

Performance Enhancement in Green Construction Project Teams: Building a Case for Shared Transformational Leadership

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Green, or sustainable, construction projects have made their place in the industry and are growing exponentially. Green construction projects have distinct characteristics and are perceived more complicated as compared to their traditional counterparts. The unique nature of these projects requires project teams to have higher integration to achieve optimal performance. While addressing this requirement, the Architecture Engineering and Construction (AEC) literature usually proposes solutions related to the project delivery methods and their characteristics. This study explores the potential of a new dimension - shared transformational leadership - in the performance enhancement of green construction project teams. Transformational leadership is one of the most extensively researched theories in the contemporary literature. Transformational leaders act as role models for their team members, provide them with individual attention and care, cater to their needs, and provide team members with opportunities to contribute intellectually. Also, many modern leadership experts support the idea of shared leadership against singular team leader concept. Shared leadership means that there can be multiple leaders in team regardless of their authority and position. This study builds a case in favor of shared transformational leadership in green construction project teams through a comprehensive discussion.

Keywords: Green construction; project teams; transformational leadership

Introduction

Buildings utilize large amounts of energy and are responsible for a large percentage of harmful emissions. In the United States, buildings account for 39% of the total energy utilization and 72% of electricity consumption (EIA, 2018). Buildings are also responsible for a significant amount (11% according to EPA, 2018) of greenhouse gas emissions. The sources include burning fossil fuels, creating waste, and using certain building materials. The world's resources are diminishing while the negative effects of climate change are increasing. Awareness regarding these global issues has highlighted the importance of more sustainable, energy efficient, and environmental-friendly buildings.

Green construction is alternatively known as green building, sustainable building, and sustainable construction (Darko, 2016). Green construction aims at increasing the building's performance in terms of energy, environment, health, economy, and productivity through improved design, construction, and operation processes (USGBC, 2003). A lot of research has been dedicated to the comparison between green and conventional construction, and there is a consensus that green construction performs superior in life cycle costs, thermal comfort, productivity, health, and indoor air quality (Zuo and Zhao, 2014). Green construction is already a significant part of the construction industry and is estimated to grow exponentially in future (Dodge Data and Analytics, 2016).

Green construction projects have sustainability goals that make them more complex to deal with in comparison to their traditional counterparts (Magent, 2009; Myers, 2008). Additional scope, extra protocols, high-tech equipment, new roles and responsibilities, and requirements for specialized professionals, all add up to make green construction

projects difficult to deal with (Rohracher, 2001; France, 2007; Widjaja, 2016). Such conditions demand teams to work together in collaboration for combined decision-making and creative thinking. Green construction literature has traditionally focused on delivery methods as a source of team integration (Mollaoglu-Korkmaz et al., 2013). As such, the human factors have been denied at large. This study is aimed at bringing a new side to the model and propose a link between an esteemed area of leadership called Transformational Leadership theory and the challenging green construction projects.

Unique Characteristics of Green Construction Projects

A number of unique characteristics for green construction projects exist that add complexity. (1) In green construction, the environment becomes one of the de facto stakeholders. Just like the owner's requirements, the needs and requirements of environment are also considered while defining objectives and detailing the project. New priorities surface, and activities like life cycle cost analysis and energy modelling become more significant. Design requires more details and iterations. Construction includes extra processes, such as waste management (Horman et al., 2006). (2) The scope of a green construction projects is usually larger in comparison to the conventional counterparts. Also, non-traditional material and equipment are involved, which are comparatively expensive. Consequently, green construction projects take longer to complete and cost more (Kim et al., 2014). However, a counter argument exists with the proponents of integrated design, who believe that green construction costs less if sustainability is introduced early in the project design (7 Group et al., 2009). (3) Sustainability goals make green construction projects more complicated (Magent, 2009). The equipment may include photovoltaics, smart building technologies, intricate mechanical devices, and other high-tech components through rare and specialized vendors (Rohracher, 2001). Specialized equipment also requires specialized professionals, which are scarce (Hoffmann & Henn, 2008). Sustainability goals also add the requirement of extra documentation (France, 2007). (4) In addition to the conventional roles such as owner, designer and contractor, green construction projects have new and specialized roles on the team. Some possible examples include sustainability/LEED consultant, energy modeler, commissioning agent, and energy service companies (Widjaja, 2016). (5) Rules and regulations regarding green buildings may vary from state to state. For example, all state-funded projects in California are required to obtain LEED Silver certification (DuBose et al., 2007).

Green construction projects face cost and schedule overruns similar to traditional construction (Darko et al., 2017; Shapiro, 2016; Shi et al., 2016), but these unique characteristics also create some additional barriers for project performance. The studies comparing the performances of conventional and green building projects reveal that green construction projects are more likely to get delayed (Hwang et al., 2015) and have more cost growth on average (Hwang et al., 2017).

