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Original Article

Impact of the Smart Device Interactivity on the Co-creation of Value in the Sport Industry

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Abstract:
The purpose of this study is to investigate the impact of smart device's interactivity on customer value cocreation in the sports industry through bridging social capital and collective efficacy. A total of 262 students participated in the study, and we carried out structural equation modeling (SEM) to measure the relationship between variables in the conceptual model. The results revealed that interactivity consisting of user control, responsiveness, and synchronicity had a significant impact on bridging social capital. In addition, both technological interactivity and bridging social capital were positively associated with collective efficacy. Lastly, collective efficacy had a positive influence on value cocreation, but bridging social capital did not appear to directly affect value cocreation. Based on these results, this study suggests the need to take advantage of new platforms that can build co-creation value with customers in the rapidly changing marketing environment.
Key Words: Smart devices, Interactivity, Value Co-creation, Collective Efficacy, Social Capital

Introduction

In the 21st century, a variety of portable smart devices started to emerge. These devices allow people to use more advanced computing ability and offer instantaneous connectivity even more so than an ordinary personal computer (Chen, Yen, & Chen, 2009). Moreover, these smart devices provide a platform where people can easily access to the optimal information that they need (Lee, 2005) and real-time information can be exchanged anywhere at any time (Hennig-Thurau et al., 2010). One of the popular smart devices is a smartphone and a significant number of business organizations have shifted marketing strategies from a mass-market perspective to a customer-centric perspective, which represents the most recent innovation in the progress of portable smart devices (Oulasvirta, Rattenbury, Ma & Raita, 2012; Sheth, Sisodia & Sharma, 2000; Smith, 2015). Through this technological development, consumers have become more active recipients of innovation and partners in the innovation process. The direction of interaction between the firm and the customer is also evolving to a two-way interactive dialogue for value cocreation (Prahalad & Ramaswamy, 2004a; Sawhney, Verona, & Prandelli, 2005).

Social network services have been effectively used by a large number of sports organizations to communicate with their customers or fans. All 30 Major League Baseball (MLB) franchises, 32 National Football League (NFL) teams, 30 National Basketball Association (NBA) teams, and 30 National Hockey League (NHL) teams use Facebook, Twitter, and Blogs. Individual athletes also attract large followings. According to Tweeting-Athletes.com (2012), 7,217 NFL, NBA, MLB, NHL, and soccer players use Twitter to interact with their fans. In addition, sports news channels use blogs to interact with fans (Martin, 2012). As such, new media is considered a core platform through which sports organizations, teams, and individual athletes interact with their fans or customers (Flew & Smith, 2011). Through portable smart devices, new media is facilitating interactivity between consumers and organizations (Lee & Lan, 2007). This rapid growth of new media requires changes in the way organizations have traditionally operated (Hennig-Thurau et al., 2010). Organizations recognize the need for platforms to facilitate value cocreation with customers in the virtual environment (Sawhney et al., 2005), and focus on interactivity and management of value cocreation with their customers (Prahalad & Ramaswamy, 2004a).

Consumers play a leading role in influencing important decisions, such as those in manufacturing, distribution, and the service process. Through this interaction, firms can progressively learn about their consumers, and even learn from them (Sawhney et al., 2005). According to Lin and Huang (2006), individual customers yield value and services for and from each other by participating in communities of customers. In addition, peers perceive the information a group of consumers provides to be timelier, more complete, and more personalized than the information the commercial media provides (Schwabe & Prestipino, 2005). Therefore,

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organizations including sports organizations would do well to implement strategies to allow consumers to participate more actively in co-creation value (Sigala, 2009). However, despite the importance of interactivity in the smart device-based environment, most of the research on interactivity has focused on the computer-based environment. Moreover, the research focused on how smart devices' interactivity affects customer participation in the sports industry is still quite insufficient. Therefore, the primary purpose of this study is to examine how interactivity in smart devices influences customer value cocreation by mediating roles of bridging social capital and collective efficacy in the sports industry.

