Tabassum, M., Raziq, M. M., Allen, M. M. C., Sarwar, N., and Golra, O. A. (2024), Exploring Emergent Leadership in Agile Teams: Network Dynamics, Roles, and Skills at the Individual Level, *Business Process Management Journal*.

**Exploring Emergent Leadership in Agile Teams: Network Dynamics, Roles, and Skills at the Individual Level**


## Abstract

**Purpose:** Leadership research has traditionally focused on formal leadership; however, leaders may emerge in informal settings in self-managed teams, and little is known about who emergent leaders are and what their characteristics are. Drawing on a multi-method approach, the study investigates emergent leaders' behaviors, roles, skills, and leadership styles.

**Method:** We first identify emergent leaders using social network analysis (SNA) and aggregation approaches. Second, we investigate emergent leaders' characteristics using interviews with forty agile team members in five organizations.

**Findings:** Results indicate different roles of emergent leaders (i.e., coach, liaisons), leadership styles (i.e., supportive), skills (i.e., culturally intelligent, strategist), and influencing factors (i.e., personality, technical knowledge, social circle).

**Originality:** We contribute by identifying emergent leaders through multiple identification methods (i.e., network analysis, aggregation), and then through identifying their various characteristics, we contribute to leadership literature as well as idiosyncrasy-credit theory. We also add to agile-leadership theory, showing that multiple informal leaders may emerge within agile teams. Finally, our findings have practical implications for self-managed teams, informal group settings, organizational change professionals, and organizations with horizontal structures.



**Keywords:** Emergent leadership, Agile software teams, social network analysis, Aggregation

# Exploring Emergent Leadership in Agile Teams: Network Dynamics, Roles, and Skills at the Individual Level

## 1) Introduction

Organizational leadership studies typically focus on vertical top-down leadership, in which leaders have legitimate, formal organizational authority. As organizational structures have become more varied, research has recently begun to emphasize the emergence of informal leaders without any formal power in a flattening team structure, such as agile teams (Przybilla, Wiesche, & Krcmar, 2019), captured by the term horizontal or emergent leadership (Tabassum, Raziq, & Sarwar, 2023). Agile teams often work on complex tasks, for which a traditional top-down approach is not appropriate (Cox, Madison, & Eva, 2022). In such teams, one member may, in certain contexts, gain more influence (Hanna, Smith, Kirkman, & Griffin, 2021) over the rest of the team than leadership (Acton, Foti, Lord, & Gladfelter, 2019).

Agile teams (Przybilla et al., 2019), provide an ideal context for assessing emergent leadership (Hanna et al., 2021); they are fluid and adaptive, enabling rapid responses to changes, and the continuous monitoring of plans, requirements, and results (Dingsøyr, Falessi, & Power, 2019). Agile teams are groups of interdependent team members who share responsibility for the project's outcomes (Renkema, Bos-Nehles, & Meijerink, 2020) and self-manage their performance (Kalliamvakou et al., 2017). Some of the key traits of agile teams are constant feedback, collective effort, full team involvement, awareness, commitment (Whitworth & Biddle, 2007), and self-management (Moe, Dingsøyr, & Dybå, 2009; Schatz & Abdelshafi, 2005).

Existing studies identify several gaps vis-à-vis emergent leadership. First, the mechanisms that foster emergent leadership are not clearly understood (Hanna et al., 2021).

Second, methods to identify emergent leaders are inconsistent (Tabassum et al., 2023). Third, existing research does not adequately identify the roles, leadership styles, and other factors that shape the development of emergent leaders (Barrick, Thurgood, Smith, & Courtright, 2015; Carnabuci, Emery, & Brinberg, 2018; Tabassum et al., 2023). Lastly, there have been many calls to study agile leadership (Modi & Strode, 2020), but few have been addressed. These motivate the following research questions: (1) How can we identify agile emergent leaders accurately? (2) What behaviors, roles, skills, and leadership styles do emergent agile leaders exhibit in agile software development teams?

The research intends to explore the roles, leadership styles, behaviors, and factors that influence the emergence of emergent leaders in agile teams. Similarly, Cox et al. (2022) found that 64% of empirical studies used student samples, with quasi-experiments (28% of 248 articles) and laboratory experiments (21% of 248 articles), rendering the generalization of findings to working groups difficult. Hence, we have conducted a qualitative study in the IT industry to have more generalizable findings.