Leadership in Green Construction Project Teams

Team integration is highlighted in the literature as one of the key project delivery elements for optimized performance in green construction (Widjaja, 2016; Magent et al., 2009; Korkmaz et al., 2010). The construction industry has approached integration mainly through delivery methods (e.g., design-build, which reduces the number of parties the owner needs to interact with) and practices (e.g., appropriate organizational structures supported by communication tools and technologies). The side of project delivery that relates to individuals' characteristics remains mostly neglected (Baiden et al., 2003). The human factors, such as leadership and team culture, are equally important in building team integration, and need to be explored (Baiden et al., 2003; Wu & Low, 2010). This is where leadership comes in.

Leaders, by definition, are the individuals in a team who train and facilitate their (one or more) followers to focus towards the organizational goals (Winston & Patterson, 2006). Ofori-Boadu et al. (2012) highlighted the requirements of leadership in green construction. In a review of management practices for LEED projects, the authors identified the need to inspire the team members for the project's vision and direct them towards

sustainability goals. The authors advocated for excellent leadership skills in team managers to achieve this goal (Ofori-Boadu et al., 2012). Leadership skills are known to positively impact integration and create a climate of creativity and innovation in teams (Zaccaro, 2001; Sarros et al., 2008). Leadership is a vast concept, and there are many theories defining different versions of it (Rost, 1993). For complex and non-conventional projects like green construction, transformational leadership has been recommended (Muller & Turner, 2010).

Shared Transformational Leadership

Transformational Leadership Theory

Transformational leadership is the most prominent and highly regarded approaches for leadership in the current era (Ronald, 2014). The spirit of transformational leadership lies in inspiring the subordinates through charisma and transforming them. Bass (1985), the founder of the theory, identified four I's in relation to transformational leadership:

Idealized influence refers to the leader becoming a full-fledged role model, acting out and displaying ideal traits of honesty, trust, enthusiasm, pride, and so forth.

Inspirational motivation by a leader means giving meaning to a task. This usually involves providing a vision or goal. The group is given a reason or purpose to do a task or even be in the organization. The leader will resort to charismatic approaches in exhorting the group to go forward.

Leadership behaviors related to idealized influence and inspirational motivation include creating pride in the followers for being linked with the leader or team, encouraging the followers to go beyond their personal interests in favor of the group cause, assuring that the problems will be solved, expressing optimism regarding the future, and sharing vision in a compelling manner.

Intellectual stimulation is provided by a leader in terms of challenge to the prevailing order, task, and individual. The leader seeks ideas from the group and encourages members to contribute, learn, and be independent. The leader often becomes a teacher. Some of the behaviors related to intellectual stimulation include asking for input from followers while making decisions, making the followers comfortable to disagree, and encouraging them to think critically.

Individualized consideration provides an emphasis on what a specific group member needs. The leader acts as a role model, mentor, facilitator, or teacher to bring a follower into the group and be motivated to do tasks. Some of the behaviors related to individualized consideration include spending time and effort in coaching or training, listening attentively to the followers, and taking care of their individual concerns or requirements.

Individual versus Shared Leadership

Recently, the literature has seen a surge of studies on shared leadership, advocating it as a better approach when compared to the traditional concept of a single team leader (Contractor et al., 2012). The traditional leadership focusses on the individuality of a leader, which is not the true representation of leadership in teams. Thus, an expanded unit of analysis is more suitable for both researchers and practitioners (Gronn, 2002). New leadership forms have emerged, which recognize leadership as a shared process in the team. These forms are referred to as "shared", "collective", or "distributed" leadership interchangeably (Avolio et al., 2009).

There are different approaches that researchers have used for shared leadership in teams. D'Innocenzo et al. (2016) listed three theoretically distinct forms in their meta-analysis: (1) aggregation, which is a collective leadership of a complete team as a unit; (2) density, which is a dyadic network of links between team members; and (3) centralization, which is a distributed form of leadership where many formally appointed and emergent leaders can co-exist. The network-based approaches have received better evaluations in terms of effect sizes.

Distributed leadership, as used by Mehra et al. (2006), is a centralization approach. It considers that a team does not necessarily have a single leader; there can be several formally appointed leaders (such as project managers/supervisors) and emergent leaders (team members without any formal authority) in a team. Distributed leadership does not necessarily ensure better group or team performance, unless there is a coordination between the formal and emergent leaders, i.e., they acknowledge each other's leadership skills as shown in Figure 1.

