

Aug 10th, 12:00 AM

## **A Systematic Review of Leadership in Online Communities: Social Leaders, Technical Leaders, and Impacts**

Xuecong Lu  
*McMaster University, lux95@mcmaster.ca*

Jinglu Jiang  
*Binghamton University, jingluj@binghamton.edu*

Milena Head  
*McMaster University, headm@mcmaster.ca*

Junyi Yang  
*McMaster University, yangj263@mcmaster.ca*

Follow this and additional works at: <https://aisel.aisnet.org/amcis2022>

---

### **Recommended Citation**

Lu, Xuecong; Jiang, Jinglu; Head, Milena; and Yang, Junyi, "A Systematic Review of Leadership in Online Communities: Social Leaders, Technical Leaders, and Impacts" (2022). *AMCIS 2022 Proceedings*. 10. <https://aisel.aisnet.org/amcis2022/vcc/vcc/10>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2022 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# **A Systematic Review of Leadership in Online Communities: Social Leaders, Technical Leaders, and Impacts**

*Completed Research*

**Xuecong Lu**  
McMaster University  
Lux95@mcmaster.ca  
**Milena Head**  
McMaster University  
headm@mcmaster.ca

**Jinglu Jiang**  
Binghamton University  
jingluj@binghamton.edu  
**Junyi Yang**  
McMaster University  
Yangj263@mcmaster.ca

## **Abstract**

Leadership in online communities has received research attention in the past ten years. Given the popularity of online communities and practical challenges facing community operation and sustainability, understanding leadership in online communities has great practical and theoretical significance. We systematically collect and analyze the past ten years of research on leadership in online communities. By differentiating socio-oriented and technical-oriented leadership, we propose an integrative framework to link various leadership manifestations and the corresponding outcomes. While four types of outcomes emerge from our review, existing studies exhibit major interests in member participation, and the other three types of outcomes (i.e., task, team, and community outcomes) are less known. In addition, there is a lack of understanding of the boundary conditions, opening avenues for future research. This review study contributes to online leadership research by offering a holistic view of leadership mechanisms in online communities and identifying emerging research directions.

## **Keywords**

Leadership, online community, socio-technical, literature review.

## **Introduction**

Leadership in online communities has received research attention in the past ten years (Dahlander & O'Mahony, 2011; Li et al., 2012; Lu et al., 2013). An online community supports diverse groups of individuals to perform activities and pursue common interests or identities (Faraj et al., 2011, 2015, 2016). Some typical examples include Q&A sites (e.g., StackExchange), open-source communities (e.g., GitHub), and content sharing communities (e.g., Flickr). Given the popularity of online communities and practical challenges facing community operation and sustainability (e.g., lack of participation, lack of high-quality content), understanding leadership in online communities has great practical and theoretical significance.

Current online community leadership research mainly focuses on understanding the emergence of leadership and how different practices and styles of leadership influence various online community outcomes (Faraj et al., 2015; Johnson et al., 2015; Oh et al., 2016). Existing studies often measure leadership based on a member's social network position (e.g., popular members indicated by their network size or centrality, Lee et al., 2019) and the recognition gained (e.g., reputation scores, Johnson et al., 2015). Leadership is critical to promote various community outcomes, such as members' knowledge sharing (Martins et al., 2013) and community growth (Antonacci et al., 2017). Despite the significant number of concepts and mechanisms being studied, much confusion still exists regarding what leadership means in an online community, how leadership works, and its corresponding outcomes.

Accordingly, the objective of this review is two-fold. First, we systematically collect and analyze the past ten years of research on leadership in online communities to understand how leadership manifests in various online communities and its corresponding outcomes. Second, we develop an integrative framework of online community leadership, aiming to break intellectual isolation between research sub-areas to inform future studies. To make appropriate abstractions and bring diverse research areas together, we draw on the socio-technical perspective (Ducheneaut, 2005) to categorize leadership roles and styles extracted from the literature. Using this perspective allows us to examine a holistic picture of leadership in online communities, enabling us to derive explanations regarding how different leadership practices influence outcomes at individual, task, and community levels. The review contributes to research by clarifying leadership mechanisms in online communities and identifying promising areas for future research.

The rest of the paper is structured as follows: the next section discusses the socio-technical perspective, which we use to organize the key concepts and themes. The following section presents the literature search and screening process, followed by elaborating on our thematic synthesis. We conclude with a discussion of study limitations and future research.

## Overarching Lens: Online Communities as Socio-Technical Systems

An online community can be viewed as a socio-technical system where members interact through the digital platform. The technological infrastructures define and promote members' behaviors in the online community, and members also create new procedures and practices through their social interactions and knowledge exchange on the platform (Ducheneaut, 2005; Faraj et al., 2016). The socio-technical perspective has been used in online community research to explain the impacts of various aspects of members' socialization or technical practices. For instance, Ren et al. (2007, 2012) have used this lens to understand how members' social identities facilitate retention and participation in online communities. We expect the socio-technical perspective to be useful in understanding leadership in online communities since it resonates with the established view of task-oriented and relation-oriented behaviors of leaders, dating back to the Ohio State and Michigan leadership studies in the 1950 (Yukl, 2006). Hence, we adopt the socio-technical perspective as our overarching lens to categorize the various leadership practices and manifestations in the literature, as shown in Table 1.

