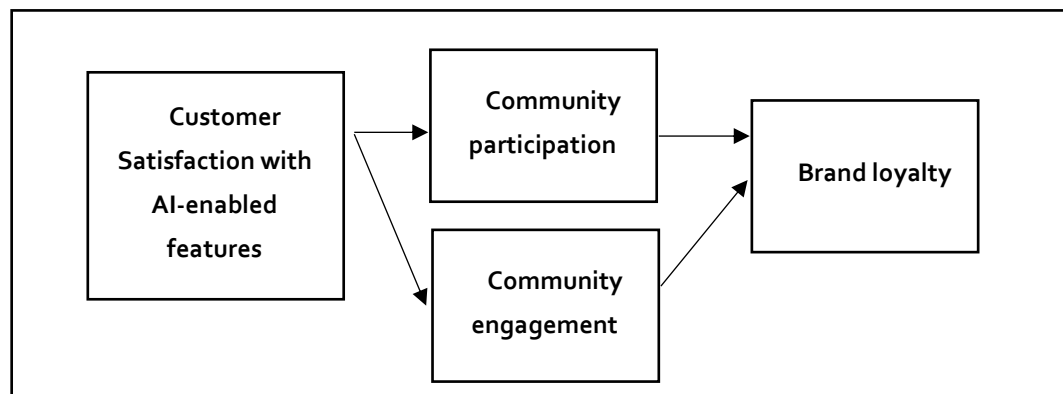

Figure 1. Conceptual Model

This model illustrates the proposed relationships between customer satisfaction with AI-enabled features, community participation, community engagement, and brand loyalty. Customer satisfaction is expected to positively influence participation and engagement, which in turn mediates its effect on brand loyalty within online brand communities.

Methodology
Mixed-Methods Approach

To address the research questions, this study adopted a **sequential mixed-methods design**, combining **netnography** and a **quantitative survey**. Netnography allowed for an in-depth exploration of community interactions, user experiences, and AI-enabled engagement practices, while the survey provided empirical evidence to test the hypothesized relationships between satisfaction, participation, engagement, and loyalty intentions. This approach offered both **contextual depth** and **statistical generalizability**, thereby reinforcing the study's theoretical contribution and methodological rigor (Creswell & Clark, 2017).

Netnography

Netnography, an extension of ethnography adapted to digital contexts, examines social interactions, shared meanings, and communication practices within online communities (Kozinets, 2015). It is particularly relevant for analyzing consumer behavior in naturalistic digital spaces (Heinonen & Medberg, 2018), especially regarding consumer–brand interactions.

A nine-month netnographic study was conducted within the Oryx Bio Facebook community, representing a leading Tunisian natural cosmetics brand specializing in prickly pear oil and organic skincare. This timeframe allowed for the observation of seasonal interaction patterns, product launches, and campaign cycles. Facebook was selected due to the community's consistently high activity levels, including peer-to-peer skincare advice, user-generated content, and direct brand interactions.

Data were collected through non-participant observation, focusing on posts, comments, reactions (likes, shares, emojis), and AI-enabled interactions (e.g., personalized product recommendations, automated FAQ responses). While advanced AI tools such as virtual try-ons are still limited in Tunisia, Oryx Bio has introduced automated consultation routing and personalized content suggestions to enhance user experience.

Approximately 500 posts and comments were thematically coded and analyzed using NVivo 12, identifying patterns related to satisfaction, participation, engagement, and loyalty. Coding was conducted iteratively by the lead researcher and cross-validated by an independent qualitative expert to ensure reliability. Insights derived from the netnography informed the design of the quantitative questionnaire, ensuring conceptual and linguistic alignment between qualitative themes and survey constructs.

Quantitative Survey

A standardized online questionnaire was then disseminated to active Oryx Bio Facebook community members to measure the perceived satisfaction, the perceptions of AI tools, the community participation and engagement, and the brand loyalty intentions. The survey was administered via Google Forms and participation was voluntary and anonymous. Data collection spanned six weeks, yielding 310 responses, of which 250 were retained for analysis after data cleaning.