Theoretical Framework

Interactivity

Interactivity is defined as "the relationship between two or more people who, in a given situation, mutually adapt their behavior and actions to each other" (Jensen, 1998, p. 188). In marketing, this is an important variable that plays a supportive role in relationships with customers (Hoffman & Novak, 1997; Hoffman, Novak & Chatterjee, 1995; Sheth & Paravatiyar, 1995) and in advertising effectiveness (Hoffman & Novak, 1996; Lee, 2005; Liu and Shrum, 2002). Current interactivity research that viewed interactivity as quality of communication focuses on reciprocity and participation, mutual action, action-reaction, and two-way communication (Johnson, Bruner, & Kumar, 2006; Kiousis, 2002; Rafaeli, 1988). Moreover, studies that consider interactivity as a property of mediated communication or as a quality of media have focused on interactivity as an aspect of technology or as a system function (Markus, 1990; Steuer, 1992). In particular, Kiousis (2002) stated "Communication technology can create a mediated environment in which participants can communicate (one-to-one, one-to-many, and many-to-many), both synchronously and asynchronously, and participate in reciprocal message exchanges" (p. 372). Consistent with this classification, previous studies considered the idea that technological improvement of systems in the new media environment will bring about various interactivities, and positive changes regarding both relationships with users and those users' perception of collective efficacy in a mediated environment (Domagk et al., 2010; McMillan, 2002; Rice & Williams, 1984; Steuer, 1992). In conjunction with the lines, it is needed to distinguish user-to-system interactivity to define this interactivity as technological interactivity. Finally, this study only considers the concept of user-to-system interactivity in terms of multidirectional interactivity to understand the usage of smart devices and their influence on users' collective efficacy and value cocreation via the mediating role of bridging social capital. Therefore, only components associated with machine interactivity among the components examined by researchers in diverse fields are used as variables. Namely, user control, responsiveness, and synchronicity were included.

Dholakia, Zhao, Dholakia, and Fortin (2000) specified three major components of technological interactivities: user control, responsiveness, and synchronicity. User control was defined as "the extent to which an individual can choose the timing, content, and sequence of a communication" (Dholakia et al., 2000, p. 6). According to Williams, Rice, and Rogers (1988), users are able to control the virtual communication environment via selecting the timing, content, and sequence of a communication. In other words, new media may also be related to minimizing effort in the achievement of tasks (Heeter, 1989) and to control over one's role as a sender or a receiver (Fortin, 1997). The second component is responsiveness, which focuses on responses to earlier messages (Dholakia et al., 2000). In addition, Dholakia et al. (2000) revealed that "users gauge responsiveness of a system from direct communication as in a reply to an email; or indirectly from actions taken as in changes in the website because of an expressed opinion" (p. 7). In this regard, users are able to obtain information through new media tools and efficiently interact with the information. The third component of machine interactivity is synchronicity, which refers to "the speed with which communication takes place, particularly response time" (Dholakia et al., 2000, p. 7). Speed of interaction, or response time, is a key component of an interactive media system. Customers participate in the environment where communication takes place coincidentally with others, and they can receive responses from others in real time (Dholakia et al., 2000; Steuer, 1992).

Smart devices may have an effect in these interactivity dimensions in new media. Information can be spread quickly and widely through mobile devices (Kim, Park & Lee, 2010). The properties of mobile devices improve Internet based interactivity (Lee, 2005). Therefore, the positive influences of user control and responsiveness in technological interactivity through ubiquitous connectivity could enhance users' feedback and accessibility to information (Lee, 2005, 2012).

Social Capital

With the development of new technologies such as smart devices, social capital can occur when users are active on the social networking platforms (Burt, 1997; Portes, 1998). Social capital is grounded on the fundamental notion that group involvement and participation can produce positive consequences for both individuals and groups (Portes, 1998). In addition, Portes (1998) defined social capital as "the ability of actors to secure benefits by virtue of membership in social networks or other social structures" (p. 6). In previous studies, social capital was considered to be the most valuable asset caused by social networks, bonding similar people, and bridging between various people (Dekker & Uslaner, 2001; Uslaner, 2001).

