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Is visual content modality a limiting factor for social capital? Examining user engagement within Instagram-based brand communities

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In the age of virtual cocreation of value by consumers, the role of the content modality in the development of social capital has been largely overlooked. Given that different modalities lead to varied forms of digital communication, this study examines whether a predominantly visual modality can enhance social capital and improve the collective value perceived by members of an online brand community. Through quantitative analysis, this study demonstrates that the visual modality of Instagram fosters social interactions, shaping the platform's engagement dynamics. Affect-based visual imagery is persuasive in eliciting responses that match the hedonic nature of the platform. Therefore, fostering a positive emotional connection to both the community and the brand can lead to increased loyalty. This research proposes a different perspective on the interactive social exchange that facilitates the establishment of social capital. Value cocreation engagement is not necessarily dependent on the extensiveness of information depth. Adopting an affective orientation in persuasion has shown efficacy in forming attitudes towards attitudinal objects, particularly the community and brand.

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Introduction

The rise in social media use among consumers, coupled with the inherently social nature of consumption, has amplified consumer-to-consumer interactions. This development is vital to understanding cocreation among consumers (Brodie et al. 2011; Schau et al. 2009). Online brand communities (OBCs) based on social media provide fertile ground for examining the dynamics of consumer networking, leading to mutual value creation (Brodie et al. 2011; Habibi et al. 2014). With the abundance of social media platforms, it is essential to consider the specific platform on which the brand community exists. Members of OBCs engage with each other to consume, produce, and share information about products, ideas, or experiences associated with a brand. (Brodie et al. 2013). Consequently, the content modality of social media can shape the level of engagement within an OBC. A defining characteristic that sets the social context of a platform apart is its content modality, which pertains to the kind of content that users typically produce or share (Waterloo et al. 2018). Contemporary social media platforms support a range of content modalities. However, Instagram stands out as a social networking platform that emphasises expression through images and short videos, often enhanced with filters. This implies that visual aesthetics are the focus of content generation (Jin and Ryu, 2020; Kusumasondjaja, 2020), with text serving to provide context or magnify the meaning of the visuals.

The apparent popularity of networked visual communication (McCrow-Young, 2021) has positioned Instagram as the second most significant social media platform for marketing communication, trailing only Facebook in popularity (Kim et al. 2021). While methodological reflections have largely centred around text-driven platforms such as Facebook, Twitter, and discussion forums (McCrow-Young, 2021), there is a noticeable oversight of visual-centric social media platforms such as Instagram (Leaver et al. 2020). This situation prompts questions about the differences between text-centric social media platforms and those such as Instagram, which prioritise images over text (Arceneaux and Dinu, 2018; Yang and Jiang, 2021). Consequently, the quality and density of information exchanged might be limited (Felbermayr and Nanopoulos, 2016; Figueiredo et al. 2013), potentially reducing the accumulation of social capital within the network.

Past research has evaluated the efficacy of both visual and verbal modalities (Zhao et al. 2022), with certain studies indicating that the visual modality exhibits a superior effect (Joffe, 2008; Sundar, 2008). The image modality is considered to convey heuristic cues (Jeong, 2008), thus facilitating faster information processing. Moreover, image modality carries emotional, vivid, and memorable impressions (Joffe, 2008). Numerous studies have consistently demonstrated that visual information is more persuasive than textual content (Childers, 1986; McQuarrie and Mick, 1999; Smith, 1991). This recapitulation underscores the potential of image modality for capturing the attention of social media users and driving engagement (Taecharungroj, 2017). Consequently, it holds significant potential for the evolution of social capital through value cocreation within the online community.

In addressing value cocreation within an OBC, social capital is defined as a society that promotes cooperation within the network, accumulating shared resources to enhance individual or collective productivity (Bourdieu and Richardson, 1986; Nahapiet and Ghoshal, 1998; Putnam, 1993; Watson and Papamarcos, 2002). Continuous interaction is pivotal for the establishment and growth of social capital, especially within an OBC. Given the intrinsic link between social interaction and social capital, the functionality of the community heavily relies on member interactivity (Ghahtarani et al. 2020). Given that social capital is an intangible asset, it is primarily acquired through social interaction. Through consistent exchanges, community members collaboratively conceive and disseminate information. This process enhances familiarity and elevates the quality of shared resources (Zarei et al. 2022). As a result, social capital is cultivated (Cao et al. 2022).

Drawing from the interplay between social interaction and social capital, members within an OBC have the opportunity to collaboratively create and exchange value (Wang et al. 2023) that resonates with their individual interests. Therefore, promoting engagement that encourages interaction is synonymous with fostering the exchange of valuable resources. Consequently, social capital emerges as the crucial foundation for value creation (Ghahtarani et al. 2020). Therefore, understanding the characteristics of social capital and the impact of these characteristics on consumers is crucial for enhancing participation and nurturing cocreative relationships.

By consolidating user interactions, social capital, and content modality, research objectives that address the research gaps in the literature can be formulated. Studies on social capital in social media-based OBCs predominantly focus on text-centric platforms such as Facebook (Mostafa, 2021; Wong, 2023), online forums (Meek et al. 2019a), or Twitter (Fenton et al. 2021; Garay and Morales, 2020). These developments demonstrate that textual information remains the primary modality for electronic social exchanges that create value (Li et al. 2020; Margaris et al. 2019). In contrast, the scarcity of studies regarding Instagram's OBCs (Casaló et al. 2017) raises the question of whether Instagram's image content modality can accommodate social capital creation.

Previous research primarily studied firm-hosted communities (Wong and Lee, 2022). This predominance in the research can be attributed to the consumer durable goods industry phenomenon, in which there is an apparent prevalence of firm-initiated OBCs (Gruner et al. 2014). Recently, some studies have examined both firm-initiated and consumer-initiated social media-based OBCs (Pedeliento et al. 2020). It has been reported that consumer-run communities exhibit stronger experience intensity than firm-initiated communities (Pedeliento et al. 2020). This phenomenon can be attributed to the highly moderated informational exchange environment in firm-initiated communities (Jang et al. 2008). Although firm-initiated communities normally have the advantage of information quality (Raichur et al. 2023), the voluntary nature of members' participation in customer-initiated communities provides unbiased and personally valuable experiences that lead to the strengthening of trust within the community (Raichur et al. 2023). Furthermore, consumer-initiated communities are notably more competent at addressing negative experiences related to the brand compared to firm-initiated communities (Zhang et al. 2021), which heavily control any unfavourable views within the community (Dholakia et al. 2004). Thus, the information and experience in customer-initiated communities are perceived to be of higher quality by the members (Gruner et al. 2014). This observation highlights the importance of investigating this type of community due to its unexplored nature (Wong and Lee, 2022).