The questionnaire employed validated measurement scales:

- Customer satisfaction (Oliver, 1980),
- Community engagement (Martínez-López et al., 2021),
- Perceived usefulness of AI tools (Rane et al., 2024), and
- Brand loyalty (Hwang et al., 2021).

All items were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Reliability tests indicated strong internal consistency, with Cronbach's alpha values ranging from 0.85 to 0.92.

Data were analyzed using IBM SPSS Statistics 24, including descriptive statistics for sample profiling, reliability analyses, and regression models to test the hypothesized relationships between AI perceptions, satisfaction, participation, engagement, and loyalty.

Ethical Considerations

Ethical principles guided the entire research process. At the beginning of the survey, participants received a clear research brief explaining the academic nature and objectives of the study, the voluntary participation and the right to withdraw at any time, and the assurances of anonymity and confidentiality.

Informed consent was obtained electronically before respondents could proceed. No personally identifiable information (e.g., names, emails, or Facebook profiles) was collected. Netnographic data were derived exclusively from publicly available posts and comments, in accordance with ethical guidelines for online research (Kozinets, 2015; AoIR, 2019).

Data were stored securely on password-protected servers, accessible only to the research team. All results are reported in aggregate form to avoid identifying individuals. No deception or intervention occurred during the observation period.

The study protocol was reviewed and approved by the Research Ethics Committee of the Laboratory of Valorization of Natural and Cultural Heritage (VPNC), University of Jendouba. These procedures ensured compliance with ethical standards and respect for digital rights in the Tunisian context.

Sample Description

The survey sample consisted of active members of the Oryx Bio Facebook community, one of Tunisia's largest online communities dedicated to natural cosmetics. Of the 310 questionnaires distributed, 250 valid responses were retained for analysis.

- Age: 75% of respondents were between 18 and 45 years old, representing young and middle-aged consumers actively engaged in online communities.
- Education: 59.4% held an undergraduate degree, suggesting a relatively educated and digitally literate sample.
- Platform usage: 87.5% reported daily Facebook use, indicating high familiarity with the platform and a strong likelihood of active community participation.

This profile aligns with the typical demographic segment of cosmetics consumers in emerging digital markets, thereby strengthening the external validity of the study.

Table 1. Descriptive characteristics of respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	195	78.0
	Male	55	22.0
Age Group (years)	18-24	80	32.0
	25-34	95	38.0
	35-44	50	20.0
	45+	25	10.0
Education Level	High school or less	35	14.0
	Undergraduate degree	150	60.0
	Postgraduate degree	65	26.0
Frequency of Facebook Use	Daily	215	86.0
	Several times a week	25	10.0
	Weekly or less	10	4.0
Experience with Oryx Bio Products	Less than 6 months	70	28.0
	6 months - 1 year	90	36.0
	More than 1 year	90	36.0

Hypotheses

Drawing on prior literature and the theoretical framework developed in this study, we formulated the following hypotheses:

- H1. Customer satisfaction with AI-enabled features is positively associated with community participation.
- H2. Customer satisfaction with AI-enabled features is positively associated with community engagement.
- H3. Community participation is positively associated with brand loyalty.
- H4. Community engagement is positively associated with brand loyalty.

- H5. Community participation and community engagement mediate the relationship between customer satisfaction with AI-enabled features and brand loyalty.

These hypotheses reflect the satisfaction–engagement–loyalty pathway in the context of AI-driven interactions in online brand communities.

Results

Descriptive Statistics and Measurement Validation

Before testing the hypotheses, reliability and validity analyses were conducted to assess the psychometric properties of the measurement scales. All constructs demonstrated strong internal consistency, with Cronbach's alpha coefficients exceeding the recommended cut-off of 0.70 (Nunnally & Bernstein, 1994). Composite reliability (CR) values also surpassed 0.70 for all constructs, indicating satisfactory construct reliability. Convergent validity was supported as average variance extracted (AVE) values for each construct were above the 0.50 threshold (Fornell & Larcker, 1981). Furthermore, discriminant validity was established because the square roots of the AVE for each construct were greater than the corresponding inter-construct correlations.