We make multiple contributions. First, a key highlight of our study is exploring the roles, leadership styles, network behaviors, and factors contributing to the emergence of emergent leaders. Second, our work is the first to provide methodological triangulation by using multiple methods (network and aggregation approaches) to identify emergent leaders. Through triangulation, we increase the validity and credibility of emergent leaders' identification while reducing the presence of any research biases. Third, existing research that applies a network technique to identify emergent leaders is based on a voting procedure (Gerpott, Lehmann-Willenbrock, Silvis, & Van Vugt, 2018; Lynn Shollen & Cryss Brunner, 2016; Truninger,

Ruderman, Clerkin, Fernandez, & Cancro, 2021), in which the individual with the most votes becomes the leader (Gerpott et al., 2018; Kalish & Luria, 2021; Lynn Shollen & Cryss Brunner, 2016; MacLaren et al., 2020; Truninger et al., 2021; Wolff, Pescosolido, & Druskat, 2002). However, we do not limit the network approach to voting purposes only; rather, we use it in more detail to capture the behaviors of emergent leaders in the team network. Because we have teams ranging in size from 4 to 11 members, performing a detailed network analysis manually would be difficult, especially for larger teams. Therefore, we employed UCINet software for in-depth network analysis.

Research on agile team leadership describes an agile leader as a fellow team member (Manz & Sims Jr, 1987) as agile teams have no formal leaders (Hoda, Noble, & Marshall, 2012). Furthermore, there is limited knowledge on how agile teams self-organize in practice (Przybilla, Präg, Wiesche, & Krcmar, 2020), hence, agile leadership research requires further empirical scrutiny (Modi & Strode, 2020). We contribute as our study provides empirical evidence on emergent leadership in agile teams. We proceed by presenting our findings through various models, which are followed by our study's limitations, implications, future directions and conclusions.

## 2) Literature Review

### 2.1) Emergent Leadership

Emergent leadership is a developing concept that highlights how leadership can arise dynamically and organically within a group; individuals become emergent leaders by gaining legitimate influence in the perceptions of others (Acton et al., 2019). Typically, teams with emergent leadership perform

better and have more support for results as compared to traditional teams. Hanna et al. (2021) identify three characteristics of emergent leadership: unit of analysis, lateral influence, and temporal duration. The unit of analysis for emergent leadership is an individual because lateral influence begins with an individual team member (Kickul & Neuman, 2000; Kolb, 1999). Walter, Cole, van der Vegt, Rubin, and Bommer (2012, p. 977) indicate that emergent leadership is a micro-level phenomenon in an organization; therefore, a team can have more than one informal emergent leader (Tabassum et al., 2023). Lateral influence means being perceived by others as having leadership qualities (Lanaj & Hollenbeck, 2015). Temporal duration implies that informal leaders could appear in a team for an indefinite period (Wolff et al., 2002).

## 2.2) Theory of Idiosyncrasy Credit

We study emergent leadership following the theory of idiosyncrasy credit. The theory of idiosyncrasy credit suggests that individuals earn credits when they meet group expectations, and lose credits when they fail to meet group expectations (Edwin P Hollander, 2006; Tariq, Abrar, & Ahmad, 2023). As emergent leadership is related to leadership perception, idiosyncrasy credit, which implies that group members regard an individual as an emergent leader because he/she fulfills their expectations, is an appropriate theory to understand the phenomenon (Gardner, Hanna, Noghani, & Cogliser, 2024). The model of idiosyncrasy credit draws on the understanding that leadership is a result of shared interpersonal views (Aftab, Sarwar, Kiran, Abid, & Ahmad, 2023; E. P. Hollander, 2006; Hollander, 2008). The process of becoming a leader in a specific group stem from interaction. It is marked by an appraisal of individual group members' different contributions, with positive (negative) contributions resulting in a higher (lower) status and position for an individual. An individual is believed to gain more credit as he/she meets the team's

expectations. Conversely, leaders may also lose credit if they cannot innovate and/or fulfill the team's expectations.