When people interact with others and build social groups in a communication environment that is mediated by social software, this leads to positive outcomes such as encouragement, support for social

interaction, and mobilization of others in online communities (Lee, 2012; Steinfield, Ellison & Lampe, 2008; Williams, 2006). In other words, characteristics of the new media environment have an influence on forms of media sociability and facilitate building of social capital. In particular, bridging social capital describes resources in which a large number of actors become closely associated and form bonds within a social group based on functional, informational, and weak ties; this occurs without strong trust even though the actors have different backgrounds, (Beane, 2012; Granovetter, 1973; Kobayashi, 2010; Putnam, 2000; Williams, 2006, 2007; Woolcock, 1998). The social networks that are based on bridging social capital are able to create access to actors who have diverse social, religious, or political points of view, and to expand actors' social horizons or worldviews (Coleman, 1988; Putnam, 2000; Williams, 2006). These in turn lead to positive outcomes such as encouragement, support for social interaction, and mobilization of others in online communities (Lee, 2012; Williams, 2006). Therefore, the current study employs bridging social capital as a mediating role to better understand the link between interactivity and collective efficacy.

Collective Efficacy

Self-efficacy is considered the basis of human agency (Fernandez-Ballesteros, Diez-Nicolas, Caprara, Barbaranelli & Bandura, 2002). While self-efficacy represents a person's belief in his or her ability to perform a task and influence events, a lot of research has been conducted about how individuals feel, think, motivate themselves, and act; self-efficacy also facilitates goal setting, investment, and persistence (Ahmad & Safaria, 2013; Armitage, Conner, Loach & Willetts, 1999; Bandura, 1993, 1994; Hackett & Betz, 1981; Scholz, Gutierrez-Dona, Sud & Schwarzer, 2002; Schwarzer & Fuchs, 1995). In addition, measures of efficacy such as self-esteem and belief about the accomplishment of individuals' purpose are highly related to depression, anxiety, and helplessness (Bandura, 1986; Schwarzer & Fuchs, 1995). According to Bandura (1997, 2000), individuals' efficacy is socially collected through diverse members' shared beliefs. In addition, this social activity accompanies interactive, coordinative, and synergetic social dynamics (Bandura, 2000, 2001). In addition, social cognitive theory extends human agency to collective efficacy through the shared beliefs of group members from diverse backgrounds (Bandura, 2000). For example, Bandura (1977) referred to collective efficacy as an extension of self-efficacy defining it as the shared belief of group members in their ability to achieve goals collectively by allocating, coordinating, and integrating their resources (Bandura, 1997; Zaccaro, Blair, Peterson & Zazanis; 1995). This requires interaction, interdependence, and cooperation between members to perform tasks (Martinez, Guillen & Feltz, 2011). As such, shared beliefs in collective efficacy allow people to pool their knowledge, capabilities, and resources, to rely on each other for support and mutual backing, and to work together to create solutions and seek better lives (Fernandez-Ballesteros et al., 2002). In other words, the collective efficacy of group members has an effect on the types of futures they endeavor to attain through group effort and action (Bandura, 2000). In the new media environment, customers can participate in diverse communities. Through the properties of mediated communication, such as information openness, connectedness, and community interaction, collective efficacy may improve customers' participation in the marketing process (Lim & Yang, 2006). This study focuses on collective efficacy in the new media environment, and we expect that properties of media interactivity, which comprise user control, responsiveness, and synchronicity, will bring about information sharing in groups and improve their collective efficacy.