Table 2. Descriptive Statistics and Construct Reliability Measures

Construct	Mean	SD	Cronbach's α	AVE	Composite Reliability
Satisfaction with AI-enabled features	4.21	0.68	0.88	0.62	0.89
Community Participation	4.03	0.73	0.86	0.59	0.87
Community Engagement	4.09	0.69	0.90	0.66	0.91
Brand Loyalty	4.18	0.71	0.89	0.61	0.90

These results confirm that the measurement model exhibits acceptable levels of reliability and validity, providing a robust foundation for hypothesis testing and model evaluation in subsequent analyses.

Hypothesis Testing

Structural equation modeling (SEM) was employed to examine the hypothesized relationships between the study constructs using IBM SPSS AMOS version 24. The measurement and structural models exhibited a good overall fit to the data (χ^2/df = 1.92; CFI = 0.95; RMSEA = 0.04), confirming that the conceptual framework adequately represents the underlying data structure.

Effect of Customer Satisfaction with AI-Enabled Features on Community Participation (H1)

The results reveal that customer satisfaction with AI-enabled features has a significant and positive effect on community participation ($\beta = 0.68$, $p < 0.001$), thereby supporting H1. This finding indicates that when customers are satisfied with AI functionalities-such as personalized recommendations, automated consultations, and chatbot responsiveness-they are more inclined to actively contribute to the community (e.g., asking questions, sharing experiences, replying to other users). This aligns with Gummerus et al. (2012), who emphasize satisfaction as a key driver of behavioral participation in brand communities.
Examples include:

- User (P4): "*I noticed the serum formulation was noticeably different than other brands. Iand chatbots that because of the natural ingredients*?"
    - Admin: "*That's right! This product contains 100% organic extracts; it is a lighter formulation, yet is 100% effective*."
    - User (P4): "*Thanks for answering! Makes me feel good to use it!*"

The tailored AI response could help promote the user's confidence and motivate them to further engagement.

Effect of Customer Satisfaction with AI-Enabled Features on Community Engagement (H2)

A similar pattern was observed for community engagement, with satisfaction exerting a strong positive effect ($\beta = 0.72$, $p < 0.001$), providing support for H2.

This suggests that AI tools do more than stimulate participation-they also deepen emotional and cognitive involvement. Members begin to feel a stronger sense of belonging, attachment, and identification with the brand community.
Illustrative exchange:

- User (P5): "*I've been using the serum every day, but I still do not see results. Any suggestions?*"
- User (P8): "*Do not worry; it took me about 3 weeks to see results. Just keep using it at night, before you go to bed*."
- User (P5): "*Thank you very much! I will do that*."

These peer-to-peer interactions, facilitated by fast and personalized AI features, foster trust and emotional bonds-key elements of community engagement (Martínez-López et al., 2021; Kumar & Kumar, 2020).

Effect of Community Participation on Brand Loyalty (H3)

Community participation was found to be positively associated with brand loyalty ($\beta = 0.61$, $p < 0.001$), supporting H3. Active participation-such as asking questions, sharing personal experiences, and helping others-appears to strengthen relational bonds and enhance both attitudinal and behavioral loyalty (Touzani & Temessek, 2009; Hollebeek et al., 2014).
Illustrative exchange:

- User (P15): "*If I'm honest, I was very hesitant to buy it, but after reading everyone's reviews on here, I thought I would give it a shot. Now I recommend it to all my friends!*" (Feb 14, 8:20 AM).
- User (P18): "*Same. I trust the community's advice more than any ads.*" (Feb 14, 9:02 AM).
- User (P15): "*Exactly. It feels like a family. I've already ordered my second bottle.*" (Feb 14, 9:10 AM).

This exchange illustrates how participation builds trust, resulting in repeat purchase behaviors and advocacy, key manifestations of loyalty at the individual and community levels.

Effect of Community Engagement on Brand Loyalty (H4)

The analysis also confirmed a strong positive relationship between community engagement and brand loyalty ($\beta = 0.66$, $p < 0.001$), supporting H4. Engaged community members who derive emotional gratification and social support from their interactions are more likely to develop enduring brand attachment and loyalty.