*2.3) Operationalizing Emergent Leaders*

Tabassum et al. (2023) describe different approaches to operationalizing emergent leaders in self-managed teams. These approaches are (1) the socio-metric approach; (2) audio-video coding; (3) the aggregation approach; and (4) the social-network approach. In the socio-metric method, each member is asked to rank other group members they would most want to lead (Yoo & Alavi, 2004). Audio-video coding identifies emergent leaders based on non-verbal cues (Sanchez-Cortes, Aran, Mast, & Gatica-Perez, 2010), audio-visual data (Beyan, Katsageorgiou, & Murino, 2019), and interaction coding (Schlamp, Gerpott, & Voelpel, 2020).

In the aggregation approach, researchers use a questionnaire with a series of semantic differential items or Likert-type scales to assess how team members view leadership (Tabassum et al., 2023). In social network analysis, emergent leaders are identified through a voting procedure in which the leader is the individual who receives the most votes (Gerpott et al., 2018; Kalish & Luria, 2021; Lynn Shollen & Cryss Brunner, 2016; MacLaren et al., 2020; Truninger et al., 2021; Wolff et al., 2002). A single-item scale is typically employed in social-network research (Kalish & Luria, 2021). Different researchers used this technique to calculate between-ness and degree centrality scores to identify emergent leaders (Reding et al., 2016; Wellman et al., 2019). A member's degree metric is the number of specific links that are associated with him/her, the greater the number of specific links, the higher the degree metric. The between-ness centrality metric of a member evaluates the extent to which he/she is a channel between two disconnected nodes: the more a member functions as a conduit, the greater that actor's between-ness centrality.

Research indicates that the identification of emergent leaders is inconsistent (Hanna et al., 2021). While some studies use very broad metrics, others focus on various subsets of behaviors. Some have construct validity issues, and some rely solely on a voting approach. Some studies limit the identification of emergent leaders to one person per team (Hawkins, 1995), while a team can have multiple emergent leaders (Hanna et al., 2021).

## 2.4) Integrative framework for emergent leadership

Most of the research focuses on emergent leaders' traits. Some research assesses task-relevant skills. Fewer studies have focused on behaviors, particularly those related to self-attribute. Relatedly, existing studies offer limited insights into emergent leaders' network behaviors, while emergent leaders emerge within team networks. Little is known about the roles emergent leaders play or the leadership styles they use. Consequently, while literature consistently focuses on the fact that emergent leaders develop in teams as a result of their influence (Hanna et al., 2021; Tabassum et al., 2023), it does not discuss how they can exert their influence on teams through their behavior or use of networks.

We identify several individual-level aspects/themes based on which the emergent leadership literature has evolved. We categorize these aspects/themes as traits, behaviors, skills, and demographics and discuss their overall relevance to emergent leadership.

### *2.4.1) Emergent Leaders' Traits*

Research related to individual-level traits includes the big five personality characteristics, such as openness to experience, conscientiousness (Taggar, Hackew, & Saha, 1999), agreeableness

(Cogliser, Gardner, Gavin, & Broberg, 2012), extraversion (Ensari, Riggio, Christian, & Carslaw, 2011; Spark, Stansmore, & O'Connor, 2018; Taggar et al., 1999), as well as cognitive ability (Kickul & Neuman, 2000) and emotional intelligence (Côté, Lopes, Salovey, & Miners, 2010; Hong, Catano, & Liao, 2011). Other traits include emotion recognition (Walter et al., 2012), emotional stability (Li, Chun, Ashkanasy, & Ahlstrom, 2012), creativity (Ensari et al., 2011; Guastello, 1995), authoritarian (Ensari et al., 2011), motivation (Crockett, 1955), empathy (Wolff et al., 2002) as positively related to emergent leadership.

*2.4.2) Emergent Leaders' Behaviors*

Individual-level behavioral patterns include self-monitoring (Dobbins, Long, Dedrick, & Clemons, 1990; Garland & Beard, 1979), self-concept (Emery, Daniloski, & Hamby, 2011), self-efficacy (Kwok, Hanig, Brown, & Shen, 2018), advice-seeking behaviors (Druskat & Pescosolido, 2006), motivation to lead (Hong et al., 2011), respective behavior (Briker, Hohmann, Walter, Lam, & Zhang, 2021) and self-esteem (Andrews, 1984; Ellis, Adamson, Deszca, & Cawsey, 1988), and all these are positively associated with emergent leadership.

