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**The Moderating Effect of Fan Engagement on the Relationship between Fan  
Knowledge and Fan Co-Creation in Social Media**

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## ABSTRACT

**Research question:** Social media has enhanced the ability of fans to interact with each other.

Whilst previous research investigates fan co-creation, few studies focus on the interactive effects within the co-creation process. We develop a model for synthesizing the interactive concepts related to fan co-creation in social media which leads to team identification.

**Research methods:** Participants (N = 483) were recruited from fans of clubs in the Persian Gulf Pro League of Iran. Structural equation modelling was applied to test the research model.

**Results and Findings:** The results showed that fan knowledge facilitates fan co-creation, which in turn leads to team identification. Additionally, fan engagement had a moderating effect on the mediating role of fan co-creation in the association between fan knowledge and team identification.

**Implications:** The findings suggest that fan knowledge is an important antecedent of fan co-creation and highlight the significance of fan co-creation in promoting team identification in highly engaged fans at football clubs.

**Originality:** The current study contributes to the field of fan co-creation and provides significant implications for sport fan marketers.

**Keywords:** Fan co-creation; fan engagement; fan knowledge; team identification

## Introduction

Value co-creation is prominent within the recent sport marketing literature (Behnam, Sato, et al., 2021; Kolyperas et al., 2019; Stegmann et al., 2021). Fan (value) co-creation refers to “the benefits realized from the integration of resources through interactions with other fans” (Santos et al., 2019, p. 167). Sport clubs, fans, and all other stakeholders co-create value through service-for-service exchange (i.e., mutual resource integration) (Hedlund, 2014; Vargo & Lusch, 2016). Co-creation is important because it facilitates the successful development of future services (Gustafsson et al., 2012), and ultimately organizational growth and profitability (Mahr et al., 2014).

Fan co-creation needs further research to provide a clearer understanding of its value for both fans and club (Kolyperas et al., 2019). The contribution of fans to stadium atmosphere is just one reason why fans are key to co-created sport ecosystems (Buser et al., 2022). Another opportunity for co-creation is social media (Etgar, 2008). Social media allows fans and organizations to interact with each other almost anywhere and at any time (Santos et al., 2019). While some studies have advanced the understanding of co-creation in the context of team sports and fans (e.g., Kolyperas et al., 2019; Santos et al., 2019; Uhrich, 2014), the factors stimulating fan co-creation via social media are not clear. Hence, this study explores the role of fans in co-creating value (i.e., co-creation) via social media.

Previous research has focused on the behaviors or attitudes of fans as a result of team identification, and the contribution of sport or place identity (Lock et al., 2011), as well as creativity and social mobility (Doyle et al., 2017) towards team identification. In contrast, our study emphasizes the role of social media in co-creating value. The Sport Value Framework, an adaptation of service dominant-logic, proposes that “sport customers co-create value primarily

by integrating resources from their social groups” (Woratschek et al., 2014, p.17). Sometimes, fans argue on clubs' social media platforms and co-creation can help clubs avoid it by sharing common values with fans. Guided by the Sport Value Framework, present study proposes a model integrating fan co-creation with fan knowledge, fan engagement, and team identification. More specifically, this study investigated the extent to which (1) fan co-creation mediates the relationship between fan knowledge and team identification; (2) fan engagement moderates the mediating relationship between fan knowledge and fan co-creation; (3) fan engagement moderates the relationship between fan knowledge and team identification through fan co-creation.

The remainder of the paper is structured as follows. First, we examine each of our model's four concepts - fan co-creation, fan engagement, fan knowledge and team identification. In doing so, we propose five hypotheses. In the methods section, we describe and justify the research context, measures, and statistical analyses. Results are then reported and subsequently discussed by presenting theoretical and managerial implications, as well as limitations and suggestions for future research.

### **Theoretical Background**

The Sport Value Framework developed by Woratschek et al. (2014) is an extension of the Service-Dominant Logic (Vargo & Lusch, 2004; 2008). The Sport Value Framework states that value is co-created by multiple stakeholders who integrate both operant (e.g., knowledge and skill) and operand (e.g., equipment) resources. Foundational Premise 6 (FP6) of The Sport Value Framework asserts that sport customers co-create value by primarily integrating resources. In this study we consider knowledge as an operant resource and examine its association with co-creation and team identification.