Given that the study is within the context of OBCs, it is essential to acknowledge that the initial mechanism for participating in the network is through the social media application (Dessart and Veloutsou, 2021). Furthermore, the parallel conceptualisation of gratification in social media activity, aligning with the intrinsic motivation for media use in OBC interaction (Brodie et al. 2011), suggests that the personal motivations driving individual engagement in consumer-initiated OBCs have not been thoroughly explored (Bowden and Mirzaei, 2021; Pedeliento et al. 2020; Wong and Lee, 2022).

Considering the importance of social capital in OBCs, numerous studies have scrutinised this topic. Table 1 below presents a brief summary of empirical social capital studies conducted in the context of OBCs over the past three years.

The information from Table 1 suggests the need for clarification regarding the role of social capital, particularly concerning its determinants and consequences (Wong and Lee, 2022). This can be attributed to conceptualising social capital as either a personal asset (Bourdieu and Richardson, 1986; Granovetter, 1973) or a collective property (Coleman, 1988). Some works utilised the bonding and bridging dimensions to postulate the concept of social capital (Chen and Li, 2017; Reimann et al. 2021), while others conceptualised it through a multidimensional framework, namely, considering cognitive, structural, and relational aspects (Chiu et al. 2006; Lin and Lu, 2011; Nahapiet and Ghoshal, 1998). This perspective emphasises the necessity for a uniformly accepted operational definition of social capital. Additionally, it highlights the limited empirical evidence regarding its dimensions and the lack of a scale that applies specifically to the context of OBCs (Jeong et al. 2021).

In response to the aforementioned shortcomings in social capital research within the OBC context, this study seeks to address these issues by testing a novel social capital framework tailored to social media-based OBCs, adopting the conceptualisation proposed by Meek et al. (2019a). The framework integrates seven subdimensions categorised by collective and individual social capital properties, representing community and personal features. The study aims to empirically assess the role of social capital in strengthening network connections (Meek et al. 2019b). Furthermore, it is crucial to understand the variations in motivations for social media usage to predict engagement levels and subsequently impact community participation (Buzeta et al. 2020; Vale and Fernandes, 2018). Hence, this study focuses on three antecedents: information, social, and recreational factors, aligning with the propositions made by Lee and Ma (2012) and Lin et al. (2017).

Next, to encapsulate the triadic relationship, loyalty intentions towards the community and the brand operate as the terminal variables. This decision is based on the well-established impact of commitment to both the community and the brand on outcomes such as loyalty intentions (Kaur et al. 2020). It should be noted that some studies distinguish between commitment and loyalty (Raïes et al. 2015). In a similar vein, this study posits that commitment emerges as a natural consequence of social capital. Such commitment is perceived as individual feelings shaped by social capital at the community level, encompassing a sense of belonging, network ties, and participative behaviour (Meek et al. 2019a, 2019b), resulting in the development of loyalty behaviour. Additionally, the brand-embedded social exchange within the community fundamentally cultivates brand commitment (Jeong et al. 2021), which can result in brand loyalty (Bowden et al. 2018).

Last, empirical studies of social capital have illustrated the complexity of its components (Jeong et al. 2021; Meek et al. 2019b). Therefore, to strike a balance between the comprehensiveness of the construct and the efficiency of the research model, the social capital construct will be formulated as a second-order factor. This approach aims to preserve the comprehensive conceptualisation of social capital while ensuring analytical efficiency. This solution can be regarded as an anomaly in the field of marketing studies unlike in the area of organisational behaviour and management, where it serves as an effective method for anticipating intercorrelations among constructs (Lee, 2009; Zheng, 2010), and a convenient method for analysing the joint causality and effects of several latent variables (Martínez-Cañas et al. 2012).

Table 1 Empirical studies on social capital in the online brand community context (brief summary).

Author	Year	Social capital composition	Antecedents	Consequences
Yao Cao, Jialing Lin, Zhimin Zhou	2022	Shared language, Shared vision, Trust, Reciprocity	-	Member inspiration, Value co-creation
Ning Zhang, Zhimin Zhou, Ge Zhan, Nan Zhou	2021	Social trust, Reciprocity	Controlling Climate, Supportive Climate	Community identification
So Won Jeong, Sejin Ha, Kyu-Hye Lee	2021	Interaction, Trust, language, Vision, Reciprocity, Identification, Shared value, Bonding, Bridging	-	Community commitment, Brand commitment
Zhimin Zhou, Rixiang Wang	2022	Shared language, Shared vision, Trust, Reciprocity	-	Subjective well being
Shunfeng Zhang, Linghao Zhang	2023	Identification, Social ties, Shared narratives	Offline activities, Online reaction, Interaction support, Immersion	Purchase intention
Amy Wong, Marcus Lee	2022	Social trust, Reciprocity	Prosocial behaviour	Affective, Cognitive, Behavioural
Liuliang Yuan, Xiaozhao Deng, Weijin Zhong	2021	Bonding, Bridging	Ease of use, Usefulness	Opinion passing, Opinion seeking
Uttam Chakrabortya, Santosh Kumar Biswa	2023	Bonding, Bridging	Informational, Attitudinal, Actionable	Brand commitment
Azim Zarei, Ghazale Taheri, Hadi Ghazvini	2022	Social participation, Common insights, Information quality, Social trust, Social commitment	-	Brand knowledge, Branding co-creation, Sense of belonging

Theoretical background and hypotheses

An understanding of how users' interactions result in resource accumulation can be achieved by recognising intrinsic motivations that drive specific behaviours aimed at accomplishing targeted goals.

Image presentations in social media communications. To emphasise the significance of visual modality in the domain of digitally networked social interaction, this study utilises insights from image act theory. This approach facilitates the exploration of engagement dynamics specific to Instagram. With social media becoming an integral part of daily life, there is a growing emphasis on image sharing as the primary form of customer-to-customer interaction (C2C) (Akpinar and Berger, 2017; Villarroel Ordenes et al. 2019).

Image acts involve images created by people and centre around the behaviours that these images are able to incite. They also have the capacity to convey thoughts and emotions and elicit responses from viewers (Bakewell, 1998). Image acts refer to visual expressions targeted at any objects of attitude, utilising visual content to depict various behavioural manifestations (Azer et al. 2023). Given the versatility of images, understanding the behavioural displays of social media users through visual content holds considerable importance. This involves not only understanding the impact of visual content on users but also discerning the ramifications for brands within the online brand community context.