A leader in an online community can be *socio-oriented*, whose leadership is reflected in the social processes such as participative activities, networking, relational building. This type of leadership focuses more on people and relations, similar to relation-oriented leaders in a traditional organization who care more about group cohesion (Sherony & Green, 2002; Taberero et al., 2009). On the other hand, a leader in an online community can be *technical-oriented*, which focuses more on the community tasks and processes. Accordingly, efficiency is the primary concern of this type of leadership, similar to task-oriented leaders in traditional organization research (Taberero et al., 2009). In most online communities, information contribution and exchange are primary tasks regardless of the actual participation activities. A technical-oriented leader would leverage community structure (e.g., its policies and tech infrastructure) to pursue more efficient and effective information contribution and exchange, which also helps establish leadership. In our results section, we organize our review into socio-oriented and technical-oriented leadership to provide different styles of leadership, while our review suggests that a significant portion of studies on leadership in online communities have taken an integrative socio-technical leadership perspective.

Leadership type	Description	Manifestation in online communities
Socio-oriented	A socio-oriented leader focuses more on people and relations.	A socio-oriented leader obtains and executes leadership through social processes and relationship building.
Technical-oriented	A technical-oriented leader focuses more on tasks and procedures.	A technical-oriented leader obtains and executes leadership by pursuing more efficient and effective information contribution and exchange.

**Table 1. Socio-oriented versus Technical-oriented Leadership in Online Communities**

## Methods

We searched existing research across multiple disciplines to create our sample of review. We followed a systematic literature review process for searching and screening articles, which is presented in Figure 1. Seven digital libraries were searched: EBSCO Host, ABI/Inform, ACM digital library, ScienceDirect, IEEE Xplore, PsycINFO, and Web of Science. Titles and abstracts of English-language articles published in peer-reviewed journals and conference proceedings from 2011 to 2021 were searched using the following terms: [“online community” OR “online communities” OR “virtual communities” OR “Virtual community” OR “online forum” OR “community of practice”] AND [“leadership” OR “leader”]. Articles were screened based on a review of titles and abstracts, with researchers reading the full text when needed. To be included for further review, the study must (1) be empirical; (2) examine leadership-related issues in the context of the online community; (3) have an explicitly measured leadership construct; and (4) examine outcomes of leadership. A study was excluded if it: (1) only investigated antecedents of leadership (i.e., no outcomes of leadership); (2) examined leadership in online contexts other than online communities (e.g., virtual teams in organization); (3) only focused on algorithm design for leader identification.

The database search resulted in 754 studies. After removing the duplicates and irrelevant studies, 89 studies remained for further screening. We iteratively applied inclusion and exclusion criteria to further assess eligibility, resulting in 26 articles. After conducting forward and backward searching based on these 26 articles, we have 31 studies in the final article pools.

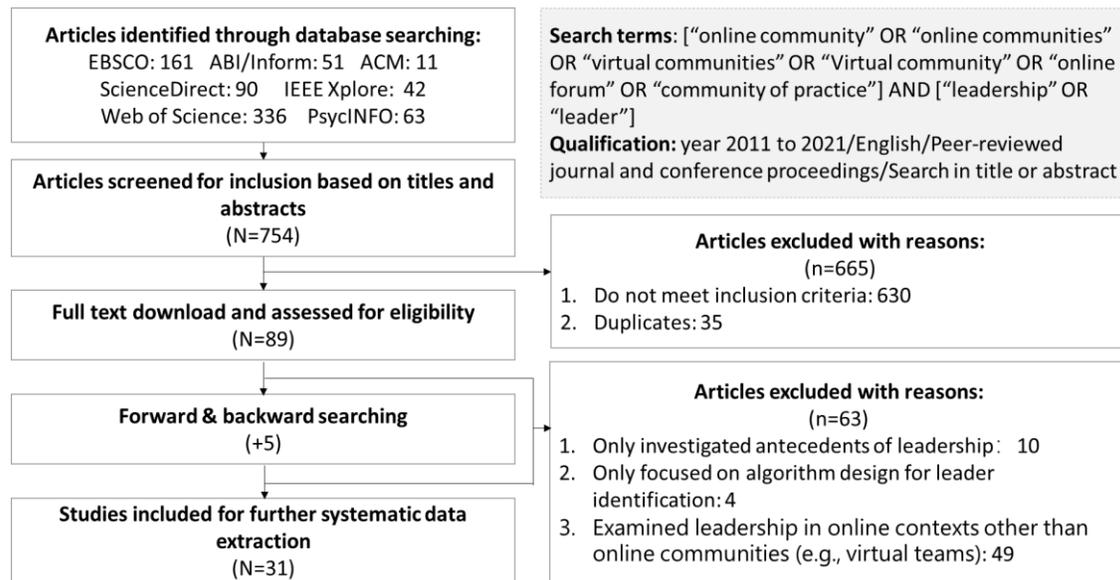


Figure 1. Searching and Screening process

## Profile of Prior Studies

We first describe the profile of included studies to provide contextual information. Table 2 presents publication trends by discipline (IS versus other), online community types, and type of leadership (socio-oriented vs. technical-oriented) under examination in three different periods (i.e., 2011-2014; 2015-2018; 2019-2021). Various online community sites have been studied, and we classify them into three types based on the focus of operation – networking, knowledge exchange, and co-production (Faraj et al., 2016; Gazit & Bronstein, 2021; Kane et al., 2014). The roles of leaders are expected to be different since the types of interactions and tasks vary, as well as the expected outcomes.