### *Fan Co-creation in Social Media*

Spectators and fans can significantly contribute to the atmosphere within a sports stadium by wearing team clothing, singing team songs chants, and moving in unison (Uhrich & Koenigstorfer, 2009). These activities support the notion that value co-creation requires customer participation (Woratschek et al., 2019). Compared to other media, social media platforms have lower interactive costs which make co-creation more likely (Rathore et al., 2016). Kang (2014) believes that social media professionals should encourage customers to use social media and to subsequently engage in co-creation (Altalhi, 2020). This allows customers to act as designers, innovators, and marketers, in effect becoming co-creators (Nambisan & Baron, 2009; Reay & Seddighi, 2012). Customers are motivated to do this because co-creation is often pleasurable (Shah, 2006).

In the digital age, social media facilitates co-creation (Yadav, et al. 2016). Social media creates an interactive environment where customers influence each other's attitudes, opinions, knowledge, and understanding (Constantinides & Fountain, 2008; Mangold & Faulds, 2009). Social media impacts market structures and transfers market power from business to customers (Kotler et al., 2010). Foux (2006) believes social media is the most honest source of information. Therefore, customers are more likely to use social media to access product and service information (Jayanti, 2010), at the expense of traditional media (e.g., radio, broadcast television) (Stavros, et al., 2014).

The forums, chat forums, blogs, and virtual worlds on social media platforms (e.g., Instagram, Facebook, Twitter) are central to the vast virtual co-creation ecosystem (Martini, et al., 2014). Fans increasingly utilize social media as part of their daily communication rituals (Mangold & Faulds, 2009), which includes conversations about their sport-related interests

(Williams & Chinn, 2010). Social media provides an otherwise unavailable opportunity for fans to develop their identity, whilst also providing sports organizations with the opportunity to better understand fan motivations and intensify fan relationships (Stavros, et al., 2014). Hence, sport marketers should seek to provide a social media experience that enhances the personal, social status, identity, and lifestyles goals of their fans (Holt, 2003; Kozinets, 2002).

### ***Fan Co-creation and Fan Knowledge***

Behnam, Pyun, et al. (2020) recently examined customer knowledge in sport organizations with a focus on customers' needs and preferences. Within the current paper, fan knowledge refers to fans' ideas, information, and preferences (adapted from Behnam, Sato, et al., 2020). We define *knowledge from fans* as fans' ideas (or feedback) with the potential to help the company prepare new services or improve existing services (Wu et al., 2013). *Knowledge about club* refers to a fan's knowledge about the club, including the club's history, current initiatives and issues, and knowledge about other fans. This type of knowledge is crucial because co-creation is enhanced when customers have adequate knowledge about their organization (Im & Qu, 2017). The aim here is for fans to become active knowledge partners (Gibbert et al., 2002). *Knowledge for fans* refers to information provided by the club. This knowledge helps consumers to learn about new/existing products and services provided by companies (García-Murillo & Annabi, 2002).

The value co-creation process is underpinned by consumers using their knowledge, skills, information, and other operant resources (Behnam, et al., 2022). Organizations that provide customers with relevant information and resources will enhance the potential for co-creation (Payne et al., 2008). This is because the co-creation process is dependent on knowledge (Guan et al., 2018). Chathoth et al. (2016) stated that consumer knowledge and knowledge sharing is a

key driver of co-creation. Sport is an interactive context (Behnam, Anagnostopoulos, et al., 2021) in which stakeholders share information, ideas, and preferences, often via social media. Co-creation is premised on the interaction and information sharing between organizations and stakeholders (Vargo & Lusch, 2016), which makes the relationship between consumer knowledge and co-creation so important. Building on the premise that operant resources are the fundamental source of strategic benefit (Vargo & Lusch, 2004, 2008, 2016), the current study examines the effect of fan knowledge as an operant resource for fan co-creation using social media. Therefore, the first hypothesis states:

**H1:** Fan knowledge is positively associated with fan co-creation.

### ***Fan Co-creation and Team Identification***

Team identification refers to “the social identity that a group of people (i.e., fans) have in common in relation to their favorite sport team” (Kwon et al., 2007, p. 541). Mahony (1995) defined team identification as “the degree to which a fan defines him/herself by the same attribute that defines the sport team” (p. 12). Sport marketing researchers have long focused on how fans identify with sports teams (Lock & Funk, 2016), and how team identification impacts a variety of behavioral outcomes (Katz et al., 2020). For example, according to Morrison et al. (2020), team identification partially mediates the relationship between cognitive awareness and media consumption, and team identification also mediates the relationship between affective evaluation and each of the following – media consumption, merchandise consumption, word-of-mouth communication, and repeat purchasing.