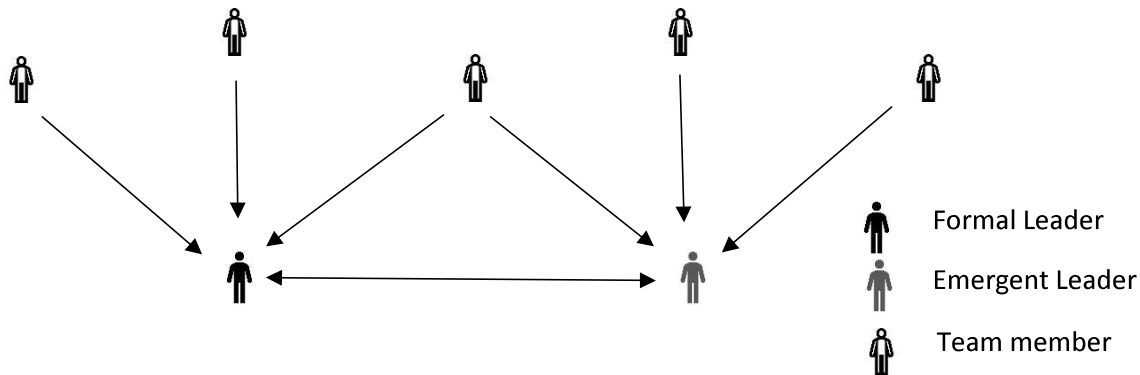


Figure 1: Distributed leadership example. The arrows are directed from followers towards leaders (adopted from Mehra et al., 2006)

Shared Transformational Leadership for Green Construction Project Teams

To exploit the advantages offered by transformational leadership, it is important to study its dynamics in green construction project teams. The main question in this regard is as follows: *Who are the transformational leaders of sustainability in construction projects?* The literature hints for various parties in green construction teams who may show transformational leadership skills.

An owner or client has been categorized as the single most important stakeholder to determine a sustainable construction approach for the project (Pitt et al., 2009). Owners are the driving force behind the success of green construction projects. Their commitment, or dedication to implement the sustainability features, is translated into the achievement of green project goals (Korkmaz et al., 2010; Beheiry, 2006). The type of owners and their motivation behind going green is important in this regard (Korkmaz et al., 2011). The owners can be looking for energy efficiency for long term savings, better indoor air and light quality for improved productivity, passion for the environment, or marketing. Highly committed owners introduce sustainability early in the process (Korkmaz et al., 2011).

Architects are considered the second most important stakeholders after owners for implementation of sustainability in construction projects (Pitt et al., 2009). The construction industry is more fragmented than ever. This calls for architects to be proactive and expand their scope of work to include collaboration and integration (Burr and Jones, 2010). Architects of today are required to help devise a vision with the owner (idealized influence), communicate extensively with the contractor (individual consideration), and include his or her skills during the design process (intellectual stimulation) (Burr and Jones, 2010).

A contractor's input has been highlighted as not only valuable, but also critical in the green building literature (Riley et al., 2003). Sharing values (idealized influence), imaging exciting possibilities and inspiring (inspirational motivation), and seeking out innovative ways to change and grow (intellectual stimulation) are some of the traits of highly successful construction project managers. Successful contractors do not rely on mandating sustainability on their workforce and try to inspire them (inspirational motivation) so that their workforce works with passion and desire (Slowey, 2017).

For construction project teams to be effective, more leadership roles are encouraged at the team level (Toor, 2011). Especially for green construction projects with all their unique requirements, sharing of leadership is highly recommended (Senaratne and Hewamanage, 2015). This brings up another important question: *What are the factors that help facilitate the sharing of transformational leadership in green construction teams?*

One of the major factors is the structure of teams. For traditional project teams, such as those that work under the design-bid-build arrangement with strong organizational boundaries (Widjaja, 2016) and sequential processes, leadership roles are confined to those stakeholders that are involved early on in the delivery process (e.g., owner and architect). On the other hand, in collaborative teams, such as those that work under an Integrated Project Delivery (IPD) contract and share project risks, the leadership role is more likely to get shared across team members spanning to many other project parties (e.g., owner, architect/designer, contractor, subcontractors, and major suppliers).

Non-contractual collaborative practices, such as partnering and lean construction, also play a role in shaping transformational leadership. Partnering process facilitates the leaders to share vision and develop project goals together with fellow team members (Manley, 2002) promoting *inspirational motivation* and *intellectual stimulation*. Similarly, lean construction promotes empowerment of team members to innovate their work for improved performance. One of the systems developed by the proponents of lean construction - Last Planner System (LPS) - uses the pull planning principle to actively involve all team members in collaborating and committing to short term goals (Ballard and Howell, 1994). The process nurtures an environment of idea generation (*intellectual stimulation*), while considering the concerns of all parties (*individual consideration*).

Another factor, which is fast growing in construction industry, is Building Information Modeling (BIM). BIM creates an accurate model of the building in virtual environment, which can be used to significantly improve the *intellectual stimulation* part of transformational leadership. Information models help teams to better visualize and more profoundly analyze the available options, resulting in innovative solutions (Azhar, 2011). Availability of such models can help the transformational leaders to encourage more critical thinking in teams.