In general, research interest in online community leadership has been increasing over the years, particularly in IS discipline. Other dominant areas publishing this topic are organizational behavior and communication outlets. Regarding the type of online communities, most research focuses on online co-production communities in the early time period (i.e., 2011-2014) – such as open source communities and Wikipedia– while research interest has shifted to online knowledge exchange communities (especially StackExchange)

in the more recent time periods. Co-production online communities share several commonalities with traditional organizations, such as the production of software (Nakakoji et al., 2002). As such, leadership conceptualization was often borrowed from traditional organization literature to inform the impacts of leadership in these communities. However, knowledge exchange sites represent a new form of collaboration. The nuances of the phenomenon make traditional leadership theories difficult to apply, triggering significant research interests in recent years. The availability of public data also nurtures the development of empirical investigation in knowledge exchange communities. After categorizing leadership roles and styles into social versus technical categories, we find the majority of the studies take a social approach, and many studies have both social- and technical-oriented leadership concepts in the empirical examination.

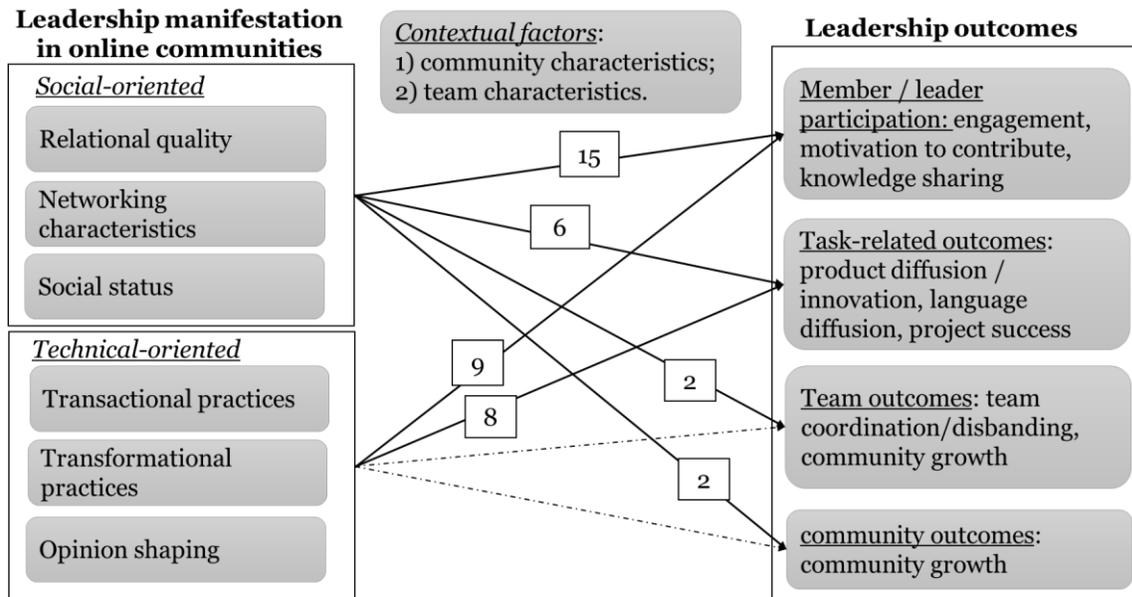
	2011-2014			2015-2018			2019-2021			Total
	IS	Other	Sub-Total	IS	Other	Sub-Total	IS	Other	Sub-Total	
Total	2	4	6	5	8	13	7	5	12	31
<b>Online community types</b>										
Networking	0	0	0	1	3	4	0	2	2	6
Knowledge exchange	0	1	1	2	3	5	4	2	6	12
Co-production	2	3	5	2	2	4	3	1	4	13
<b>Type of leadership included in the examination</b>										
Technical-oriented	1	0	1	0	3	3	0	2	2	6
Socio-oriented	1	1	2	1	5	6	3	2	5	13
Both*	0	3	3	3	1	4	4	1	5	12

\* This category of studies examines the impacts of both socio-oriented and technical-oriented leadership concepts. It does not refer to examining a single leadership concept that incorporates both social and technical elements.

**Table 2. Profile statistics of prior studies on impacts of leadership in online communities**

## Leadership and Outcomes in Online Communities

This section presents our thematic synthesis of leadership manifestations from the socio-technical perspective and the impacts. Key types of leadership manifestations, categories of outcomes, and the relationships are summarized in Figure 2, which represents our integrative framework.