Lock and Heere (2017) argue that team identification is grounded in both social identity theory (Tajfel and Turner, 1979) and identity theory (Stryker, 1968). Social identity is “that part of an individual’s self-concept which derives from his knowledge of his membership of a social



group (or groups) together with the value and emotional significance attached to that membership” (Tajfel, 1978, p. 63). On the one hand, a tenet of social identity theory is that individuals affiliate with social groups that are equal to, or better than their own self-concept (Doyle et al., 2017). On the other hand, identity theory focuses on the role of an individual in a social structure (Stets & Burke, 2000). Identity theory proposes that the individual’s self depends on the roles performed in a social structure. Thus, social identity theory focuses on an individual’s “being” whereas identity theory focuses on an individual’s “doing”.

Over time, consensus on the dimensionality of team identification has not emerged (Naylor et al., 2017). A lack of validity is common and has led to the combination or removal of dimensions (see Dimmock et al., 2005; Lock et al., 2014). Naylor et al. (2017) hypothesized, operationalized, and tested a three-dimensional model of team identification composed of cognitive, evaluative and affective dimensions. This mirrored seminal group identity research (see Tajfel, 1978, 1982; Tajfel & Turner, 1985). Items used in the accompanying scale can be operationalized as either a personal or social identity, but not both simultaneously. A personal identity is an intimate connection to a team, whereas social identity is broader and focused on other fans of a team (i.e., the community of sports fans for a team).

In the fan co-creation process, Santos et al. (2019) stated that fans help their team by sharing and posting online photos/videos/information/comments. Fans demonstrate a willingness to co-create their identity by penning new songs, singing traditional club songs, or displaying banners and flags (Healy & McDonagh, 2013). In this regard, McDonald and Karg (2014) found a positive relationship between ritual behaviors, an example of co-creation, and team identification. Meng et al. (2015) stated that teams which create the opportunity for co-creation

can potentially improve team identification. On this basis, we hypothesize that fan co-creation has a positive impact on team identification:

**H2:** Fan co-creation is positively associated with team identification.

### ***Mediating Effect of Fan Co-creation***

People develop an identity based on what they know about themselves, others, and the groups to which they and others belong (Naylor et al., 2017). Consumer decisions to participate in web-based discussion boards is also related to social identification (Lee et al., 2006).

Knowledge, either about the team or the fan group, is important for shaping group-specific behavior (Naylor et al., 2017; Tajfel, 1978). There is recognition that “value co-creation is dependent on knowledge” (Guan et al., 2018, p. 2). Consequently, fan knowledge about their team makes fan co-creation more likely. In sum, fans use their knowledge in the process of co-creation which ultimately leads to team identity. Therefore, in the context of H1 and H2, we expect that fan knowledge to exert a significant indirect impact on team identification through fan co-creation. This hypothesis can contribute to the theoretical discussion of team identification, co-creation, and fan knowledge. Consequently, we posit that fan knowledge's positive impact on team identification is mediated by fan co-creation:

**H3:** Fan co-creation will mediate the association between fan knowledge and team identification.

### ***The Moderating Role of Fan Engagement***

In the last decade, customer engagement has received considerable attention in the marketing literature (Behnam, Hollebeek, et al., 2021; Fehrer et al., 2018; Brodie et al., 2019). Consumer engagement refers to "a customer's motivationally driven, volitional investment of focal operant resources (including cognitive, emotional, behavioral, and social knowledge and

skills), and operand resources (e.g., equipment) into brand interactions in service systems" (Hollebeek et al., 2019, p 166). Some research has focused on fan engagement in sport (e.g., Huettermann et al., 2019; Santos et al., 2019; Yoshida et al., 2014). According to Yoshida et al. (2014), fan engagement comprises three dimensions: performance tolerance (i.e., supporting unsuccessful team), prosocial behavior (i.e., helping other fans), and management cooperation (i.e., helping team management).