*2.4.3) Emergent Leaders' Skills*

Individual skills, including task-oriented, change-oriented, and relation-oriented communication (Gerpott, Lehmann-Willenbrock, Voelpel, & Van Vugt, 2019), ‘speaking up promotively’ (McClean, Martin, Emich, & Woodruff, 2018), effective communication (Ziek & Smulowitz, 2014), task competence (Bunyi & Andrews, 1985), task ability (De Souza & Klein, 1995), task coordination (Walter et al., 2012), perceived competence (Ho, Shih, & Walters, 2012)

and leadership competency (Truninger et al., 2021) are also positively linked with emergent leadership.

*2.4.4) Emergent Leaders' Demographics*

Research related to emergent leaders' demographics also focuses on the role of gender, examining, for instance, the gender orientation of the group's task (Wentworth & Anderson, 1984), experience, and trustworthiness for men, and interpersonal skills for women (Holmes, McNeil, & Adorna, 2010). Similarly, research has assessed relations-oriented communication for both genders (Schlamp et al., 2020), age (Chaturvedi, Zyphur, Arvey, Avolio, & Larsson, 2012), as well as the female participation rate (Garland & Beard, 1979).

## 3) Methodology

*3.1) Sample*

The study's target population comprises individuals working in software companies. We selected our sample using purposive sampling, which is a non-probability-based approach in which individuals are chosen because they meet the researcher's requirements (Nikolopoulou, 2023). Our purpose was to choose agile-based teams. Thus, non-probability sampling was deemed the most appropriate sampling technique for selecting agile teams. We selected five firms that use an agile framework for data collection. All enterprises were based in Islamabad, Pakistan. Two enterprises had more than 80 employees, while three had more than 200. We gathered information from their project managers about the teams using the agile framework in their departments. We chose teams whose members were willing to participate in the study and whose access was granted by the project managers.

We identified nine agile teams, comprised of seven software development teams and two technical support teams, for data collection. The sample included male and female employees. We selected team members who had been on the team for at least six months, as this gave them enough time to provide information on the emergent leaders' emergence in their teams. We selected team members who worked full-time on software development and held posts such as Senior/Junior Software Engineers, Senior/Junior Developers, QA Engineers, Full Stake Engineers, PHP Developers, and Android Developers etc. We chose teams of various sizes and agile frameworks to better understand emergent leaders. We collected data until we reached data saturation. Data saturation is the point in a research process where enough data has been collected to draw necessary conclusions, and it is deemed that any further data collection will not produce value-added insights. Table 1 provides information about our study's teams.

**Table 1 About Here**

*3.2) Data Collection*

To increase the reliability of our findings, we used multiple criteria to identify the emergent leaders. First, we used network analysis. Second, we employed an aggregation approach. Other approaches to identifying emergent leaders were irrelevant to our study because we did not use audio/video data (audio-video coding) or we did not need the ranking of team members (socio-metric). We selected network analysis since voting allows us to determine the team's most influential member(s). The aggregation approach identifies emergent leaders based on multiple leadership-relevant criteria. Both approaches can help us to identify team members who influence their teammates and may perform a variety of leadership activities, giving them the

potential to emerge as emergent leaders. For data collection from agile teams, two instruments were used. One is for the network approach, while the other is for the aggregation approach. Data was gathered in teams. Each team received both instruments at the same time. Instruments were provided using team members' official email addresses.

For social network analysis, we designed a network survey, asking participants to "Please nominate an individual(s) from your team who provides leadership assistance in setting team goals, delegating team tasks, resolving relationship issues, and encouraging others to engage in team projects?" (Chiu, Nahrgang, Bartram, Wang, & Tesluk, 2021). For the aggregation method, a roster was circulated within the teams containing the complete list of team members. Every team member had to rate their fellow team members. The items were adopted from (Spark & O'Connor, 2021), having a 1–5 Likert scale with 1 for strongly disagree and 5 for strongly agree. The five items in the scale included: he/she influenced group decisions; he/she was the real leader of the group; if asked to meet a second time with this exact group to work on an identical type of task, I think this person would make a desirable leader; he/she exemplified leadership; he/she led the conversation in the group.