The image modality plays a significant role in consumer engagement. Visual content allows for a better representation of experiences and creates a sense of visibility for intangible concepts (Akpinar and Berger, 2017; Bakri et al. 2020). Moreover, image modality offers richer contextual signals, presenting vivid cues to users. Consequently, it emerges as a powerful and credible medium for communication (Kress and Van Leeuwen, 2020). Furthermore, images effectively stimulate users' thoughts and emotions, invoking the realism heuristic (Sundar, 2008), which posits that images are inherently perceived as more authentic than written text. This concept aligns with the distinction that the brain processes words, whether spoken or written, differently from images (Townsend and Kahn, 2014).

Visual images are inherently more tangible and are more likely to evoke an emotional response from viewers. As a result, images can provide both intimacy and immediacy. Various perspectives from the communication literature align with the notion that image-based communication provides a comparatively genuine and intimate interpersonal experience (Pittman and Reich, 2016).

In the digital economy, where attention serves as currency, images stand out as effective and efficient means of conveying thoughts and feelings (Pittman and Reich, 2016). Acknowledging the significance of visual presentations in consumer-to-consumer interactions (C2C) underlines the pivotal role of images in enhancing social exchange.

Motivations for online engagement. Personal motivation is typically categorised into intrinsic and extrinsic motivations (Ryan and Deci, 2000). As social media usage behaviours are generally voluntary, they are fundamentally rooted in personal intentions and motives (Rauniar et al. 2014). Thus, when defining usage activities based on inherent interest, personal inquiries, enjoyment, and social relatedness, intrinsic motivations emerge as the more dominant factor in determining content generation and consumption (Zhang et al. 2017).

A primary intrinsic motivation in social media settings is curiosity. As such, information seeking measures the extent to which users adopt information from social media to satisfy their need for relevant information (Whiting and Williams, 2013). This motivation is the core of social media usage, among other fundamental motivations (Whiting and Williams, 2013). Using social media for information gathering also allows users to observe others' opinions on specific topics.

When seeking to satisfy information requirements, Instagram has a significant advantage over other social media platforms (Pittman and Reich, 2016). This is signified by the effectiveness and credibility of visual representation as a potent mode of communication, as emphasised in the research of Kress and Van Leeuwen (2020). Derived from the principles of image act theory, visual images convey both the cognitive thoughts and emotional sentiments a user holds towards a brand, effectively directing their intentions to a greater degree. (Bakewell, 1998). Furthermore, images are processed more rapidly, prompting increased emotional and cognitive elaboration. Thus, a heightened level of information absorption is evoked and accelerated, thereby contributing to the elicitation of intentions (Blackwood, 2019; Kjeldsen, 2015). Combining this with consumer engagement studies, intentions are ultimately reflected in engagement behaviour (Bowden et al. 2018; Brodie et al. 2013).

When people feel a connection to a community as a source of information, they enjoy interacting with its members and value their input (Bailey et al. 2021). In this situation, social media serves as a substitute for interpersonal communication, with relationship maintenance being essential for its sustained use. Hence, the motivation to socialise cultivates stronger relationships within the community.

Furthermore, engaging in social interactions on social media often results in enjoyment derived from the perception of cultivating friendships (Colwell and Payne, 2000). Enjoyment can heighten involvement, leading to positive experiences that encourage user interaction. Participating in a community through actions such as photo sharing, commenting, and liking posts constitutes content contribution. Furthermore, social media interactions offer enjoyment not only through community engagement but also through solitary recreation. Given Instagram's visually driven platform, content that is aesthetically appealing easily captivates users seeking recreational gratification (Tiggemann and Zaccardo, 2015). They are inclined to interact with captivating images, innovative graphics, and engaging short videos, potentially resulting in increased counts of likes, comments, and shares (Song et al. 2021). Furthermore, as suggested by Weinstein (2018), motivation driven by entertainment is more likely to enhance the experience of positive emotions, thereby promoting self-expression. Combined with the platform's interactive features, engaging with content and other users can trigger feelings of happiness, a sense of intimacy, and alleviate the sensation of being disconnected and lonely (Lu and Lin, 2022; Pittman and Reich, 2016). Thus, the propositions concerning intrinsic motivations for online engagement are similar to the concepts of uses and gratifications of social media (Whiting and Williams, 2013). In the aforementioned study, three of the top ten most common gratifications for social media usage were social interactions, information seeking, and recreation. Therefore, the hypotheses representing personal motivation can be stated as follows.

H1. Information seeking via Instagram is positively related to the collective social capital of shared language, shared vision, reciprocity, and social trust.

H2. Socialising via Instagram is positively related to the collective social capital of shared language, shared vision, reciprocity, and social trust.

H3. Recreation via Instagram is positively related to the collective social capital of shared language, shared vision, reciprocity, and social trust.

Social capital. Various standpoints exist regarding the definitions of social capital. However, it is generally agreed that social capital

is derived from the structure of the social network between people in the community, which yields collective productivity (Cao et al. 2022; Coleman, 1988, 1994; Granovetter, 1985; Nahapiet and Ghoshal, 1998). The components that constitute social capital are frequently discussed in the literature related to communities. Nahapiet and Ghoshal (1998) asserted that the conceptualisation of social capital becomes clearer when its characteristics are divided into three categories. The first is the relational dimension. This encompasses the perceived closeness between individuals, mutual trust, the recognition of obligations, and expectations concerning the relationship (Granovetter, 1985; Nahapiet and Ghoshal, 1998). Reciprocity and social trust are the accepted conventions that best represent this aspect (Nahapiet and Ghoshal, 1998; Watson and Papamarcos, 2002). Reciprocity symbolises moral responsibility and the core attribute of an authentic group (Muniz and O'Guinn, 2001). Social trust illustrates how information, opinions, and views are critical to the functionality of an OBC (Zhou et al. 2022). Within a community, members generate diverse content. When interactions are grounded in social trust, the shared information is perceived as more reliable and is more likely to be adopted.

The second is the cognitive dimension. It refers to a shared understanding, language, and interpretations that foster collaborative activity (Nahapiet and Ghoshal, 1998). Central to this dimension are shared language and shared vision (Chiu et al. 2006). A shared language consists of a specific vocabulary used routinely to enhance efficiency in social exchanges. Conversely, a shared vision embodies the community's collective values and orientation, which facilitates the integration of its members and fosters personal connections (Meek et al. 2019a). Last is the structural dimension. It represents the nonpersonal patterns of associations among group members (Granovetter, 1985). This includes the ties that define their relationships and the intensity of their interactions (Liao and Chou, 2012). These ties are often referred to as network ties (Meek et al. 2019a). Thus, network ties reflect stronger personal-level relationships due to relational and cognitive dimensions (Muniz and O'Guinn, 2001).