Note: Solid arrows represent relationships examined in the literature, while dotted arrows represent unexamined ones. The box shows the number of studies on the specific relationships.

**Figure 2. An integrative framework of leadership in online communities**

## **What is leadership in online communities**

Leadership has been defined in multiple ways in online community research. In online co-production communities, leaders often have a formal role, such as administrators or project managers. Accordingly, leadership is often defined as the ability of an individual to influence, motivate and enable others to contribute toward the production process and achieve efficiency (Oh et al., 2016; Zhu et al., 2012, 2013). In knowledge exchange communities, leadership is often defined as their recognition by other community members (Faraj et al., 2015), where recognition could originate from a formal leadership position (Liang et al., 2016), reputation scores (Muller, 2006), and their emergent roles (Lee et al., 2019). In networking communities, leadership is often conceptualized as an opinion leader who posts influential information for others to follow (Casaló et al., 2020; Weeks et al., 2017). Taken together, leadership is conceptualized differently depending on the types of online communities, and thus their conceptualization of effectiveness may also differ. However, common mechanisms exist that account for how a leader exerts influence in online communities, such as influencing through opinion-shaping and motivating member participation.

## **Outcomes of leadership**

We synthesized four types of leadership outcomes in online communities that are frequently examined in the existing literature. First, many studies investigated how leaders influence other community *members' participation*, represented by the amount of contribution activities, types of contribution, effort, and motivation to contribute (e.g., Oh et al., 2016; Poell et al., 2016; Zhu et al., 2013). For most online communities that rely on members' voluntary participation, these individual behaviors are critical to the community's survival (Lee et al., 2019), and therefore received the most research attention. Second, for communities with specific tasks such as developing a product in a co-production community, some studies investigated *task-related outcomes*, including development project success (Gadman, 2013), task achievement (Lee et al., 2018), language diffusion (Zhang et al., 2016), and product diffusion (Casaló et al., 2020). Third, many co-production and knowledge exchange communities adopt a team concept, either in a competitive (e.g., crowdsourcing contests) or non-competitive setting (e.g., open-source collaboration). Studies may leverage relevant contextual factors and investigate how leadership influences *team outcomes*, such as coordination (Dahlander & O'Mahony, 2011) and team disbanding (Li et al., 2021). Finally, although relatively rare, some studies investigated *community outcomes*, such as community growth (Antonacci et al., 2017) and retention (Karumur et al., 2018). These outcomes can be seen as an aggregation or compilation of individual member participation. Yet, they are practically significant for community managers to understand how leadership may influence the community as a whole.

## **Socio-oriented leadership and the impacts**

After applying the socio-technical perspective on leadership, we code and categorize the various leadership mechanisms and styles into socio-oriented and technical-oriented. As explained earlier, socio-oriented leadership focuses on networking, relational building, and social interactions in online communities. We have identified three types of socio-oriented leadership manifestations in various online community research.

First, leadership can be captured by an enhanced *relational quality* between the leader and community members, characterized by high levels of mutual trust, obligation, reciprocity, and support from leaders (Chrisentary & Barrett, 2015; Goh & Wasko, 2012; Li et al., 2021; Oh et al., 2016; Panteli & Sivunen, 2019; Wu et al., 2021). Such relational quality reflects how fair a leader treats his/her followers (Li et al., 2021; Oh et al., 2016; Wu et al., 2021), which has been found to positively influence member participation like engagement and knowledge sharing (Chrisentary & Barrett, 2015; Goh & Wasko, 2012; Panteli & Sivunen, 2019). For instance, Oh et al. (2016) found that uniform leader-member exchange (i.e., the development of equal relationship quality with members) is more effective in the early stage of online co-production communities to promote member participation because leaders should focus on enticing diverse interests to promote a collective goal among the members. By contrast, differential leader-member exchange (i.e., developing differential relationship quality with members) becomes more beneficial to promote participation at a later stage of the community to retain the core group of members who are more likely to contribute in an uncertain environment. Another study (Mu et al., 2019) showed that relational quality between members and leaders facilitates open-source project success. Taken together, the relational quality between members and leaders facilitates more support for members, resulting in more member participation and better task outcomes in online knowledge exchange and co-production communities.

Methodologically, the relational quality between leaders and members has been measured through established survey items borrowed from organizational research (Goh & Wasko, 2012) or identified through qualitative analysis (Chrisentary & Barrett, 2015; Panteli & Sivunen, 2019). Simulated experiments have also been adopted to manipulate leadership styles (i.e., Oh et al. 2016; Wu et al. 2021).

Second, leadership can also manifest through *networking*, which positively influences member participation, task performance, and community outcomes (Dong & Götz, 2021; Lee et al., 2019; Poell et al., 2016; Wei & Ko, 2021; Yue et al., 2021). Leaders' networking behaviors like building connections facilitate members' engagement in online networking communities since network connections facilitate communication and bring novel and useful information to the community (Lee et al., 2019). If a leader becomes a broker in the network, she can bring together separated subgroups in the community, facilitating members' contribution to novel ideas (Wei & Ko, 2021). A similar positive impact of leader networking on member participation has been found in the co-production community. Leaders' network size has been shown to influence how well open-source projects address users' needs (Dong & Götz, 2021). Project leaders with more network ties get exposed to more opportunities to know skilled developers in the community so that they can attract more capable contributors to the focal project (Dong & Götz, 2021). Furthermore, leadership rotation can result in community growth because it represents more democratic and distributed participation, which can attract more members to join and contribute to the community (Antonacci et al., 2017).