Value Cocreation

The traditional market concept is firm-centric, and from this perspective, the process of value creation arose from companies (Prahalad & Ramaswamy, 2004a; Sharma & Sheth, 2004). The roles of firms and customers were also clearly distinguished as producers and consumers, repectively (Prahalad & Ramaswamy, 2004a, 2004b). In this concept, the firm carried out the whole process of product design, product development, and marketing strategy creation with little or no interaction with its consumers (Normann & Ramirez, 1994; Prahalad & Ramaswamy, 2004a; Wikstrom, 1996). The interaction between customers and firms, however, has become more significant to innovation and value creation with the development of new communication technologies in the new media environments (Bitner, Brown & Meuter, 2000; Dahan & Hauser, 2002; Nambisan & Baron, 2009; Sawhney et al., 2005; Thomke & von Hippel, 2002). Firms have recognized the power of new media as a platform for cocreating value with their customers (Sawhney et al., 2005), and the process of value creation has shifted from a firm-centric perspective to personalized customer experiences through informed, networked, empowered, and active customers (Prahalad & Ramaswamy, 2004a). In virtual environments, customers participate in product design, testing, and support through online discussion (Nambisan, 2002; Nambisan & Baron, 2009). For example, people who use sports applications to improve their health will review the applications they download and share problems, inconveniences, and features with other users; they will also post ideas on discussion boards. Developers then use this information to improve their products.

Customers generate value and services for and from each other by participating in diverse online communities (Lin & Huang, 2006). This participation can be divided into two categories: passive participation, in which customers share information with other consumers, and active participation, in which they suggest strategies or ideas directly to firms (Lim & Yang, 2006). This study focuses on active customer participation in firms' marketing activities and regards this form of customer participation as value cocreation.

Based on the aforementioned literature, we advance the following hypotheses:

H1a: Interactivity in smart devices directly enhances bridging social capital

H1b: Interactivity in smart devices directly enhances collective efficacy.
H2a: Bridging social capital has a positive impact on collective efficacy
H2b: Bridging social capital has a positive impact on value cocreation.
H3: Collective efficacy influenced by interactivity and bridging social capital enhances value cocreation.

Material & methods

Participants

Based upon their usage and experiences, participations responded to the 22 items (e.g., technological interactivity, bridging social capital, collective efficacy, and co-creation value) listed below and 10 demographic items (e.g., gender, major, age, academic classification, race, marital status, number of people in household, household income, smart device possession, and types of smart devices). In addition, participants rated each item on a 7-point Likert type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). As a result, 451 students were initially contacted, and 262 students completed the survey, which resulted in a 58 % response rate.

A total of 262 students were collected from a random group of students at a university in the southern United States. Participants comprised 118 males (45.0%) and 144 females (55.0%); there were 53 freshmen (20.2%), 52 sophomores (19.8%), 64 juniors (24.4%), 77 seniors (29.4%), 15 graduate students (5.7%), and 1 other participant (0.4%). The participants' mean age was 23 years old and ranged from 18 to 63 (SD = 6.94). In addition, of the 262 participants who had at least one smart device, 153 (58.4%) owned only smartphone, 10 (3.8%) had only another type of portable smart device, and 99 (37.8%) possessed both.

Measurement

Technological interactivity was divided into three subvariables: user control, responsiveness, and synchronicity. First, three items adapted from Liu (2003) measured user control: control over visiting, free options what I wanted to see, and my decisions. Second, three items of responsiveness was adopted from Johnson et al. (2006), including ability to respond to questions relevantly, ability to respond to my question, and ability to meet with expectations. Finally, four synchronicity items were adapted from Liu (2003), quick processes, fast information, information delayed, and instantaneous information. Five items of bridging social capital in a university environment setting was adapted from Lee (2012), which was originally developed from Steinfield et al (2008). The items include parts of the community, interests of community, interactions with people, emotions of interaction with people, and willingness to spend time within community. Collective efficacy was measured with three items adapted from a study by Jung and Sosik (2002): participations in community website, excellent ability of the website, community members to solve problems. Lastly, the four value cocreation scale items were adapted from Bettencourt (1997), measuring the necessary of the webmaster's better services, suggestions to improve services, and willingness to suggest any useful idea, and willingness to deliver my experiences to the webmaster.