After identifying emergent leaders, we interviewed team members and emergent leaders. We conducted 40 face-to-face, semi-structured interviews; each interview lasted 40 to 60 minutes and was transcribed. At the start of each interview, we introduced ourselves, and the purpose of the research, obtained consent to record the interview, and emphasized how participants' names would be kept private. During our interviews, we asked team members to rank different traits and skills of emergent leaders in order of relevance for a leadership role. The data collection period was from January 2023 to July 2023, with the first two months spent on identifying leaders and the remaining five months on conducting interviews.

## 4) DATA ANALYSIS

In the first stage, after collecting the network analysis survey, we used UCINET software to calculate each team member's centrality score (Chiu et al., 2021). Most of the studies have recommended using in-degree and between-ness centrality scores (Chiu et al., 2021; Kalish & Luria, 2021; MacLaren et al., 2020; Truninger et al., 2021; Wellman et al., 2019; Zhang, Waldman, & Wang, 2012). For analysis in the UCINET, we first prepared a data file with node details in the form of rows and columns. The team members are represented by the nodes, which have numeric identifiers. All the nodes are written in a tabular manner with rows and columns. For each node, the number '1' is added against all nodes for whom a team member voted. In this technique, the network survey data is added to a data file. The UCINET imports the data file, performs the analysis using built-in algorithms, and exports the centrality scores for each node to a text file.

Aggregated scores were calculated (from the aggregated survey feedback) through averaging the scores. The aggregation survey includes leadership behaviors such as making group decisions, leading conversations, exemplifying leadership, and other desirable behaviors. Some team members may be deemed as desirable leaders while others less desirable. So, if a team member makes good decisions, other team members award him/her high scores for the leadership ability. Similarly, a team member may have good communication skills, and, so, gets high scores from the team members for his/her leadership ability.

Each team member rated other team members. There were four team members in team A, so each team member received three scores from other team members. team members 2, 3, and 4 scored for the team member 1. Team members 1, 3, and 4 all scored for team member 2. Team members 1, 2, and 4 scored for the team member 3. Team members 1, 2, and 3 scored for the team member 4. For team member 1, the total score from the other team members were 14, 16, 21 (an

average score of 17). The total score of team member 2 from other team members was 21, 11, and 20 (average score 17.3). For team member 3, the total score from the other team members was 14, 8, 18 (average score 13.3). Team member 4 received a total score of 15, 16, 8 (average score 13). Similarly, scores were computed for other teams. Visible differences in the aggregated scores amongst teams were observed – this is partly because team members were evaluated based on distinct leadership behaviors. Feedback showed that different team members were good in different leadership behaviors. Against each team member, we calculated three scores representing in-degree centrality, between-centrality, and the aggregated score. Emergent agile leaders were those team members with the highest aggregated score and highest centralities (in-degree and between). From nine teams, seventeen emergent leaders were identified (Table 2). Table 5 presents the demographic information of emergent leaders. We did not find any significant differences between the characteristics of male and female emergent leaders.

**Table 2 About Here**

**Table 5 About Here**

Interview narratives were analyzed following Gioia, Corley, and Hamilton (2013) in three stages (Figure 1), beginning with first-order themes and ending with aggregated categories. We coded manually and incrementally, switching back and forth between the collected narratives. Before beginning the coding procedure, we thoroughly examined the entire transcripts during the first step of the research. As old codes were checked against each new narrative, the list of codes evolved continuously through a comparing and contrasting approach. Figure 1 depicts the first-order codes, which correspond to the respondents' statements. We extended the level of abstraction

and produced higher-order conceptual themes by using these first-order codes. We merged the second-order themes into an aggregated theoretical composite at the end of our research. While we refer to this analytical process as a series of stages, it did not unfold linearly. We moved back and forth between data and theory in a dynamic and interactive process. After producing a complete set of 1st-order terms, 2nd-order themes, and aggregate dimensions, we have the foundation for developing the data structure (Figure 1), which is an important phase in our entire research process. The data structure not only assists us in organizing our data into a usable visual tool but also provides a graphic representation of how we progressed during the analyses from raw data to terms and themes (Gioia et al., 2013).