Illustrative example:

- User (P12): "*I finished my first bottle last month and just ordered two more. Really improved my skin texture.*"
- User (P14): "*How often do you use it?*"
- User (P12): "*Every day in the morning, after I cleanse my face. I like that it is not heavy and it absorbs well.*"

Such conversations exemplify **loyalty behaviors** (repurchase) and **social proof effects**, amplifying the brand's credibility within peer networks.

Mediation Analysis (H5)

A bootstrapping procedure with 5,000 resamples was used to assess the mediating role of community participation and engagement. The results show significant indirect effects of satisfaction with AI-enabled features on brand loyalty through both mediators:

- Satisfaction → Participation → Loyalty: $\beta = 0.41$, 95% CI [0.27, 0.55], $p < 0.001$
- Satisfaction → Engagement → Loyalty: $\beta = 0.47$, 95% CI [0.32, 0.61], $p < 0.001$

The absence of zero in the confidence intervals confirms the statistical significance of these indirect effects.

These findings demonstrate that customer satisfaction with AI-enabled features influences brand loyalty both directly and indirectly, through enhanced participation and engagement within the community. This supports the co-creation of value perspective (Prahalad & Ramaswamy, 2004) and aligns with current research on AI-driven consumer interactions (Chatterjee et al., 2023).

Summary of Hypotheses Testing

Table 3. Summary of Hypotheses Testing

Hypothesis	Path	β	p-value	Result
H1	Satisfaction → Participation	0.68	<0.001	Supported
H2	Satisfaction → Engagement	0.72	<0.001	Supported
H3	Participation → Loyalty	0.61	<0.001	Supported
H4	Engagement → Loyalty	0.66	<0.001	Supported
H5	Mediation via Participation & Engagement	Indirect effects significant	<0.001	Supported

Integration with Qualitative Findings

The quantitative findings not only confirmed but also expanded upon the netnographic insights derived from the Oryx Bio Facebook community. Specifically, AI-enabled features, such as personalized recommendations, automated responses, and responsive chatbots, proved to be critical drivers of customer satisfaction, enabling individualized, real-time, and context-relevant interactions that exceeded what traditional, human-only moderation could offer.

Netnographic observations revealed that community members expressed strong appreciation for the speed, accuracy, and personalization of AI-generated suggestions. For instance, users who received product recommendations tailored to their previous purchases or their specific hair and skin concerns often reported feeling "seen," "heard," and "valued" by the brand. This sense of individualized attention reinforced their trust in the brand and fostered a perception of genuine care.

The quantitative survey results statistically validated these insights, showing significant positive relationships between satisfaction with AI-enabled features and both community participation (H1 supported) and community engagement (H2 supported). Furthermore, participation and engagement were shown to significantly mediate the relationship between satisfaction and brand loyalty (H5 supported), thereby supporting the proposed conceptual framework.

Together, these findings reveal a virtuous cycle operating within the Oryx Bio community:

1. AI-enabled features enhance personalization and responsiveness, creating more relevant brand–consumer interactions.
2. This leads to higher customer satisfaction, as users perceive the brand as innovative, efficient, and attentive.
3. Satisfied customers show greater participation and engagement through interactions, sharing experiences, and providing peer support.
4. Increased participation and engagement strengthen emotional bonds with the brand, ultimately fostering brand loyalty through trust, advocacy, and repeat purchases.

This transition from passive users to engaged community members and brand advocates aligns with Kumar and Kumar (2020), who highlight the role of technology in deepening relational experiences. It further extends the arguments of Hollebeek et al. (2014) and Chatterjee et al. (2023), emphasizing AI as a relational technology, not merely a functional tool, capable of cultivating emotional attachment and loyalty within online brand communities.

By combining netnographic immersion with quantitative validation, this research provides a comprehensive understanding of how AI integration in brand communities enhances satisfaction, engagement, and loyalty. This insight is particularly relevant for brands in emerging markets, where digital transformation represents a strategic lever for achieving a competitive first-mover advantage.