McDonald et al. (2022) identified the antecedents and outcomes of customer engagement in theoretical research. In this study, team identification was an antecedent to customer engagement. However, Hollebeek and Macky (2019) argued that emotional engagement is a driver of brand identification. Moreover, Rather et al. (2022) established that customer engagement moderated the relationship between customer brand experience and brand identification. Some recent research shows that customer engagement affects co-creation in the sport context (Behnam, Anagnostopoulos, et al., 2021; Behnam, Sato, et al., 2021). Considering H2, we posit that fan engagement is a driver of team identification through co-creation. Van Doorn et al. (2010) stated that highly engaged consumers can be a major source of knowledge, helping organizations to co-create value and modify existing service/product and ideas for development or design of new services/products. Hence, it is likely that that fan knowledge will be higher amongst highly engaged fans. Although the relationship between consumer engagement and co-creation is examined in prior works (Behnam, Hollebeek, et al., 2021), the moderating role of consumer engagement in the relationship between consumer knowledge and co-creation is still neglected (Gupta & Pandey, 2021). Given that customer behaviors vary according to high and low levels of engagement (e.g., Hollebeek et al., 2014), further investigation of these relationships is essential. Understanding these relationships are also

important because fans generally co-create to enhance their identity (Healy & McDonagh, 2013). Consequently, the positive association between fan knowledge and fan co-creation proposed in H1 will be strengthened when fans have higher engagement compared to when they have lower engagement. Moreover, by strengthening the association of fan knowledge with fan co-creation, high fan engagement further facilitates the mediation relationship between fan knowledge and team identification through fan co-creation. On this basis, we posit the following hypotheses:

**H4.** The direct effect of fan knowledge on fan co-creation is stronger as fan engagement increases.

**H5.** Fan engagement moderates the mediating relationship between fan knowledge and team identification through fan co-creation such that the mediating relationship is stronger when fan engagement is high than when it is low.

## **Methods**

### ***Study Context***

The Persian Gulf Pro League is the highest division of professional football (soccer) in Iran. In 2020, the International Federation of Football History and Statistics rated the Persian Gulf Pro League of Iran as the 51st best national league. Average attendance at PGPL matches is approximately 28000 people. The Islamic Republic of Iran Broadcasting, the state-owned television channel, broadcasts most matches of the Persian Gulf Pro League of Iran. Most of the 16 Persian Gulf Pro League of Iran clubs are owned by a combination of private, industrial, and government interests (Foroughi et al., 2014).

### ***Participants***

A link to an online survey was promoted every two weeks to the fans of three PGPL teams via social media (i.e., Telegram and Instagram) over a three-month period. The three

teams were Persepolis, Esteghlal, and Tractor. These teams have the largest fan base in the PGPL. We collected 572 questionnaires, but 89 questionnaires were subsequently removed due to incomplete responses to several items. Table 1 shows an overview of the participants' demographic characteristics.

[Insert Table 1 here]

### ***Measures***

We used multi-item measures with a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree) to determine fan knowledge, fan engagement, fan co-creation, and team identification (Refer Table 2). The questionnaires were developed in English, so they were translated into Persian. We followed the back-translation method suggested by Brislin (1970, 1986) to evaluate consistency between the original and translated measures. The comparison indicated that the original and twice-translated versions were conceptually equivalent.

All items were sourced from established and validated scales. To measure fan knowledge, we used a 14-item scale modified from Behnam, Sato, et al. (2020), which consists of three dimensions: a) knowledge about the club (six items); b) knowledge for fans (four items); and c) knowledge from fan (four items). A nine-item fan engagement scale with subscales for management cooperation (three items), prosocial behavior (three items), and performance tolerance (three items) was sourced from Yoshida et al. (2014). Fan co-creation was measured by a five-item scale developed by Nysveen and Pedersen (2014) and more recently used by Santos et al. (2019). To measure team identification, we relied upon a nine-item scale from Naylor et al. (2017), which consisted of three dimensions - cognition, evaluation, and affect. Each dimension was measured using three items. Finally, we used a five-item unidimensional scale to measure life satisfaction (Sato et al., 2015).

## ***Data Analysis***

Maximum likelihood estimation uses a mean-adjusted chi-square and standard errors (i.e., MLM, the Satorra-Bentler chi-square). To assess the second-order measurements (i.e., fan engagement, fan knowledge, team identification), second-order confirmatory factor analyses were conducted using Mplus Version 7.4 (Muthén & Muthén, 1998-2017).

Consistent with best practice, internal consistency, indicator reliability, convergent validity, and discriminant validity were assessed (Chin, 1998). Reliability of the measures was tested by calculating composite reliability (CR). Average variance extracted (AVE) and factor loading values tested convergent validity and discriminant validity (comparing the squared roots of the AVE values with the correlation coefficients among the constructs; Fornell & Larcker, 1981). A concern with cross-sectional surveys is common method bias. To test for potential CMB, we used Harman's single factor test and the marker variable technique to verify common method bias's existence in our data. Our findings demonstrated that the variance clarified by the first factor was 30% (i.e., < 50%). Using life satisfaction as our marker variable (i.e., a variable theoretically-unrelated to the others in this study), we determined no evidence of CMB (Podsakoff et al., 2003).