Furthermore, social capital at the collective level drives the routine interaction between members, resulting in increased participative behaviour (Meek et al. 2019a). When members fully assimilate into the community, they develop the ability to foster a sense of belonging within the group (Bagozzi and Dholakia, 2002; Chakraborty and Biswal, 2023). Building on the concept of social capital, Wellman and Frank (2017) argued that social capital involves networked resources. These resources are created, maintained, and utilised through social relations facilitated by mediated communication. This postulation implies that the manifestation of social capital within the community is shaped by the content modality that mediates the social interaction through which ideas or information are expressed. In conclusion, the relational and cognitive dimensions enrich network ties, build a sense of belonging, and facilitate ongoing interactions that are mediated by the visual modality presentation. Thus, the hypotheses can be stated as follows.

H4. Social capital is positively related to participative behaviour.
H5. Social capital is positively related to sense of belonging.
H6. Social capital is positively related to network ties.

Personal consequences of social capital. The result of collectively shared social capital is the development of commitment to the community, driven by participative behaviour, a sense of belonging, and network ties. Together, these elements nurture a sense of self-identification with a group, thereby enhancing social cohesion and leading to social conformity (Fonseca et al. 2019).

When an individual is perceptively aware of a social group membership, the emotional significance tied to that membership can motivate them to align more closely with the group's defining characteristics or values, such as by supporting a specific brand (Dholakia et al. 2004). The importance of perceived self-identification in brand community studies is apparent (Bagozzi and Dholakia, 2002; Heere et al. 2011). This perception enhances positive evaluations of the social group, reinforcing their association as a display of behavioural loyalty within the community (Heere et al. 2011), reflected through contributions, interactions, and relationships (Stokburger-Sauer, 2010). A deep connection with a community results in self-congruence with its core aspect, which in this context is the brand, subsequently fostering brand loyalty (Hollenbeck and Kaikati, 2012). Consequently, the hypotheses can be constructed as follows.

H7. Participative behaviour positively impacts brand loyalty behaviour.
H8. Participative behaviour positively impacts community loyalty behaviour.
H9. Sense of belonging positively impacts brand loyalty behaviour.
H10. Sense of belonging positively impacts community loyalty behaviour.
H11. Network ties positively impact brand loyalty behaviour.
H12. Network ties positively impact community loyalty behaviour.

Research framework
Drawing from individual motivations, social capital, and the personal consequences of social capital, this study investigates the effects of motivations on social capital through interaction within an OBC. Furthermore, this research also examines the subsequent spillover effects on both the brand and the community. Figure 1 displays the research framework representing the hypotheses in this study.

Methodology
Research context. This study is centred around automotive communities on Instagram. This particular category was chosen due to its inherent capacity to evoke emotion and foster engagement (Algesheimer et al. 2005). Considering the prevalence of automotive communities on Instagram, specific criteria need to be in place to guarantee adequate interaction. First, a community should have at least 1 K followers or members, ensuring established social interaction and indicating a shared perceived value among its members. Second, active engagement, which is evident from a post being made on the community's main timeline in the past thirty days, confirms continuous collaboration between administrators and members. Last, Indonesia is the fourth largest Instagram user by country (Dixon, 2023). With many Indonesians primarily accessing the internet via mobile devices, this signifies the presence of a mobile-first cultural approach, influencing how they interact with and consume social media content (Puspitasari and Ishii, 2016). Therefore, taking these factors into account, the Indonesian market is deemed suitable for this study.

Participants and data collection. A pretest was conducted to assess the suitability of the research instrument. An online survey link created using Alchemer was disseminated to 34 members of automotive OBCs on Instagram, which is a commonly accepted size for a psychometric-based preliminary test utilising SPSS. Based on the feedback from five randomly selected participants, small adjustments were made to certain aspects of the questionnaire, such as wording, layout, and structure. This was done
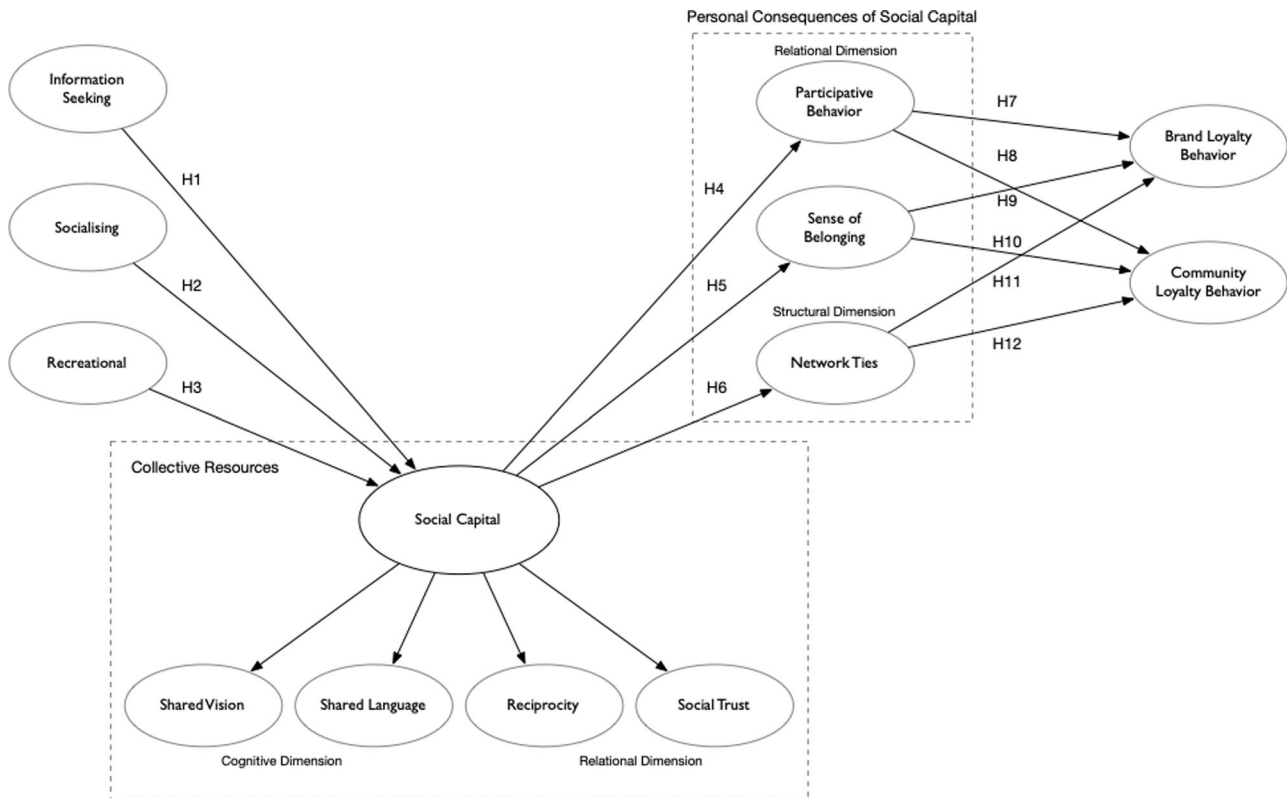
Fig. 1 Conceptual framework. The objective of the framework is to evaluate elements of social capital, that influenced by motivations behind user's engagement, and their long term effects on the community's sustainability.