Methodologically, leaders' networking characteristics are often measured by network positions like centrality and brokerage (Lee et al., 2019), the size of the network (Dong & Götz, 2021), or through content analysis of posting behaviors (Poell et al., 2016). For instance, posting messages were analyzed to understand how community leaders invite members to participate in a social movement (Poell et al., 2016).

Lastly, leadership can manifest through signaling social status and privileges such as a leader title in an online community (Dahlander & O'Mahony, 2011; Liang et al., 2016). On the one hand, obtaining and maintaining social status and privileges motivate leaders to contribute more to the community. In addition, being in the leader position facilitates one's identification with the community, which facilitates more contribution from leaders (Dahlander & O'Mahony, 2011; Liang et al., 2016). For example, being in a leadership position encourages one to participate in controversial topics (Gallus & Bhatia, 2020) since a leader often feels obliged to take on more challenging tasks in online communities. Leaders' participation will further facilitate followers' involvement. On the other hand, social status helps leaders receive more recognition from community members (Xiong et al., 2018), enabling leaders to motivate members' participation. However, there is also contradictory evidence that high-status leaders may suppress others' expression of opinions or expertise, thus hindering the knowledge exchange process and team cohesion (Li et al., 2021). This is particularly found in online knowledge exchange communities where the status difference among medical team members leads to team disbanding, especially in a team with low diversity (Li et al., 2021).

Methodologically, leadership as social status is identified by examining members' titles, such as moderator roles in online knowledge exchange communities (Liang et al., 2016) or administrator roles in online co-production communities (Dahlander & O'Mahony, 2011; Gallus & Bhatia, 2020).

### ***Technical-oriented leadership and impacts***

Technical-oriented leadership focuses on tasks and procedures, often executed through influencing members' information contributions. Three types of technical-oriented leadership manifestation emerged from the literature in various online community settings.

Firstly, leadership can manifest through *transactional practices*. Following organizational leadership research (Bono & Judge, 2004; Howell & Hall-Merenda, 1999), transactional leadership practices include: (1) providing tangible or intangible support and resources to followers to promote performance and efforts (i.e., contingent reward); (2) monitoring performance, setting standards and taking corrective action as necessary (i.e., active exception); and (3) taking responsibilities only when problems become serious (i.e., passive exception). These practices can encourage community members to maximize their expected return from community participation. Standards and directions given to the members can facilitate them to take corrective actions for better performance. Online community leadership research (Li et al., 2012; McEwan & Gutwin, 2017; Shahatha & Ahmad, 2018; Zhu et al., 2013) has found that such transactional leadership effectively motivates members to contribute knowledge in online co-production communities, resulting in

project success (Mu et al., 2019). Transactional leaders set clear standards or rules for members to share knowledge effectively in the knowledge exchange community (Poell et al., 2016). Transactional leaders also provide guidance on obtaining achievement, which has more salient effects on members focusing on achievement-oriented outcomes (Shahatha & Ahmad, 2018). Methodologically, transactional leadership is measured with adapted survey items from organizational leadership research (Li et al., 2012) or through text analysis (Zhu et al. 2013).

Secondly, leadership can manifest through *transformational practices*. Traditional organization research has outlined various transformational leadership practices (Barbuto, 2005; Bono & Judge, 2004). For example, leaders can consider specific demands and needs for each follower and provide individualized care. Leaders can communicate with members with shared excitement about future goals to promote inspiration. Leaders can also encourage members to solve problems in novel and innovative ways through intellectual stimulation (Kearney & Gebert, 2009). Transformational leadership facilitates a positive change in individual members, inspiring members to contribute innovative knowledge or solve problems in a novel way (Becker et al., 2021), which further enhances member performance in online communities. Transformational leadership has been examined in both online co-production (Li et al. 2012) and online knowledge exchange communities (Becker et al. 2021). For instance, transformational leadership facilitates members to challenge their existing beliefs and seek new perspectives in solving problems, thus resulting in high-quality knowledge contribution in co-production communities (Li et al., 2012). Transformational leaders also offer individualized care for members to support their knowledge sharing, which is particularly effective to members with high self-efficacy in knowledge sharing (Shahatha & Ahmad, 2018). Previous research (Becker et al., 2021) also found differentiated impacts regarding three dimensions of transformational leadership. Specifically, leaders' idealized influence enhances members' participation quality and quantity in the online knowledge exchange community, whereas inspiration (i.e., leaders' expression of appealing long-term visions) and intellectual stimulation (i.e., encouraging followers to challenge assumptions and solicit their ideas) mitigate participation quantity (Becker et al. 2021). Leaders who focus on innovative ways of contributing have been found to facilitate exchanging product innovation ideas in the online knowledge exchange community (Wang et al., 2020). Methodologically, transformational leadership is measured with adapted survey items from organizational leadership research (Li et al., 2012) or through text analysis of user posts (Becker et al. 2021).