## **Results**

### ***Measurement Model, Construct Reliability, and Construct Validity***

Results of the CFA demonstrated a good model fit (Tabachnick & Fidell, 2007), with  $\chi^2/df = 1953.11/800 = 2.44$ ,  $p < 0.05$ , comparative fit index (CFI) = 0.93, Tucker-Lewis index (TLI) = 0.92, standardized root mean square residual (SRMR) = 0.055, and root mean square error of approximation (RMSEA) = .055. The findings indicate that the CR values of all five constructs ranged between .86 to .97, exceeding the .70 threshold and suggesting acceptable internal consistency (refer Table 2). All the factor loadings were higher than .70, suggesting all constructs

exhibited satisfactory indicator reliability (see Table 2). For the convergent validity, all the AVE and CR values were higher than the threshold, indicating convergent validity of the measures in each construct (see Table 2). The findings also reveal acceptable discriminant validity (see Table 3).

[Insert Table 2 here]

[Insert Table 3 here]

### ***Structural Model***

The analysis of the structural model produced the following goodness-of-fit indices:  $\chi^2/df = 1286.06/341 = 3.77$ ,  $p < .05$ , CFI = .89, TLI = 0.88, SRMR = .07, and RMSEA = .076, indicating an acceptable model fit (Tabachnick & Fidell, 2007). The structural models accounted for 14% of the variances in fan co-creation and 30% of the variance in team identification. In support of H1, fan knowledge was positively associated with fan co-creation ( $\beta = .37$ ,  $p < .001$ ). In support of H2, fan co-creation was also positively associated with team identification ( $\beta = .28$ ,  $p < .001$ ). Though not part of the hypothesis testing, results also show that fan knowledge was directly associated with team identification ( $\beta = .37$ ,  $p < .001$ ).

We used a bootstrapping approach for the indirect effects. Bias-corrected bootstrap 95% confidence interval (CI) was reported using 5000 bootstrap samples, a highly reliable procedure to test significance of indirect and total effects (Hayes & Scharkow, 2013), whilst also dealing with non-normality of the indirect effect (Little, 2013). We determined that fan co-creation mediated the relationship between fan knowledge with team identification ( $\beta = .10$ , 95% CI [.05, .19]), which supported H3 (See Figure 1).

[Insert Figure 1 here]

The Monte Carlo integration algorithm (Muthén & Muthén, 1998-2017) determined the moderation effect. Fan engagement was a moderator between fan knowledge and fan co-creation ( $\beta = .18, p = .001$ ), supporting H4. The simple slope graph in Figure 2 shows that when fan engagement was high (i.e., one standard deviation above the mean:  $4.80 [M] + 1.09 [SD] = 5.89$ ), fan knowledge explained a higher variance in fan co-creation (simple slope =  $.62, p < .001$ ), compared to low fan engagement (i.e., one standard deviation below the mean:  $4.80 [M] - 1.09 [SD] = 3.71$ ; simple slope =  $.22, p = .007$ ). Moreover, fan engagement was a moderator in the mediating relationship between fan knowledge and team identification through fan co-creation ( $\beta = .08, 95\% \text{ CI } [.03, .13]$ ), supporting H5. The simple slope graph in Figure 3 also shows that when fan engagement was high, fan knowledge yielded a higher variance in team identification through fan co-creation ( $\beta = .24, 95\% \text{ CI } [.16, .33]$ ) compared to the instance of low fan engagement ( $\beta = .08, 95\% \text{ CI } [.02, .15]$ ).

[Insert Figure 2 here]

[Insert Figure 3 here]

## **Discussion**

### ***Theoretical implications***

Considering the Sport Value Framework (Woratschek et al., 2014), the current research examines for the first time how fan knowledge affects fan co-creation. To do so, the study positioned fan knowledge as a fan co-creation driver, a relationship moderated by fan engagement. The study developed and validated a comprehensive conceptual model to test fan knowledge's relationship with fan co-creation. The findings extend our knowledge regarding how fans co-create value by integrating their knowledge (i.e., an operant resource) into their social media contributions. Thus, we provide empirical support for FP6 of the Sport Value



Framework, which is that “sport customers co-create value primarily by integrating resources from their social groups” (Woratschek et al., 2014, p. 17).