In qualitative research, reliability is established through dependability. Dependability implies that study can be replicated by readers using an identical contextual framework (Bryman, 2016). Hence, the entire problem formulation process, the selection of research participants, the details of identifying emergent leaders, the operational detail of data gathering, interview transcripts, fieldwork notes, and data analysis decisions are kept accessible to others. Validity is established through respondent validation, triangulation and transferability (Priest, 2002). By using respondent validation, we gave each team member and emergent leader a summary of their conversation during the interview. If there was an inconsistency between what the interview participants said and what the researcher interpreted, the difference was resolved by further discussion. Making use of more than one method or source of data is referred to as triangulation (Denzin, 1971). We used several voices to establish data triangulation, such as data gathered through interviews with emergent leaders and team members and members of different teams from different organizations. Transferability means the degree to which qualitative research findings can be applied to other settings (Creswell & Tashakkori, 2007). We facilitated transferability by describing the details of

self-managed teams, and agile teams, and why these contexts were important for leaders to emerge, making it more meaningful for an outsider.

By using multiple coders, respondent validation, data triangulation, and confirmability, we sought to avoid researcher bias. Two authors (Author 1 and Author 2) coded the data, ensuring that both coders' interpretations were consistent - we discussed the information we gathered during the triangulation process to reinforce and maintain confirmability. We audited, analyzed, and coded the data gathered from the interviews using multiple data sources, including emergent leaders, team members, and teams from multiple organizations.

## 5) Findings

### *5.1) Network Analysis Findings*

Our network analysis highlighted that emergent leaders are 'hubs' within their team network because they have the highest in-degree scores (Goldenberg, Han, Lehmann, & Hong, 2009; Rogers Everett, 1995). On the other hand, emergent leaders are also 'gatekeepers/bridges' within their team network because they have the highest between-ness metrics. Figure 2 depicts these findings, highlighting the position of an emergent leader within an agile team network. Straight arrows pointing from team members to the emergent leader indicate that team members seek leadership assistance from the agile emergent leader and agile emergent leaders are hubs. The double-headed arrows indicate that they also serve as a channel/bridge between members who are not directly linked (e.g. between member 1 and member 3) for two-way communication.

### *5.2) Qualitative Analysis Findings*

In our analysis, we identified different characteristics of emergent leadership: 1) influencing factors, 2) supportive leadership style, 3) strategist, 4) roles, 5) culturally intelligent, and 6) leaders and member ranking for emergent leadership. Details are given in Figure 1 and Table 3.

**Figure 1 About Here**

**Table 3 About Here**

*5.2.1) Influencing Factors*

Emergent leadership depends on lateral influence, which means that team members perceive an emergent leader's influence. There is no research on the factors that enable an emerging leader to exert influence over his team members. Respondents indicate three major aspects that play a role in the influencing process. These are the emergent leader's personality, technical skills, and social circle. Emerging leaders are generally nice, polite, humble, and empathetic. Emerging leaders are so soft-spoken that team members can ask any question or address any issue without fear of getting scolded. A team member who uses harsh language and engages in disrespectful behavior is highly unlikely to become an emergent leader. Personality, therefore, plays a critical role in exerting influence over team members. Similarly, technical skills are essential. An emergent leader is a team member with great technical abilities and expertise. They can assist their team members in addressing challenging problems in their domain. When emerging leaders provide guidance or solve technical problems, they gain credit from their team members. Similarly, an emerging leader's social circle is another essential aspect that contributes to the influencing process. An

emergent leader has good relationships not only within the organization but also with other people in the industry. Emerging leaders maintain positive relationships with clients and upper management. Hence, their network can assist an emerging leader in gaining credit from their peers.

*5.2.2) Supportive Leadership*

The literature on the leadership style of emergent leaders is scarce. According to agile-team members' feedback, emergent leaders adopt supportive leadership styles. Supportive leadership is a form of leadership in which the leaders give resources as well as tools to their subordinates until they can work independently. Supportive leaders ensure every person on their team has the necessary skills, devices, and resources to complete a task or long-term project successfully. They care about their team members. They assist their team members whenever necessary by utilizing their expertise and abilities. They value team members' perspectives and never impose a decision. They are adaptable and patient to tolerate team members' attitudes and embrace team members' solutions and feedback.