Finally, leadership can manifest as *opinion-shaping*, which is characterized as a member's frequent and high-profile postings that can influence other members' opinions (Park & Kaye, 2017; Weeks et al., 2017; Zhang et al., 2016). This type of leadership often occurs in online networking communities, such as Facebook groups. For instance, Casalo et al. (2020) showed that opinion-shaping leadership could influence members' intention to participate in brands and product-related discussions in an online community, resulting in effective product diffusion. Zhang et al. (2016) showed that opinion leadership facilitates the diffusion of Internet slang, creating new trends in language use in online networking communities. Methodologically, opinion leadership is often measured with survey data regarding other members' perceived opinion influence from a leader (Casalo et al., 2020) or a platform-approved status based on opinion influence (Zhang et al., 2016).

## **Discussion: Gaps and Avenue for Future Research**

We further identify three gaps that also inform future research. First, various under-investigated concepts and relationships exist in how leadership manifest and the role of leadership in influencing member-level, task-level, team-level, and community-level outcomes. For example, while transactional leadership has been shown effective in online co-production communities, less is known about how it manifests in other types of communities (e.g., online knowledge exchange communities). Similarly, although opinion leadership has been investigated in online networking communities, other types of leadership may occur in this type of community, which deserves further investigation. For instance, developing high relational quality with members in online networking communities may facilitate members' trust toward leaders, enhancing members' willingness to accept leaders' opinions or recommendations. Furthermore, most existing research focuses on member-level leadership outcomes, especially those related to member participation, leaving outcomes at the community level or task level in an under-investigated area.

Second, this review demonstrates that an integrative view of the social and technical perspectives of online leadership is needed in future research. Although online communities are characterized as socio-technical

spaces, existing online leadership studies mostly examined the separated impacts from socio-oriented or technical-oriented leadership without digging into potential synergies. The socio-technical perspective suggests that social systems and technical systems are interrelated and inseparable. In an online community, such interrelatedness can be reflected in the visibility of knowledge contributions through posts (Stohl et al., 2016) – the exposure and diffusion of the posts depend on the technology infrastructure provided by the community and social network boundary of the post writers. Another example is the leaders' reputation recognition. Whereas the community defines the rule for gaining reputation, leaders' central positions in the communication network often help to realize such recognition (Faraj et al., 2015). Although recent research (e.g., Faraj et al. 2015) has taken an integrative perspective to examine the interaction effect between leaders' social structure and their technical contributions, more research is needed to understand potential interaction between different socio- or technical-factors and different patterns of interaction.

Third, there is a lack of understanding regarding the boundary conditions of how and when various types of leadership exert impacts. Although a few moderators have been identified, such as community characteristics, team attributes, and individual motivation (Oh et al., 2016; Li et al., 2021), many relationships remain unexplored regarding their boundary conditions. For example, we have observed some systematic differences based on the types of community, given that the goals of participation are different. Future studies must examine the boundaries of leadership manifestation and impacts so that we can better understand the generalizability of the results and how the theoretical mechanisms can be effectively leveraged in real-life.

In summary, we synthesize literature regarding leadership in online communities and provide insights on leadership conceptualization and manifestation. By differentiating socio-oriented and technical-oriented leadership, we propose an integrative framework to link various leadership manifestations and the corresponding outcomes. While four types of outcomes emerge from our review, existing studies exhibit major interests in member participation, and the other three types of outcomes (i.e., task, team, and community outcomes) are less known. In addition, there is a lack of understanding of the boundary conditions, opening avenues for future research. This review study contributes to online leadership research by offering a holistic view of leadership mechanisms in online communities and identifying emerging research directions. One potential limitation of this paper is that limited database and key words were applied in the search process, and future version of this paper would further increase the sample size to ensure a comprehensive inclusion of relevant papers. Future research could also consider other formats of review (e.g., meta-analyses, theoretical review) to provide more quantitative or theoretical basis regarding research in this area.

## **REFERENCES**

- Antonacci, G., Fronzetti Colladon, A., Stefanini, A., & Gloor, P. (2017). It is rotating leaders who build the swarm: Social network determinants of growth for healthcare virtual communities of practice. *Journal of Knowledge Management*, 21(5), 1218–1239.
- Barbuto, J. (2005). Motivation and Transactional, Charismatic, and Transformational Leadership: A Test of Antecedents. *Journal of Leadership and Organizational Studies*, 11(4), 26–40.
- Becker, L., Coussement, K., Büttgen, M., & Weber, E. (2021). Leadership in innovation communities: The impact of transformational leadership language on member participation. *Journal of Product Innovation Management*, 1–23.
- Bono, J. E., & Judge, T. A. (2004). Personality and Transformational and Transactional Leadership: A Meta-Analysis. *Journal of Applied Psychology*, 89(5), 901–910.
- Casaló, L. v., Flavián, C., & Ibáñez-Sánchez, S. (2020). Influencers on Instagram: Antecedents and consequences of opinion leadership. *Journal of Business Research*, 117, 510–519.
- Chrisentary, J., & Barrett, D. (2015). An Exploration of Leadership in Virtual Communities of Practice. *Management - Journal for Theory and Practice of Management*, 20(77), 25–34.
- Dahlander, L., & O'Mahony, S. (2011). Progressing to the Center: Coordinating Project Work. *Organization Science*, 22(4), 961–979.
- Dong, J. Q., & Götz, S. J. (2021). Project leaders as boundary spanners in open source software development: A resource dependence perspective. *Information Systems Journal*, 31(5), 672–694.