to facilitate more straightforward and convenient responses, and more importantly, to avoid ambiguity. For the main test, we contacted community administrators via direct message and proposed a collaboration. We sought their participation in the study by inviting the community's members to complete the questionnaire. After our outreach to community administrators, 540 valid responses were collected. These were gathered using invitational posts (both Instastory and timeline) shared by the administrators of the targeted communities. In addition, we employed the snowball method, where one member recommended the survey to another, to expedite the data collection process.

In Instagram's consumer-initiated automotive OBCs, the community is centred around individual brands (e.g., Camry, CR-V, Mazda 2) instead of the corporate brand (e.g., Toyota, Honda, and Mazda). Nevertheless, the fundamental orientation of both types of communities remains aligned with the brand. The sole distinction is that one represents the company's brand, while the other embodies admiration for a specific brand or product line. In contrast to other types of communities that are consumption-oriented, where the brand revolves around the centrality of the community, often a particular lifestyle, it is thus classified as a subculture community (Canniford, 2011). Understanding the nuanced distinctions between these communities is essential for the scope of our study. Therefore, this rationale aligns with our research objectives and is unlikely to influence the outcome of the data analysis.

The sample's demographic characteristics, as presented in Table 2, indicate that male respondents accounted for most of the sample, comprising 95 percent of the participants. This result aligns with previous research on the automotive category, as reported by Algesheimer et al. (2005) and Pedeliento et al. (2020). Regarding age distribution, most respondents (46%) were in the

Table 2 Sample demographics ($n = 540$).

Demographics		Frequency	Percentage (%)
Gender	Male	514	95
	Female	26	5
Age	>18–25 years	75	14
	>25–30 years	137	25
	>30–40 years	246	46
	>40–50 years	77	14
	>50 years	5	1
Educational	Tertiary	202	37
	Undergraduate	291	54
	Postgraduate	45	8
	Doctoral	7	0
Membership	<6 months	58	11
	>6–12 months	114	21
	>1–2 years	143	26
	>2 years	225	42

30–40 age group. Moreover, 54% of the respondents had an undergraduate educational background, while the predominant segment, accounting for 42% of the sample, had a membership length greater than 2 years.

Scale and measurements. The measurement items employed in this study utilised a 5-point Likert scale based on previously validated instruments. Although these instruments were developed in different contexts, they remain pertinent to the study's psychological scope. The original sources of these instruments have shown consistent reliability and validity. Moreover, given their basis in virtual settings, the items can be readily adapted and

adjusted, pertaining to the accuracy of construct measurements and making their application more straightforward for the target population.

Information seeking was measured with three items from Asghar (2015), socialising was assessed with three items from Lee and Ma (2012), and recreation was evaluated using three items from Agarwal and Karahanna (2000). Regarding social capital factors, shared language and shared vision of the cognitive dimension were measured using three items derived from Chiu et al. (2006). The three units measuring social trust of the relational dimension originate from Liao and Chou (2012), while reciprocity comprises three items from both Mathwick et al. (2007) and Liao and Chou (2012). As consequences of social capital, three constructs are highlighted. Among them, the first is the sense of belonging, measured with three items from Chiu et al. (2006). The second is participative behaviour, determined via three items extracted from Kamboj and Rahman (2017). Finally, network ties were verified based on three items (Liao and Chou, 2012).

The first terminal variable is brand loyalty intentions, measured with four items that constitute the purchase intention defined by Algesheimer et al. (2005), Kaur et al. (2020), along with positive word of mouth (Goyette et al. 2010). The second terminal variable is community loyalty, validated through four items (Chen, 2007; Woisetschläger et al. 2008) reflecting usage continuity and positive recommendation.

In the structural equation model, the maximum likelihood procedure is employed, initiated by the estimation of the measurement model. The reliability and validity of each construct are then confirmed using confirmatory factor analysis (CFA) (Hair et al. 2014). Structural model testing was performed by applying overall model fit analysis and path coefficients based on the constructed hypotheses.

Data analysis and results

Measurement model. Amos 24.0 was utilised to analyse the measurement model, which incorporated all latent constructs. Additionally, social capital was included as a second-order factor, encompassing four underlying components: shared language, shared vision, social trust, and reciprocity. The resulting pooled measurement model yielded a statistically satisfactory fit between the data and the model ($\chi^2 = 1571.579$; $p < .001$; $df = 621$; $\chi^2/df = 2.531$; CFI = 0.943; SRMR = 0.041; RMSEA = 0.053) (Hair et al. 2014). For reliability measurements, as detailed in Table 3, all the constructs' Cronbach's alpha scores ranged between 0.795 and 0.937, surpassing the recommended cut-off value of 0.7. Correspondingly, composite reliability (CR) for all constructs exceeded 0.7, indicating that reliability was achieved (Hair et al. 2014).

For validity measures, the average variance extracted (AVE) of all constructs surpassed the threshold of 0.5 (Hair et al. 2014). However, the discriminant validity measures, based on HTMT.85 analysis (Henseler et al. 2015), reveal significant correlation issues between two exogenous variables (information seeking-to-socialising) and endogenous variables representing the consequences of social capital (participative behaviour-to-network ties and participative behaviour-to-sense of belonging). Therefore, it is imperative to scrutinise previous studies to address these concerns.

The statistical indifference between information-seeking and socialising mirrors the definition of information-seeking behaviour on social media: a utilitarian cognitive need that encompasses social experiences, question-asking, knowledge acquisition, and search for information (Asghar, 2015). This exposition highlights the wide spectrum of information-seeking engagement on social media. However, a challenge may arise when attempting to measure a construct that represents the breadth and depth of psychosocial motives by solely concentrating on desired and acquired gratifications (Asghar, 2015). Building on this understanding of information-seeking behaviour, theoretical reasoning suggests that information-seeking and socialising on social media merge both active-passive and interactive-extractive informational techniques (Mostafa, 2021; Yuan et al. 2021). Recognising the dual nature of actively and passively searching for information, information seeking and socialising are consequently combined into the "informational" variable. This measure aligns with the recommendations by Schroeder et al. (1990). It aims to stabilise the variances of problematic coefficients by merging independent variables without undermining the theoretical foundation of the model.