Data Analysis

The data were analyzed using IBM SPSS 20.0 and Amos 18.0 package. First, frequency analysis was examined to measure the individual characteristics of the participants. Second, a confirmatory factor analysis (CFA) was employed to estimate the factor structure, and the convergent and discriminant validity. Composite reliability was evaluated based on CFA results. Finally, the decomposition of the significant relationships among interactivity, bridging social capital, collective efficacy, and value cocreation was scrutinized using the structural equation model. In addition, both confirmatory factor models and structural equation models were assessed using multiple fit indexes including chi-square statistics (÷˛), comparative fit index (CFI), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), probability of close fit (PCLOSE).

Results

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was used to estimate the factor structure, and the measures' reliability, and validity. In the CFA, average variance extracted (AVE) value of bridging social capital (.458) was slightly lower than the recommended standard (i.e., equal to or greater than .50; Bagozzi & Yi, 1988). To establish convergent validity, the study sequentially removed items with low loadings, and the decision was made to remove two items in bridging social capital (BSC3 and BSC5). Furthermore, to estimate the potential impact of a common method bias due to DV and IV being collected using the same instrument, the study used a common latent factor (CLF). No common method bias was observed. Finally, the CFA was reexamined with bridging social capital containing the items with high loadings.

Internal consistency was estimated using construct reliability (CR) and average variance extracted (AVE), as illustrated in Table 1. Specifically, the construct reliability values exceeded the recommended standard (greater than .70; Fornell & Larcker, 1981) ranging from .772 to .866. All of the AVE values were greater than .50, ranging from .531 to .648. Furthermore, the items' loadings were significant, as the critical ratios ranged from 9.231 to 14.539 ($p < .001$). For these reasons, based on the overall values of reliability, the measures were deemed to have reliable levels of convergent validity.

Table 1. The values of factor loadings, critical ratios, construct reliability, and AVE

	Factor loadings	Critical ratios	Construct reliability	AVE
User Control			.807	.586
Con3	.805			
Con2	.609	9.231***		
Con1	.782	11.509***		
Responsiveness			.842	.648
Res3	.579			
Res2	.838	9.518***		
Res1	.888	9.638***		
Synchronicity			.866	.618
Syn3	.780			
Syn2	.853	13.117***		
Syn1	.798	14.539***		
Syn4	.780	13.477***		
Bridging Social Capital			.772	.531
BSC4	.752			
BSC2	.784	11.519***		
BSC1	.765	11.308***		
Collective Efficacy			.810	.588
CE3	.721			
CE2	.794	11.504***		
CE1	.817	11.730***		
Value Cocreation			.834	.557
CV4	.760			
CV3	.743	11.504***		
CV2	.835	12.720***		
CV1	.722	11.185***		

***$p < .001$.

As each AVE value was compared with the squared phi correlations between the two constructs, the measures were found to possess acceptable levels of discriminant validity except for the value between bridging social capital and collective efficacy. Although the AVE value for bridging social capital (.531) was not be greater than the squared phi correlations (.531) between bridging social capital and collective efficacy, the AVE value revealed the same value comparing to the squared phi correlations between them. According to a study by Kline(2005), discriminant validity can be established when the value for an interfactor correlation is below .85. Due to its theoretical relevance to the study, the factor was retained. Finally, chi-square value ($X^2 = 287.685$, $df = 155$, $p < .001$) was significant, and the normed chi-square ($X^2 / df = 1.856$) was in the suggested range (i.e., less than 3.0; Bollen, 1989). All other multiple fit indices indicated an acceptable model fit: comparative fit index (CFI) = .949; standardized root mean square residual (SRMR) = .048; root mean square error of approximation (RMSEA) = .057, Probability of close fit (PCLOSE) = .121.

Structural Equation Modeling

Structural equation modeling (SEM) was employed to estimate the significant relationships among latent constructs in the conceptual model. This model derived from the SEM indicated a good fit to the data: χ^2 (60) = 119.460, p < .001, SRMR = .045, RMSEA = .062, CFI = .960, PCLOSE = .115. Although the RMSEA was slightly low than an ideal threshold (Hu & Bentler, 1999), other indices revealed a satisfactory model fit to the data.