- Ducheneaut, N. (2005). Socialization in an open source software community: A socio-technical analysis. *Computer Supported Cooperative Work: CSCW: An International Journal*, 14(4), 323–368.
- Faraj, S., Jarvenpaa, S. L., & Majchrzak, A. (2011). Knowledge collaboration in online communities. *Organization Science*, 22(5), 1224–1239. <https://doi.org/10.1287/orsc.1100.0614>
- Faraj, S., Kudaravalli, S., & Wasko, M. (2015). Leading collaboration in online communities. *MIS Quarterly*, 39(2), 393–412.
- Faraj, S., von Krogh, G., Monteiro, E., & Lakhani, K. R. (2016). Online Community as Space for Knowledge Flows. *Information Systems Research*, 27(4), 668–684. <https://doi.org/10.1287/isre.2016.0682>
- Gadman, J. L. (2013). Open source leadership: Leading and managing community led programmes to support strategies for next generation broadband implementations across Europe. *International Journal of Organizational Analysis*, 21(4), 528–545.
- Gallus, J., & Bhatia, S. (2020). Gender, power and emotions in the collaborative production of knowledge: A large-scale analysis of Wikipedia editor conversations. *Organizational Behavior and Human Decision Processes*, 160, 115–130.
- Gazit, T., & Bronstein, J. (2021). An exploration of the leadership strategies of Facebook community leaders. *Online Information Review*, 45(1), 99–117.
- Goh, S., & Wasko, M. (2012). The Effects of Leader-Member Exchange on Member Performance in Virtual World Teams. In *Journal of the Association for Information Systems* (Vol. 13).
- Howell, J. M., & Hall-Merenda, K. E. (1999). The ties that bind: The impact of leader-member exchange, transformational and transactional leadership, and distance on predicting follower performance. *Journal of Applied Psychology*, 84(5), 680–694.
- Johnson, S. L., Safadi, H., & Faraj, S. (2015). The emergence of online community leadership. *Information Systems Research*, 26(1), 165–187.
- Kane, G. C., Johnson, J., & Majchrzak, A. (2014). Emergent Life Cycle: The Tension Between Knowledge Change and Knowledge Retention in Open Online Coproduction Communities. *Management Science*, 60(12), 3026–3048.
- Karumur, R. P., Yu, B., Zhu, H., & Konstan, J. A. (2018). Content is king, leadership lags: Effects of prior experience on newcomer retention and productivity in online production groups. *Conference on Human Factors in Computing Systems - Proceedings, 2018-April*.
- Kearney, E., & Gebert, D. (2009). Managing diversity and enhancing team outcomes: the promise of transformational leadership. *J Appl Psychol*, 94(1), 77–89.
- Lee, J. Y. H., Yang, C. S., Hsu, C., & Wang, J. H. (2019). A longitudinal study of leader influence in sustaining an online community. *Information and Management*, 56(2), 306–316.
- Lee, Y. H., Hsieh, Y. C., Hsiao, C., & Lin, C. H. (2018). From virtual worlds to reality: Moderating and mediating mechanisms between online and offline leadership. *Information Technology and People*, 31(2), 557–577. <https://doi.org/10.1108/ITP-05-2017-0156>
- Li, J., Wu, H., Deng, Z., Evans, R., Hong, Z., & Liu, S. (2021). Why online medical teams disband? The role of team diversity and leadership type. *Information Technology & People*, 34(3), 1175–1199.
- Li, Y., Tan, C. H., & Teo, H. H. (2012). Leadership characteristics and developers' motivation in open source software development. *Information and Management*, 49(5), 257–267.
- Liang, C., Chang, C. C., Rothwell, W., & Shu, K. M. (2016). Influences of organizational culture on knowledge sharing in an online virtual community: Interactive effects of trust, communication and leadership. *Journal of Organizational and End User Computing*, 28(4), 15–32.
- Lu, Y., Jerath, K., & Singh, P. V. (2013). The emergence of opinion leaders in a networked online community: A dyadic model with time dynamics and a heuristic for fast estimation. *Management Science*, 59(8), 1783–1799.
- Martins, A., Ah Pak, D., & Martins, I. (2013). Communication and Leadership – Dialectical Tensions in Virtual Communities of Practice. *Management - Journal for Theory and Practice of Management*, 18(68), 23–30.
- McEwan, G., & Gutwin, C. (2017). A Case Study of How a Reduction in Explicit Leadership Changed an Online Game Community. *Computer Supported Cooperative Work: CSCW: An International Journal*, 26(4–6), 873–925.
- Mu, W., Bian, Y., & Zhao, J. L. (2019). The role of online leadership in open collaborative innovation: Evidence from blockchain open source projects. *Industrial Management and Data Systems*, 119(9), 1969–1987.
- Muller, P. (2006). Reputation, trust and the dynamics of leadership in communities of practice. *Journal of Management and Governance*, 10(4), 381–400.