Consistent with H1, fan knowledge was positively associated with fan co-creation. Despite the theoretical concepts, previous studies have scarcely explored the dynamic interplay between customer knowledge and co-creation (see Hollebeek et al., 2019). Our results add to the existing literature on customer knowledge (e.g., Behnam, Pyun et al., 2020; Behnam, Sato et al., 2020) and fan co-creation (e.g., Kolyperas et al., 2019; McDonald & Karg, 2014) by empirically demonstrating that fan knowledge is a driver of fan co-creation. This finding highlights the role of fan knowledge in prompting fans to co-create value for their clubs via their social media posts. The current study contributes to knowledge on value co-creation in the sport industry, highlighting social media as a co-creation platform that leverages fan knowledge and fan engagement to enhance team identification. In line with Paswan et al., (2014), our study shows that knowledge is an operant resource that impacts co-creation.

Fan co-creation was positively associated with team identification, hence H2 was supported. We extend the previous studies on team identification (e.g., Lianopoulos et al., 2020; Stroebel et al., 2021; Wear & Heere, 2020; Wegner et al., 2020) by testing its relationship with fan co-creation. The findings resonate with the study by McDonald and Karg (2014) who demonstrated that team identification is related to co-creating rituals. Despite team identification’s importance (Wegner et al., 2020), very few studies have linked team identification with fan co-creation. Our study highlights the contribution of online co-creation activities to team identification.

Fan co-creation demonstrated an important role in the association between fan knowledge and team identification. Hence H3 is also supported. Whilst there are some known links between

customer knowledge sharing and co-creation (e.g., Behnam, Hollebeek, et al., 2021, Hollebeek et al., 2019), the indirect effects of fan knowledge on team identification through fan co-creation are untested. The customers who know about the organization (Chang et al., 2019) tend to contribute to the co-creation with the organization (Zhang et al., 2017), which facilitates team identification by integrating the resources of various actors (e.g., co-creation in the stadium atmosphere, Stroebel et al., 2021). This result adds to prior research (e.g., Behnam, Hollebeek, et al., 2021; McDonald & Karg, 2014) demonstrating that fan knowledge can be perceived as an essential base for reinforcing fan co-creation that amplifies team identification.

H4 and H5 were also supported. Both the effect of fan knowledge on fan co-creation and the effect of fan knowledge on team identification through fan co-creation are significantly stronger when fan engagement is high. Our results reveal that the effect of fan knowledge on team identification through fan co-creation is more significant to those who engage higher with the club than for those who engage low. The current research responds to calls for examining the moderating role of fan engagement (Wang & Tang, 2018) and extends insight into the role of fan engagement (McDonald et al., 2022; Yoshida et al., 2014) in boosting the positive effect of fan knowledge on team identification through fan co-creation.

### ***Managerial Implications***

The research has a number of important managerial implications. Clubs should strategically use social media as a co-creation platform. More specifically, the strategy should encourage more of the following: clubs sharing knowledge with fans; fans sharing knowledge with club; and fans sharing knowledge with other fans.

In terms of the knowledge to be shared by clubs with their fans, we consider that most fans are unlikely to be critical of too much transparency. Hence, we encourage clubs to err on the

side of meaningful knowledge (as distinct from the trivial or inconsequential). Similarly, we encourage, wherever pragmatic and responsible, the dissemination of news to fans sooner rather than later. Clubs should also recognize their history as content for knowledge sharing. This includes celebrating past players, re-visiting exciting and controversial moments, as well as club successes.

Clubs can encourage fans to share their ideas and opinions with the club or other fans by framing pictures, videos or text in such a way as to elicit written responses. This may be enhanced by past or current players extending an explicit invitation for fan contributions. To promote fan contributions, the club can also offer incentives provide status symbols for fans that have contributed a certain amount of content. Similarly, the club can recognize fans that are considered by their peers as making positive contributions to the online community. Clubs should also ensure their online communities are socially supportive (McDonald et al., 2022).

### ***Limitations and Future Research***

We acknowledge that our participants were recruited from only three Iranian professional football clubs. Future studies should incorporate fans from other sports and cultures, perhaps also using a multiple-case study approach to compare the effects across different sports (Gerke & Dalla Pria, 2018). The sports should include individual sports, as well as both professional sport franchises and national teams. A second limitation is that whilst we provided assurances that responses would stay confidential and anonymous, social desirability bias was likely to be present. A third limitation was the study's cross-sectional nature. Therefore, we cannot estimate the causal effects from the relationship of fan knowledge, fan co-creation, and fan engagement with team identification or give insight into the temporal duration related to this process. Longitudinal research is an opportunity to overcome this limitation.