Recommendations for Future Research

The previous sections have discussed transformational leadership and its relevance to green construction projects. This section presents direction for future research at both individual and team levels for project teams.

Individual level investigations can focus on the transformational leadership received from one or more leaders in the team by an individual, and its impact on his/her performance. Transformational leadership is known to develop individual skills and creativity, leading to performance enhancement (Dong et al., 2017). The mediation of various variables can lead to valuable findings. Other potential mediating factors discussed in the literature include trust, mental model development, commitment, empowerment, and communication (Dionne et al., 2004).

At team level, transformational leadership in green construction can be studied via social network analysis (SNA). Shared leadership can not only be visualized, but also be better analyzed and explained through SNA (Mayo et al., 2003). SNA forms graphical representation of team organization – also known as Sociograms – using nodes linked with the help of arrows (Borgattiet al., 2002). In the context of this article, nodes will represent individual team members, while the arrows will link transformational leaders to their followers. A conceptual diagram of such sociogram is shown in Figure 2. Team level investigations in this context via SNA can explore transformational leaders in green construction project teams, the factors that define leadership networks, relationship between network characteristics (such as density and centrality) and team performance; and demonstrate how leadership networks change overtime during project delivery.

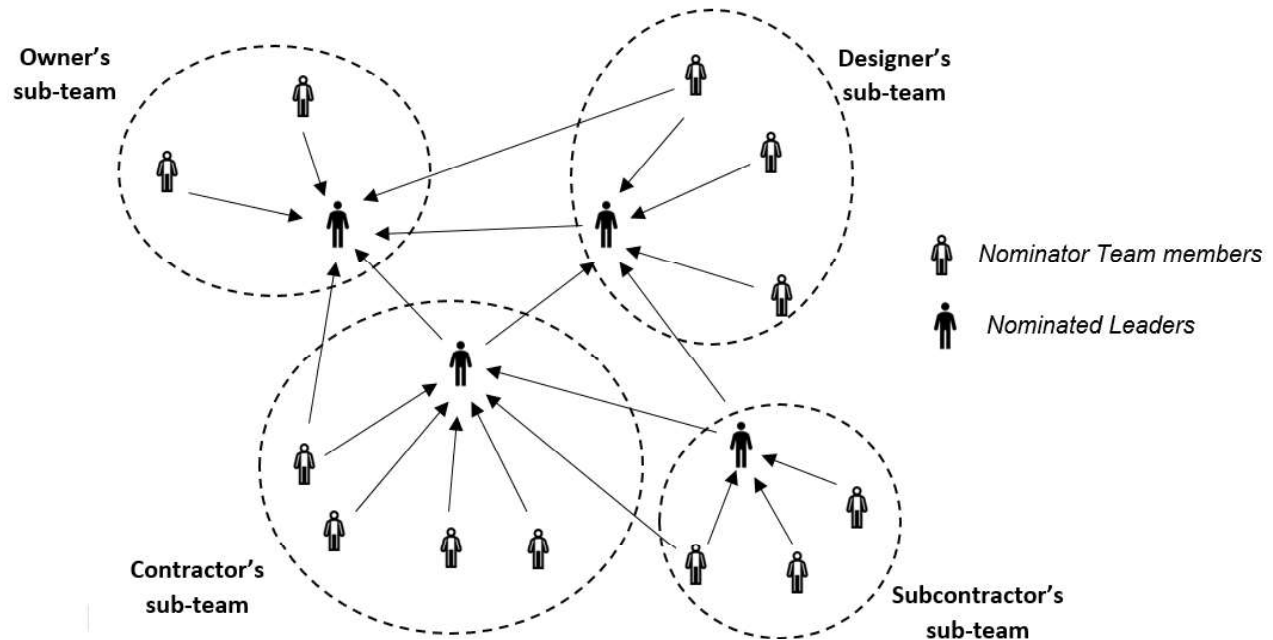


Figure 2: Conceptual network diagram for transformational leadership in a project team

Conclusion

The paper aimed to explore shared transformational leadership and its potential in improving green construction project teams and outcomes. The paper first discussed the unique nature of green construction projects and the need for collaboration, integration, and innovation in these project teams. In relation to these concepts, the paper discussed leadership literature and its implications focusing on shared transformational leadership. Finally, the needs to explore transformational leadership for green construction, types and domains of such leaders in construction, and the potential factors that can help facilitate shared transformational leadership in green construction teams were discussed.

Construction management literature has long neglected the human factors in improving organizational and project performance and focused majorly on technology and processes. This paper applies a new stream of research from leadership literature to green construction. Future research can further explore this area by identifying the structure and flow of transformational leaderships in project teams via network methodologies. Empirical investigations can also greatly benefit the impact assessment of transformational leadership on various team and project performance indicators.

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