Participative behaviour correlates with two other constructs simultaneously portraying the consequences of collective-level social capital. Hence, combining participative behaviour with either a sense of belonging or network ties will be redundant. Referring to the conception by Granovetter (1973), in gaining new social resources, people engage in relationships characterised by weak ties. Thus, the bridging effect of social capital occurs (Putnam, 1993). In social media, online social networks serve as mediums for strengthening weak ties through collective action. This suggests that participative behaviour is not only limited to the personal level but also manifests on the collective level, e.g., Meek et al. (2019a), where increased participation results in building trust, further developing the potential of social capital for the community (Kobayashi et al. 2006). Given the premise that participative behaviour also contributes to the building of collective social capital, omitting the variable as a consequence of social capital is justifiable.

The revised measurement model reached the recommended goodness-of-fit index criteria ($\chi^2 = 1289.763$; $p < 0.001$; $df = 531$; $\chi^2/df = 2.229$; CFI = 0.950; SRMR = 0.042; RMSEA = 0.051) (Hair et al. 2014). For reliability measures, each construct achieved a Cronbach's alpha (CA) score above 0.7. Additionally, the construct reliability (CR) values exceeded 0.7, and the average variance extracted (AVE) values were greater than 0.5, as recommended (Hair et al. 2014). Furthermore, the altered model performed appropriately in the HTMT$^{0.85}$ analysis. Table 4 reveals that each construct is statistically distinguishable. Finally, using principal axis factoring, Harman's single factor test was performed to avoid common method bias risk. The test generated a 49.3 percent explanation of covariance for entire constructs, marginally passing the recommended threshold of <50% (Podsakoff et al. 2003). Conclusively, there is no evidence of intercorrelations of constructs, as shown in Table 4; hence, common method bias risks are unlikely.

Structural model. The structural model displays a reasonable fit ($\chi^2 = 1709.449$; $p < 0.001$; $df = 542$; $\chi^2/df = 3.154$; CFI = 0.922; NFI = 0.891; RMSEA = 0.063). The model's reliability, referring to squared multiple correlation results, explained 42% of the variance in "brand loyalty", 66% of the variance in "community loyalty", 66% of the variance in "network ties", 73% of the variance in "sense of belonging", and 72% of the variance in "social capital". The structural model confirmed all the relationships stipulated in the hypotheses, as demonstrated in Table 5. Both informational ($\beta = 0.72$, $p < 0.001$) and recreational motivations ($\beta = 0.46$, $p < 0.001$) have a positive impact on social capital. These results confirm that motivations that induce active participation will lead to cooperative interaction. Furthermore, social capital positively affects both sense of belonging ($\beta = 0.86$, $p < 0.001$) and network ties ($\beta = 0.82$, $p < 0.001$).

Table 3 Measurement model characteristics.

Constructs and items	Std. loading	Mean	CA	CR	AVE
Information seeking			0.84	0.84	0.64
This community is the place to learn about things related to my interest that I'm not familiar with	0.78	4.36			
I feel that to know more about a brand, I must follow its community	0.83	4.23			
I think reading the community feeds is informative	0.78	4.25			
Socialising			0.82	0.79	0.57
I can interact with people when sharing news or information in the community	0.68	4.30			
I join the community to keep in touch with people with similar interest	0.76	4.26			
It is effective to exchange ideas with other people on the community	0.81	4.18			
Recreational			0.88	0.89	0.68
I often spend more time on the community than I had intended	0.90	3.83			
Time appears to go by very quickly when I am on the community	0.84	3.78			
Using the community provides me with a lot of enjoyment	0.85	3.93			
Social capital			0.94	0.93	0.79
Shared language					
Community members use common terms or jargon	0.87	4.13			
Community members use understandable language during discussions	0.90	4.15			
Community members use understandable narrative forms to post messages	0.85	4.14			
Shared vision					
Members of the community share a goal of helping others	0.86	4.31			
Members of the community share the same goal of learning from each other	0.85	4.35			
Members of the community share the same idea that helping each other is pleasant	0.88	4.34			
Social trust					
Members of the community will not take advantage of others even if opportunities arise	0.76	4.06			
Members of the community will always keep the promises they make to one another	0.84	3.93			
Members of the community are honest in dealing with one another	0.90	4.07			
Reciprocity					
When I receive help from the community, I feel it is only right to give back and help others	0.74	4.21			
Members should return favours when the community is in need	0.82	4.07			
My behaviour in the community will lead to cooperation from other members in the future	0.85	4.18			
Sense of belonging			0.87	0.86	0.69
I feel a strong connection to this community		4.08			
I have a strong positive feeling toward the community		4.21			
I am proud to be a member of the community		4.24			
Participative behaviour			0.79	0.79	0.56
I am a participant in the activities of this community	0.77	4.18			
I spend a lot of time sharing information and opinions on the community	0.79	4.09			
I frequently provide or share useful information online to the other members in the community	0.67	3.85			
Network ties			0.86	0.86	0.68
I maintain close social relationships with some members of this community	0.83	4.07			
I spend a lot of time interacting with some members of this community	0.83	3.91			
I know some members of this community on a personal level	0.82	4.14			
Brand loyalty			0.86	0.85	0.60
I intend to buy this brand in the near future	0.62	4.08			
I have strong preference for this brand	0.74	3.94			
I am going to spread positive words about the brand	0.83	4.12			
I will recommend this brand to other customers	0.87	3.95			
Community loyalty			0.89	0.90	0.69
I will continue to use the community to gain information or share experiences in the future	0.766	4.20			
I would like to continue my participation in the future activities held in the community	0.87	4.05			
I am going to spread positive word about the community	0.87	4.02			
I will recommend this community to other customers	0.81	3.97			

Table 4 HTMT results.

|	1	2	3	4	5	6	7
Informational (1)							
Recreational (2)	**0.68**						
Network Ties (3)	0.67	**0.73**					
Sense of Belonging (4)	0.71	0.69	**0.85**				
Brand Loyalty (5)	0.53	0.59	0.62	**0.63**			
Community Loyalty (6)	0.63	0.69	0.82	0.78	**0.79**		
Social Capital (7)	0.84	0.74	0.79	0.84	0.643	**0.75**	

Discriminant validity results marked in bold according to the HTMT$^{0.85}$ criterion.