Having established a link between fan knowledge on fan co-creation and team identification, it would be interesting to now investigate the how and why of these relationships. This could be pursued by examining whether fan knowledge types have the same impacts on fan co-creation and ultimately team identification. Including the cognitive (i.e., knowledge), affective (i.e., emotional aspect of satisfaction), and conative (i.e., commitment) dimensions of loyalty may also provide some nuanced insights.

Consumer resource integration (Hollebeek et al. 2019) and brand associations (Wear & Heere, 2020) are other potential mediators which could extend our model. For example, customers intend to integrate their specific resources with the brand by virtue of interactivity which can influence co-creation and customer engagement (Hollebeek et al. 2019). While we used fan engagement as a moderating variable that effects the association between fan knowledge and co-creation, the investigation of other potential moderators (e.g., fan psychological involvement: Behnam, Sato et al. 2021) that would affect each relationship within the model is warranted.

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**Table 1***Participants' Demographic Characteristics*

<b>Characteristic</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Male	295	61.1
Female	188	38.9
<b>Age</b>		
16–25	121	25.1
26–35	183	37.9
36–45	117	24.2
46–55	46	9.5
More than 55	16	3.3
<b>Fanship</b>		
Less than one year	20	4.1
One to two years	97	20.1
Three to four years	141	29.2
Five to six years	149	30.8
More than six years	76	15.7

**Table 2***Constructs and Items*

<b>Construct</b>	<b><math>\beta</math></b>
<b>Fan knowledge: Knowledge from fan</b> (CR = .93; AVE = .72)	
I provide feedbacks about current service quality to the X.	.86*
I provide suggestions about competitor service quality to the X.	.85*
I inform X about my interest services.	.86*
I provide ideas to the X for developing novel and innovative services.	.83*
<b>Fan knowledge: Knowledge about club</b> (CR = .92; AVE = .65)	
I know about X's history.	.72*
I know about X's fans.	.74*
I understand X's requests from fans.	.81*
I know about X's problems.	.82*
I know about X's income level.	.87*
I know about X's records.	.86*
<b>Fan knowledge: Knowledge for fans</b> (CR = .91; AVE = .72)	
X provides information about current services for fans.	.88*
X provides information about new services for fans.	.87*
X provides information about the benefits of new services for fans.	.83*
X helps fans to make better decisions by providing information to them.	.81*
<b>Fan knowledge (second-order)</b> (CR = .86; AVE = .68)	
Knowledge from fan	.84*
Knowledge about club	.92*
Knowledge for fans	.71*
<b>Fan Engagement: Management cooperation</b> (CR = .95; AVE = .81)	
I try to work cooperatively with X.	.88*
I do things to make X's event management easier.	.90*
The employees of X get my full cooperation.	.92*
<b>Fan Engagement: Prosocial behavior</b> (CR = .91; AVE = .77)	
I often interact with other fans to talk about issues related to the X.	.87*
I often advise other fans on how to support X.	.88*
I spend time on social media (e.g., Facebook, Twitter, and Instagram) sharing information with other fans of X.	.89*
<b>Fan Engagement: Performance tolerance</b> (CR = .89; AVE = .73)	
I wear apparel which represents the fans of X even if the team has an unsuccessful season.	.88*
I display the logo of X on my clothing even if (team name) do not perform well.	.86*
I wear clothing that displays the name of X even if X have an unsuccessful season.	.83*
<b>Fan Engagement (second-order)</b> (CR = .97; AVE = .91)	
Management cooperation	.92*
Prosocial behavior	.98*
Performance tolerance	.97*
<b>Fan co-creation</b> (CR = .90; AVE = .63)	
Using social media, I often suggest how the X can improve its services.	.81*
Using social media, I am actively involved when X develops new solutions for me.	.80*
Using social media, the X encourages fans to create solutions together.	.85*
Using social media, I help X by sharing information/comments/photos/videos	.77*
Using social media, I help X by disseminating songs/choreographies that are part of its history	.75*
<b>Team Identification: Cognition</b> (CR = .89; AVE = .74)	
I know a lot of information about X	.81*
I have a lot of knowledge about X	.89*
I am very knowledgeable about X	.88*
<b>Team Identification: Evaluation</b> (CR = .89; AVE = .73)	
I am like other fans of X	.86*
Compared to other fans of X, I am similar	.88*
I am a typical fan of X	.83*
<b>Team Identification: Affect</b> (CR = .87; AVE = .69)	

I like being a fan of X	.75*
I feel happy to be a fan of X	.87*
I feel good about being a fan X	.86*
<b>Team Identification (second-order)</b> (CR = .91; AVE = .77)	
Cognition	.86*
Evaluation	.93*
Affect	.84*

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*Notes:* \* $p < .001$ ;  $\beta$  = factor loading; CR = composite reliability; AVE = average variance extracted; NA = not applicable.