Table 2. Summary of findings

Hypothesis	Beta	Sig.	Conclusion
H1a. Interactivity -- Bridging social capital	.588	p < .001	Supported
H1b. Interactivity -- Collective efficacy	.328	p < .001	Supported
H2a. Bridging social capital -- Collective efficacy	.535	p < .001	Supported
H2b. Bridging social capital -- Value cocreation	.207	p = .082	Rejected
H3. Collective efficacy -- Value cocreation	.287	p < .05	Supported

Hypothesis 1 was supported. The direct path from interactivity to bridging social capital was significant (H1a, $\beta = .588$, $p < .001$) and accounted for 34.6% of the variance in bridging social capital. The path from interactivity to collective efficacy was significant (H1b, $\beta = .328$, $p < .001$).

Hypothesis 2 was partially supported. Bridging social capital, as influenced by interactivity, had a direct positive impact on customers' collective efficacy (H2a, $\beta = .535$, $p < .001$), supporting bridging social capital's mediating role between interactivity and collective efficacy. Interactivity and bridging social capital explain 60.0% of the variance in collective efficacy. However, Hypothesis 2b was not supported. The direct path from bridging social capital, as influenced by interactivity, to value cocreation was not significant (H2b, $\beta = .207$, $p = .082$). Lastly, the direct path from collective efficacy to value cocreation was significant (H3, $\beta = .287$, $p < .05$), and accounted for 21.2% of the variance in cocreation value. Social capital and collective efficacy influenced co-creation value. These findings are summarized in Table 2.

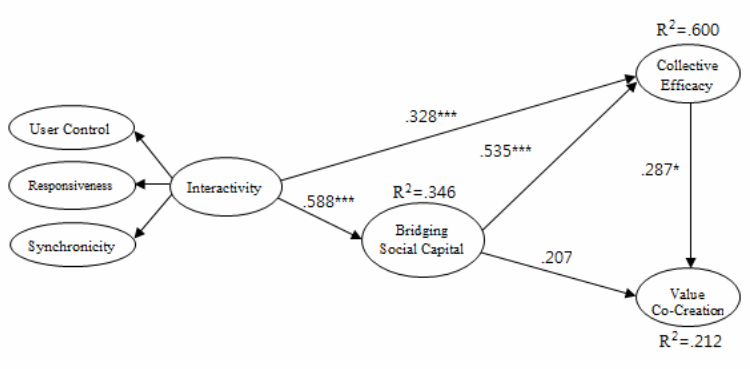

Figure 1. Results of hypotheses tests.
Note: *$p < .05$, ***$p < .001$.

Discussion

The main purpose of the study was to examine the relationship between smart devices' interactivity and customers' activities in the sports industry. Specifically, this study focused on the components of user-to-system interactivity as a mediated technological environment in the new media environment. Therefore, the study distinguished the components of technological interactivity in the new media environment (user control, responsiveness, and synchronicity) and studied their effects on bridging social capital, collective efficacy, and value cocreation.

First, the results showed that technological interactivity had a significant impact on bridging social capital. This indicates that college students who used smart devices for gathering sports information were more likely than those who did not to socially integrate with sports fans. While sports information can be quickly, widely, and easily delivered to others through smart devices in the new media environment, these properties of new technological communication allow people to build numerous social relations and to maintain these connections cheaply and easily (Donath, 2007; Donath & Boyd, 2004; Kim, Park & Lee, 2010). This finding is parallel to findings of a study conducted by Wu, Wang, Su and Yeh (2013), in which perceived interactivity enhanced individuals' bridging social capital using new technology. Finally, the results supported the finding that sports information can bridge sports fans' social relationships through technological interactivity in a virtual environment.