Discussion

The findings from both the quantitative and qualitative analyses reveal that AI-enabled tools significantly shape customer satisfaction, participation, and loyalty pathways. These results, combined with rich community interaction data, provide important theoretical and contextual insights. The primary aim of this study was to develop a holistic explanatory framework illustrating how AI-enabled tools influence customer satisfaction, community dynamics, and brand loyalty within online brand communities in an emerging market context. Using a mixed-methods approach, combining netnographic observation and quantitative survey analysis, the study sheds light on the behavioral, emotional, and perceptual mechanisms underlying customer engagement in the Oryx Bio Facebook community.

The qualitative findings, collected over nine months, highlighted intense community interactions, characterized by emotional identification, peer support, and reciprocity. These dynamics align with Valck et al. (2009), who found that satisfaction with online communities increases visit frequency and brand loyalty. Similarly, Martínez-López et al. (2021) emphasize that participation in brand communities is driven by intrinsic, social, and emotional motivations. The concept of "emotional involvement" (Chan & Li, 2010) is also reflected in this study, where members' affective connections with the brand and with one another played a critical role in sustaining ongoing engagement.

Beyond individual satisfaction, this research demonstrates how collective engagement within the community translates into brand engagement and loyalty. This echoes Raies and Gavard-Perret (2011), who highlight the bidirectional link between community engagement and brand engagement. For instance, members of the Oryx Bio community frequently shared brand-related content (e.g., a post about a dental gel shared over 600 times), left positive product testimonials, and recommended the brand to their networks. Such behaviors reflect both attitudinal loyalty (positive affective attachment) and behavioral loyalty (repeat purchases and advocacy), in line with the consumer brand engagement model proposed by Hollebeek et al. (2014).

Crucially, the findings underscore the transformative role of AI in these communities. Quantitative results showed that users who perceived AI-enabled features, such as personalized product suggestions, chatbot assistance, or virtual consultations, as useful and engaging reported significantly higher satisfaction and loyalty. This corroborates recent research (e.g., Rane et al. 2024; Costa et al. 2022; Huang et al. 2021), which demonstrates that AI enhances hyper-personalization, responsiveness, and interactivity, thereby deepening customer-brand relationships.

Moreover, this study contributes new empirical evidence from a North African emerging market, a context often underrepresented in AI and marketing research. The integration of AI into brand communities in Tunisia illustrates how technological innovation can amplify value co-creation processes (Prahalad & Ramaswamy, 2004). For example, chatbot interventions that provide instant, personalized support reduce customer effort, increase satisfaction, and ultimately enhance loyalty, a dynamic also observed by Dai and Liu (2024) in retail personalization.

The Tunisian context adds important nuance: as Mbonigaba (2024) notes, AI adoption in emerging economies is facilitated when AI complements human interaction, builds trust, and operates within a clear regulatory framework. This study confirms that Tunisian consumers are willing to adopt AI functionalities when they offer speed, convenience, and trustworthy experiences.

Finally, while all hypotheses were supported, the findings should be interpreted with contextual awareness. Future research could replicate and extend this study to other industries or explore moderating factors such as cultural orientation, perceived risk, or digital literacy, to further refine our understanding of how AI mediates community engagement and loyalty.

Conclusion and Implications

This study makes a significant contribution to the literature on online brand communities by integrating artificial intelligence-enabled technologies as a central mechanism influencing customer satisfaction, engagement, and brand loyalty. It provides both theoretical and practical insights into how AI tools embedded within social media ecosystems can serve as powerful drivers of stronger consumer–brand relationships, particularly in emerging market contexts. Beyond traditional models focusing on participation and emotional involvement in online brand communities, this research highlights how AI-enabled features, such as personalized recommendations, intelligent chatbots, and virtual consultations, shape consumers' socio-psychological perceptions and interactions. By embedding perceptions of AI into the satisfaction–engagement–loyalty pathway, the study proposes a contemporary and relevant conceptual model that reflects the experiential reality of digital consumers in an AI-enhanced environment.