- Nakakoji, K., Yamamoto, Y., Nishinaka, Y., Kishida, K., & Ye, Y. (2002). Evolution Patterns of Open-Source Software Systems and Communities. *International Workshop on Principles of Software Evolution (IWPSE), January*, 76–85.
- Oh, W., Moon, J. Y., Hahn, J., & Kim, T. (2016). Leader Influence on sustained participation in online collaborative work communities: A simulation-based approach. *Information Systems Research*, 27(2), 383–402.
- Panteli, N., & Sivunen, A. (2019). “I Am Your Fan; Bookmarked!” Members’ Identification Development in Founder-Led Online Communities. *Journal of the Association for Information Systems*, 20(6), 824–841.
- Park, C. S., & Kaye, B. K. (2017). The tweet goes on: Interconnection of Twitter opinion leadership, network size, and civic engagement. *Computers in Human Behavior*, 69, 174–180.
- Poell, T., Abdulla, R., Rieder, B., Woltering, R., & Zack, L. (2016). Protest leadership in the age of social media. *Information Communication and Society*, 19(7), 994–1014.
- Ren, Y., Kraut, R., & Kiesler, S. (2007). Applying common identity and bond theory to design of online communities. *Organization Studies*, 28(3), 377–408.
- Ren, Y., Harper, F. M., Drenner, S., Terveen, L., Kiesler, S., Riedl, J., & Kraut, R. E. (2012). Building Member Attachment in Online Communities: Applying Theories of Group Identity and Interpersonal Bonds. *MIS Quarterly*, 36(3), 841–864.
- Shahatha, F. F., & Ahmad, A. (2018). The Moderating Effect of Virtual Leadership Behaviors towards Knowledge Sharing in Online Programming Communities. *Journal of Information System and Technology Management*, 3(7), 97–112.
- Sherony, K. M., & Green, S. G. (2002). Coworker exchange: Relationships between coworkers, leader-member exchange, and work attitudes. *Journal of Applied Psychology*, 87(3), 542–548.
- Stohl, C., Stohl, M., & Leonardi, P. M. (2016). Managing opacity: Information visibility and the paradox of transparency in the digital age. *International Journal of Communication*, 10(1), 123–137.
- Tabernerero, C., Chambel, M. J., Curral, L., & Arana, J. M. (2009). The role of task-oriented versus relationship-oriented leadership on normative contract and group performance. *Social Behavior and Personality*, 37(10), 1391–1404.
- Wang, Y., Li, C., Zhang, D., Wu, J., & Liu, Y. (2020). A deeper investigation of different types of core users and their contributions for sustainable innovation in a company-hosted online co-creation community. *Journal of Cleaner Production*, 256.
- Weeks, B. E., Ardèvol-Abreu, A., & de Zúñiga, H. G. (2017). Online influence? Social media use, opinion leadership, and political persuasion. *International Journal of Public Opinion Research*, 29(2), 214–239.
- Wei, X., & Ko, I. (2021). Virtual Leadership Matters: Capturing its Role in Facilitating Knowledge Sharing in Virtual Learning Environment. *54rd Hawaii International Conference on System Sciences (HICCS), Online, January 5-8*.
- Wu, C.-H., Wu, W., Ma, S., Su, Y., & Tsai, S.-B. (2021). Organisational leadership style, network structure, and knowledge performance in online knowledge community organisations. *Enterprise Information Systems*, 15(6), 868–887.
- Xiong, Y., Cheng, Z., Liang, E., & Wu, Y. (2018). Accumulation mechanism of opinion leaders’ social interaction ties in virtual communities: Empirical evidence from China. *Computers in Human Behavior*, 82, 81–93.
- Yue, C. A., Qin, Y. S., Vielledent, M., Men, L. R., & Zhou, A. (2021). Leadership going social: How U.S. nonprofit executives engage publics on Twitter. *Telematics and Informatics*, 65.
- Yukl, G. A. (2006). *Leadership in Organizations (6th ed.)*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Zhang, L., Zhao, J., & Xu, K. (2016). Who creates Trends in Online Social Media: The Crowd or Opinion Leaders? *Journal of Computer-Mediated Communication*, 21(1), 1–16.
- Zhu, H., Kraut, R. E., & Kittur, A. (2013). Effectiveness of shared leadership in Wikipedia. *Human Factors*, 55(6), 1021–1043.
- Zhu, H., Kraut, R., & Kittur, A. (2012). Effectiveness of shared leadership in online communities. *Proc. ACM 2012 Conf. Comput. Supported Cooperative Work (ACM, New York)*, 407–416.