Second, both interactivity and social capital functions shown to improve collective efficacy. In particular, this result revealed that bridging social capital directly improves individuals' collective efficacy, which, in turn, plays a significant mediating role between interactivity and collective efficacy. It is important to note that communitive technologies in virtual environments in the sports industry improved sports fans' social relations and information exchanges, bridging social capital in these communities. Although Resnick (2002) noted that individuals have weak ties with social group members created in the new media environment, the integrated social groups that used bridging social capital, which was enhanced by sports fans' interactivities, were efficient in organizing for collective action. In addition, while they actively exchange sports information, users showed the improved satisfaction due to the collective actions (Kavanaugh, Reese, Carroll & Rosson, 2005). For these reasons, Kavanaugh et al. (2005) asserted that participants with bridging social capital had higher levels of collective efficacy and engagement in their community actions than those who were without bridging ties. These theoretical schemes supported the finding that in a new media environment, bridging social capital mediated by components of technological interactivity enhances collective efficacy in communities. According to several studies, users who controlled information and sequencing had improved efficacy (Jaffe, 1997; Maibach & Flora, 1993). Our results parallel the previously found positive relationship between technological interactivity in the new media environment and collective efficacy.

Lastly, while collective efficacy had a positive influence on value cocreation, bridging social capital did not sport fans' value cocreation. Although bridging social capital leads to encouragement, support for social interaction, and mobilization of others (Lee, 2012; Steinfield et al., 2008; Williams, 2006), this study revealed that bridging social capital does not directly increase value cocreation. This could be because the users in this study were students and whose shared beliefs in collective efficacy only allowed them to gather resources (e.g.,

Knowledge and abilities) and collaborate toward a shared goal (Fernandez-Ballesteros et al., 2002). However, this study confirmed that the perceived collective efficacy had a positive impact on group effectiveness and performance and that collective efficacy played a mediating role between bridging social capital and value cocreation. In particular, these relationships were consistent with those in previous studies. According to Bandura (2000), socially collected individuals' efficacy is enhanced by their shared beliefs and by positive interactions with group members. In addition, this phenomenon is supported by social cognitive theory, which represents a variety of knowledge that is shared to collectively achieve goals by allocating, coordinating, and integrating resources (Bandura, 1997, 2000; Zaccaro et al., 1995). While sports fans who use new technologies create new social groups and associations in the media environment, it still gives each individuals to participate in diverse communities.

In spite of the contributions of the study, it has some limitations that need to be considered. First, the data were collected from students in a university in the southeast United States. This limits the generalizability of the study. Therefore, future studies should include broader sampling frames and diverse locations. Second, this study focused on the impact of technological interactivity. There is a need for follow-up research on user-to-user and user-to-document interactivity. In addition, the study operationalized interactivity as a single factor with three variables (user control, responsiveness, and synchronicity). Future studies could analyze the relationship between these interactivity factors and the outcome variables. Additionally, information on other outcome variables could be beneficial (e.g., purchase intentions, actual purchase, and negative effects of collective efficacy). Finally, the participants answered self-reported questionnaires. This may have led to biases in their responses. For example, the household income responses may be inflated, as some students may have reported their parents' income rather than their own income. Future self-reported studies should specify which income the participants are to report. Alternatively, other studies could use an experimental design to avoid self-reported data.

Conclusions

The significant findings of the study could contribute to the professionals in sport marketing, communication, management, and information systems. For example, technological interactivity in virtual environments leads to sports fans' participation in firms' marketing activities through the construction of social capital based on weak ties and through the reinforcing of shared efficacy in a group. This type of interactivity has a positive influence on value cocreation in corporate management activities. It would be helpful for marketers to understand and strategically consider the relationship between interactivity and customer activity in new media environment, such as in reverse marketing. Specifically, diverse platforms through which customers can develop relationships with others are needed. When providing these platforms consideration needs to be given to user control, responsiveness, and synchronicity in smart devices' interactivity to best bridging social capital and strengthen shared collective efficacy in the virtual environment. By improving interactivity, these platforms can be used to collect customers who have interest in firm's products or services and to acquire information easily and cheaply from target customers.

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