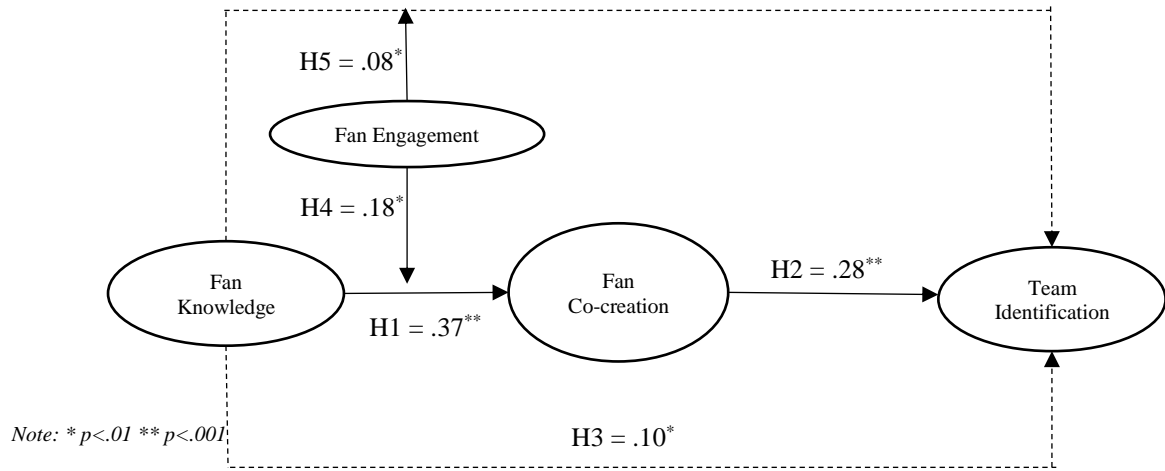
**Table 3***Construct Correlations*

	1	2	3	4	5
1. Fan knowledge	<b>.82</b>				
2. Fan engagement	.05	<b>.95</b>			
3. Fan co-creation	.37	.13	<b>.79</b>		
4. Team identification	.48	.08	.42	<b>.87</b>	

*Notes:* The diagonal values in bold refer to square root of AVE.

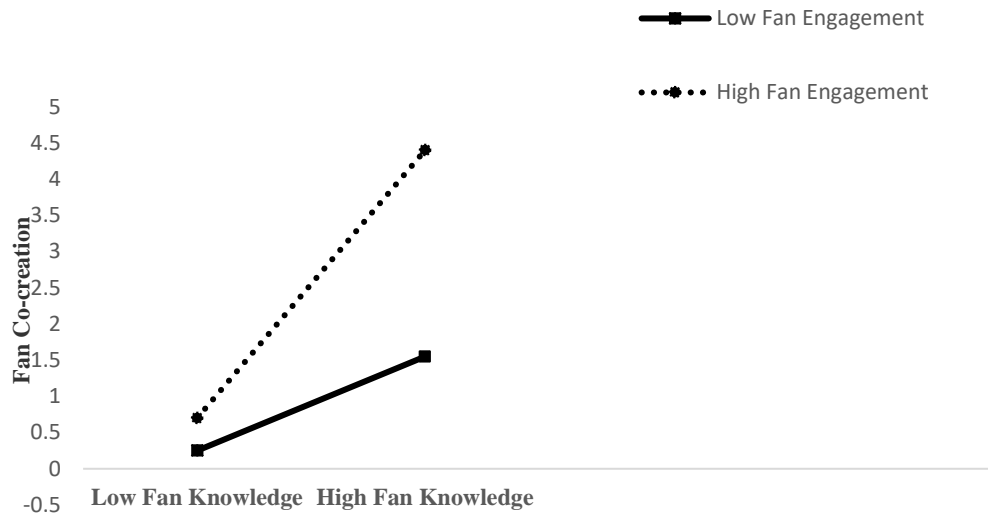
**Figure 1**

*Hypotheses and Results of Structural Model*



**Figure 2**

*Moderating Effect of Fan Engagement on the Relationship Between Fan Knowledge and Fan Co-Creation*



**Figure 3**

*Moderating Effect of Fan Engagement in the Mediating Relationship Between Fan Knowledge and Team Identification Through Fan Co-Creation*