This result confirms that engaging in social interactions provokes collective action, creating positive thoughts and recognition towards the community. Finally, sense of belonging has a positive impact on both brand loyalty ($\beta = 0.31$, $p < 0.001$) and community loyalty ($\beta = 0.26$, $p < 0.001$). Similarly, network ties significantly influence brand ($\beta = 0.39$, $p < 0.001$) and community loyalty ($\beta = 0.61$, $p < 0.001$). These findings suggest that sharing brand experiences through social exchange reinforces cognition and attitude, resulting in favourable behaviour towards the brand. Similarly, the resonance of common interest will develop a sense of ingroup-outgroup distinction that stimulates ingroup favouritism. A summary of this study is shown in Fig. 2.

Table 5 Hypothesis testing.

Hypothesis	Std. estimates	t-Values	Support
Informational → Social capital	0.72	14.61	Yes*
Recreational → Social capital	0.46	11,78	Yes*
Social capital → Sense of belonging	0.86	15.71	Yes*
Social capital → Network ties	0.82	14.96	Yes*
Sense of belonging → Brand loyalty	0.31	4.49	Yes*
Sense of belonging → Community loyalty	0.26	4.66	Yes*
Network ties → Brand loyalty	0.39	5.50	Yes*
Network ties → community loyalty	0.61	9.61	Yes*
Squared Multiple Correlations			
Brand loyalty	0.42		
Community loyalty	0.66		
Network ties	0.66		
Sense of belonging	0.73		
Social capital	0.72		
Model Fit Statistics			
$\chi^2/df = 3.154$	CFI = 0.922	NFI = 0.891	RMSEA = 0.063

Notes. *$p < 0.001$.
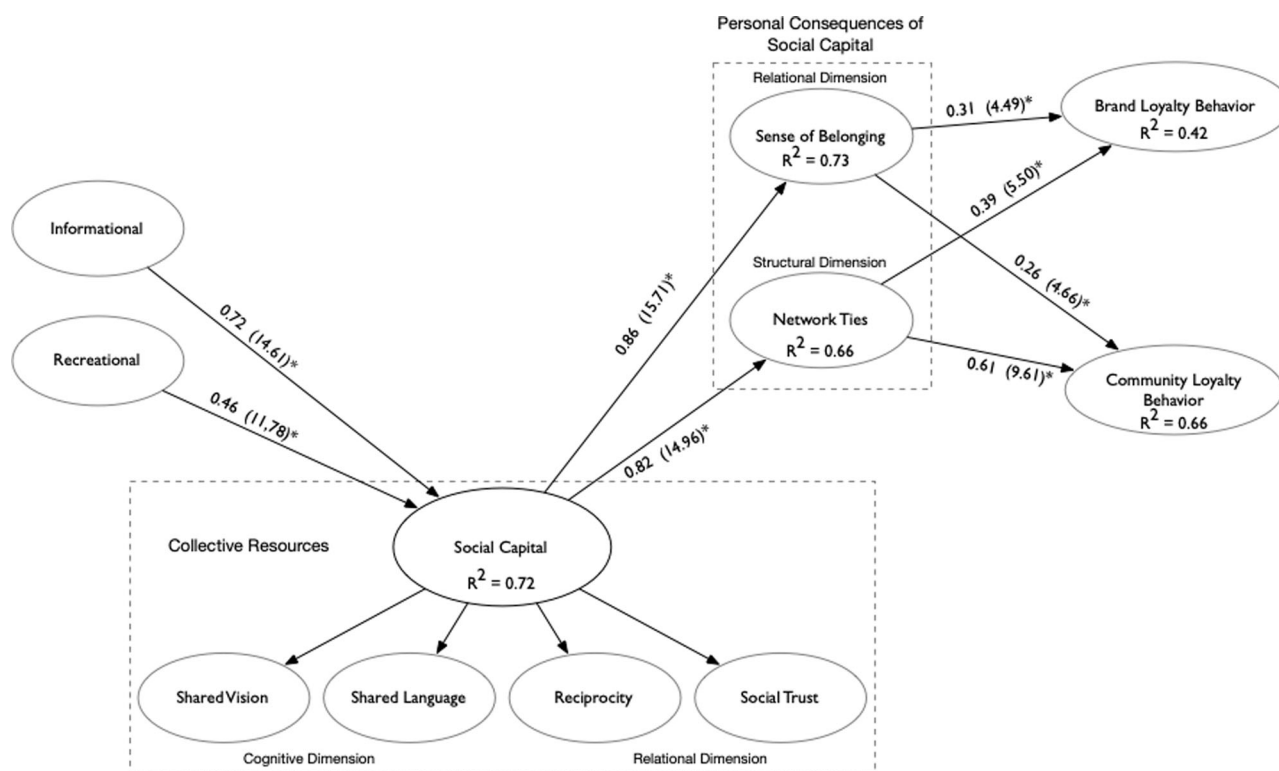
Note: Standardized path coefficient and *t-values* in parenthesis; *p < 0.001

Fig. 2 Results of the study. Values displayed in the figure represent standard estimates, t-values, and squared multiple correlations.

Discussion

This study deepens our understanding of virtual social capital formation by highlighting a specific social media content modality that may impose constraints on information quality and density. The main purpose of this study is to facilitate a conclusive social capital interpretation in the context of social media-based consumer-initiated OBCs by emphasising social capital evolution via image modality communication. The findings reveal significant relationships for all the hypotheses tested. Aligned with previous studies, information needs drive social interaction (Meek et al. 2019a; Whiting and Williams, 2013). While other studies with different contexts (e.g., Facebook) delineate social, information, and erudition aspects regarding informational gratification (Asghar, 2015; Lee and Ma, 2012), this study suggests that the visual modality, being particularly engaging, encapsulates informational drives as both active interaction and passive involvement. The enhanced engagement facilitated by the visual modality influences the attitude formation process for content encountered within the community.

Recreational motives also significantly affect social capital. This showed that hedonic motives critically increase the perception of bonding and bridging for accruing social capital (Tan et al. 2018).

Notably, Instagram, with its dominant visual modality, effectively enhances these hedonic-related drives (Kusumasondjaja, 2020). The visual content's affective appeal not only fulfils recreational motives but also fosters greater interaction and affiliation among users (Tan et al. 2018). By emphasising the motivational aspects, as highlighted in this study, image modality has a distinct advantage in initiating engagement. These findings validate the assertion of the image modality's superiority in capturing users' attention (Taecharungroj, 2017).