From a theoretical standpoint, the study demonstrates that technology-enabled personalization and interactivity can enhance engagement and loyalty, addressing a gap in

the literature where empirical research exploring the relationship between AI technologies and community dynamics remains limited, especially in emerging markets. These contexts are characterized by distinct digital infrastructures, rates of adoption, and cultural behaviors that can significantly shape how consumers experience AI and interact with brands.

From a managerial perspective, the findings offer practical guidance for marketers and brand managers seeking to strategically implement AI tools within their online communities. Creating customer satisfaction now goes beyond producing quality content and fostering human interactions. It also involves using AI functionalities to offer personalized, responsive, and service-oriented interactions that strengthen members' sense of value and emotional attachment to the brand. Encouraging deeper emotional relationships among community members is also critical, as it transforms passive followers into engaged advocates who identify with the brand in meaningful, non-transactional ways. Moreover, the deployment of AI features offers marketers valuable behavioral data that can be measured and analyzed to better understand customer perceptions, evaluate feature effectiveness, and refine marketing strategies. This strengthens the ability of brands to justify their investment in AI and optimize their community management and loyalty-building initiatives. For emerging markets such as Tunisia, AI can help bridge infrastructural and cultural gaps by improving service accessibility and reinforcing consumer trust, provided that it is tailored to local digital literacy and cultural expectations.

Beyond its immediate managerial implications, this research deepens the understanding of how emerging technologies are transforming consumer engagement in online brand communities. By focusing on Tunisia, an underrepresented context in AI and marketing research, the study highlights the influence of cultural, infrastructural, and technological variables on AI adoption and consumer behavior. This emphasizes the need to adapt digital marketing strategies to local contexts rather than relying exclusively on models developed in mature markets.

Finally, the research provides a foundation for future studies seeking to explore how AI integration shapes satisfaction, engagement, and loyalty over time. Future investigations may examine moderating and mediating factors such as trust in AI, perceived privacy risks, or long-term behavioral outcomes. Because AI technologies are evolving rapidly, it will be essential to continue assessing their impact across different platforms, product categories, and cultural settings. This research, therefore, contributes both to advancing academic understanding and to guiding marketing practice in an increasingly AI-driven and community-centered digital landscape.

Limitations and Future Research Directions

Although this research represents a significant contribution to understanding how AI-enabled features influence satisfaction, engagement, and loyalty in online brand communities, several limitations should be acknowledged, which also suggest potential future research directions. First, the research is located in a single brand community and a

single industry (the cosmetics industry) in Tunisia. While this cultural and industry context contributes a meaningful understanding of the issues at hand, it may limit the generalizability of the findings to other industries and regions. Future work could conduct this same research within different sectors and cultural contexts, which would provide a more comprehensive understanding of the consumer experience of AI and the context of the brand community.

Second, while the mixed-methods approach provided both depth and richness of understanding, the cross-sectional design means causal inference cannot be strong, and the longer-term effects of AI-enabled interactions on loyal behaviors post-interaction cannot be further examined. A longitudinal design or experimental studies would allow researchers to explore how consumer attitudes and loyalty behaviors develop over time; because of having ongoing exposure to AI-enabled brand interactions to better understand the underlying mechanisms for the satisfaction–engagement–loyalty pathway of the customer journey. Third, it should be recognized that self-reported data represents a potential bias, including social desirability bias, especially in new market contexts where engaging with AI might carry a symbolic and aspirational meaning. Although measures were taken to ensure anonymity and minimize bias, future research could benefit from incorporating behavioral data, platform analytics, or observational measures to triangulate self-reported findings and strengthen validity.

As AI technologies continue to advance rapidly, it will be important for researchers to document how these technologies influence consumer-brand relationships across a wider span of platforms, product categories, and cultural contexts. Longitudinal studies, cross-market assessments, and experimental designs could provide richer understandings of how the mediating role of AI in experiences produces long-lasting effects on satisfaction, trust, and loyalty from consumers. This research ultimately lays the groundwork for such investigations by integrating AI technology with online brand community theory. It also offers a conceptual and empirical basis for understanding how brands can strategically harness AI to build stronger digital consumer relationships and secure sustainable competitive advantages in a multi-platform, AI-mediated marketing environment.

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