Collective social capital significantly correlates with both sense of belonging and network ties. Congruent with the interpretation of OBC as a structured network of weak ties (Meek et al. 2019a), this study signifies that the visual modality plays an important role in enhancing community cohesion through its ability to transmit feelings of connectedness (Maclean et al. 2022). Moreover, image-based content is a medium that effectively generates social presence within a nonpersonal virtual society (Sundar, 2008). Therefore, perpetual interaction and cooperation foster a stronger relationship reflected in an increased sense of belonging and improved network ties (Muniz and O'Guinn, 2001). The relational (social trust, reciprocity) and cognitive (shared language, shared vision) dimensions of social capital have a positive impact on engagement (Wong and Lee, 2022; Zhou et al. 2022). These findings emphasise that while the visual content modality might use limited text, it can still facilitate effective communication and minimise perceived risks in adopting knowledge and exchanging information. In support of this notion, Pittman and Reich (2016) stated that an Instagram image is worth more than a thousand words written on Twitter. Social media users perceive pictures as being more authentic, offering greater intimacy, and being able to convey information more efficiently (Pittman and Reich, 2016).

Thus, sense of belonging and network ties denoting structural dimensions that significantly influence brand and community loyalty signal a convergence of social capital and social identity that is rarely articulated in OBC studies. When an individual fully integrates into a social group, it creates satisfaction based on the value they receive, which in turn encourages them to maintain the relationship (Muniz and O'Guinn, 2001). Furthermore, self-identification with a community will build self-esteem that inspires altruistic behaviour (Dholakia et al. 2004; Schau et al. 2009). Additionally, when community integration causes brand values to align with personal identity, as a consequence, the community exercises effort towards the brand's success (Zhang and Zhang, 2023).

Last, differing in content modality from previous social capital research contexts, this study examines the efficacy of the framework developed by Meek et al. (2019a). The structure suggests that incorporating either engagement, commitment, or both as factors is redundant when social capital is central to the research model. This model views the entire cognitive and behavioural process of social capital accumulation as a manifestation of engagement and involvement.

Conclusions and theoretical implications. This study contributes to the literature on social capital and OBC in general. First, it is the first to begin an investigation of OBCs' social capital evolution with the limited use of text in the visual content modality. Given that prior studies have predominantly focused on text-centric social media (Leaver et al. 2020; McCrow-Young, 2021), this points to a promising avenue for further exploration, especially concerning content modality and social capital. Second, this study highlights the type of motivations prescribed differently by the environment that social media provides (Buzeta et al. 2020). Previous studies stated that information and entertainment needs could be satisfied without active engagement (Buzeta et al.

2020; Vale and Fernandes, 2018). However, due to the hedonic nature of Instagram's image modality, through perceived vibrancy and interactivity, users could be driven into active engagement by both informational and entertainment motivations, leading to the accumulation of social capital.

This aligns with findings that demonstrate the potency of the informative and emotional appeal of image modality to drive engagement (Rietveld et al. 2020). Images are inherently endowed with high-arousal visual cues that capture attention and prompt evaluation. Given that users consume vast amounts of content through their social media streams, an image's high-arousal appeal serves as a means to break through the clutter of information (Rietveld et al. 2020). When users are emotionally aroused, affective cues come into play, conditioning them to react (Zhang and Su, 2023). In this scenario, heightened engagement occurs. Hence, the image content modality plays a significant role in defining the OBC's engagement dynamics. Third, social capital is conceivably theorised as a multifaceted concept (Chiu et al. 2006; Jeong et al. 2021; Meek et al. 2019a; Nahapiet and Ghoshal, 1998). Thus, as this study has shown, translating this aspect into a parsimonious second-order factor can be considered an alternative method for retaining the comprehensiveness of the concept without compromising the integration with various concepts that capture the OBC dynamics.

Practical implications. Based on the results of this study, it is essential to appreciate the persuasiveness of the image modality for attracting engagement (Yang and Jiang, 2021). Practitioners must understand that engagement in value cocreation is not necessarily due to the prevalence of information depth, nor is it cognitively oriented (Jia et al. 2022). Conversely, interaction can be stimulated using affective-based visual imagery (Kusumasondjaja, 2020), and affective-based persuasion is quicker in eliciting a response (Jin et al. 2023). Since the brand-embedded interaction on Instagram is primarily hedonic, it secures an initial step to form a positive emotional connection with the brand. Therefore, to optimise the potential capabilities of Instagram's content modality, practitioners must find the right balance between information density and affectionate appeal to accommodate informational and recreational needs.

Considering the minimal use of text in the image content modality, practitioners should encourage common language creation by using particular jargon or phrases to improve communication efficiency and information quality (Bullock et al. 2019). Specialised and technical vocabulary is linked to fostering a sense of belonging, arousing curiosity, and establishing connections (Shulman et al. 2020). Hence, affect-based visual appeal not only supports community objectives and knowledge building but also benefits from a decrease in the demand for text-heavy information (Jin et al. 2023).

To effectively engage members within online brand communities, both marketers and administrators should account for the varied psychological states of each member. Segmentation based on membership length is a practical approach to designing messages that resonate with both experienced and inexperienced members. Affect-rich visuals are effective for attracting new members' attention and promoting active engagement. In contrast, established members often resonate more with content that has a cognitive appeal, focusing on collaborative knowledge interaction (Yang et al. 2021). Thus, the mixture of cognitive and affective appeal must be appropriately synergised to enrich social capital.

Limitations and future research. The concluding section of this study outlines the limitations and suggests directions for future research. The primary limitation is that this is a single-domain

study focused exclusively on the automotive category, and it pertains only to customer-initiated communities. Since automotive products convey significant utilitarian and hedonic value, this might affect how members cognitively and behaviourally assimilate into a community. Thus, the results of this study must be considered with precautions. For future research, it is suggested to examine social capital in a combination of consumer-initiated and company-initiated communities on Instagram. This exploration should also consider different product types and characteristics, as each community is formed with distinct orientations. Hence, comparing how each community utilises image modality for value cocreation activities is an interesting proposition.

The second limitation of this study is the omission of experience factors. Consuming, participating, and creating content for the community can generate varied and distinct experiences. Additional factors reflecting consumer experience in an OBC should include sensory, affective, intellectual, and behavioural factors.

Data availability

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Author contributions

AAK (corresponding author) performed the conception and design of the study. AAK and AZA conducted the literature review and contributed to drafting. AAK and GG were responsible for analysis, methodology, and data collection. AAK and SRHH were involved in data collection, data interpretation, and analysis tools. AZA supervised the study. All authors made substantial contributions, provided critical reviews of the study, and approved the final version.

Competing interests

The authors declare no competing interests.

Ethical approval

Informed consent

Before beginning the survey, participants were informed about the purpose and nature of the study and their right to withdraw at any time. Additionally, all participants provided their consent by actively choosing to complete and submit the survey.

Additional information