*5.2.3) Strategist*

Emergent leaders are project strategists because they develop a suitable strategic plan for their projects. This entails determining the team's goals and defining the specific activities that must be completed to attain those goals. Once the plan is finalized, the strategist oversees its implementation to ensure that the team and its members continue to follow the requirements. Emergent leaders create activities and concepts to aid in the organization of work so that tasks can be completed on time and to high standards. An emergent leader assesses all tasks, determines their duration, establishes priorities, assigns tasks, and makes every attempt to stay on schedule.

Emergent leaders also serve as project implementation strategists, using the strategic planning stated earlier in the process to help a team achieve project objectives while staying under budget and meeting crucial deadlines.

*5.2.4) Roles*

Emergent leaders play the role of coaches and boundary spanners. As a coach, the emergent leader observes the team's challenges and potential as an objective party, allowing the team to determine the best path for themselves. They inspire, investigate, encourage, and guide team members. They monitor the team members' experiences and adjust the personalized approach to make the best use of their skills and abilities. Participants also indicated that emergent leaders acted as boundary-spanners. Every time a team member needs to speak with someone outside the team, an emergent leader serves as a go-between, linking upper management and team members, as well as team members and clients. Therefore, emergent leaders serve as a means of communication for the team. Since boundary spanners frequently act as mediators, their responsibilities also include negotiating with others, building and maintaining relationships, and persuading people to see things from another person’s perspective.

*5.2.5) Cultural Intelligence*

Existing research indicates that emergent leaders are emotionally intelligent. Our findings imply that emergent leaders are also culturally intelligent. Cultural intelligence refers to the ability to work effectively in culturally diverse environments. A culturally intelligent emergent leader can relate to individuals of different races, genders, ethnicities, faiths, ages, political views, socio-economic positions, disabilities, and so on. It is critical to be able to collaborate well with people

from diverse backgrounds and life experiences. Emerging leaders recognize personality differences among team members and can adapt their behavior to accommodate such variances. They are aware of their team members' abilities and weaknesses and work with them accordingly.

*5.2.6) Ranking of Emergent Leaders' Traits and Skills*

We asked team members to rank the big five personality traits, interpersonal skills (communication skills, conflict management), and technical skills (risk management, problem solving) of their emergent leaders. The number-one ranking indicates the most important attribute or skill. We determined the average of these rankings against each criterion (traits and skills) after obtaining the rating data. The lower the average rating, the more important that criterion is. As Table 4 shows, communication skills, and consciousness are of the utmost importance for emergent leaders to influence their peers.

**Table 4: About Here**

*5.2.7) Conceptual Model*

Figure 2 depicts the research findings. The process of emergent leadership is described in the first part of the Figure. At first, all team members collaborate, and one of them begins to influence his/her team members by his/her personality, technical skills, and social circle. Any of these factors, or a combination of them, can have an influence. When it comes to personality, the emergent leader is culturally intelligent and capable of dealing with team members based on their personalities, backgrounds, and culture. She/he is a strategist (technical skill) who helps team members complete their tasks. Once she/he has gained influence over her/his team members, they regard her/him as their leader. Emergent leaders begin to adopt supportive leadership to lead the

team, taking on different team roles. For example, she/he begins to serve as a coach and boundary-spanner, as well as a hub and bridge for the team network.

**Figure 2: About Here**

## 6) Discussion

Leadership in organizations is generally seen in terms of assigned roles to individuals having authority over followers (Müller et al., 2018). However, with the rise of different industries as well as modern practices, organizations today are transforming away from top-down or vertical leadership toward horizontal forms of leadership (Kaplan, Dollar, Melian, Van Durme, & Wong, 2016), involving informal leadership (DeRue, Nahrgang, & Ashford, 2015; McClean et al., 2018). Informal leaders emerge in flat organizational structures which are common in organizations with self-managed teams.

The literature on the leadership dynamics that prevail in agile teams is scarce. Thus there is a need to shed light on how agile teams self-manage in practice and which leadership styles an agile team needs (Spiegler, Heinecke, & Wagner, 2021). Agile teams are self-managed teams and hence a suitable context to study emergent leadership (Przybilla et al., 2019). However the roles, leadership styles, network behaviors, influencing factors (through which emergent leader influence their peers), and validity of emergent leaders' identification are missing in the literature (Cox, Madison, & Eva, 2021).

The theory of idiosyncrasy credit (Edwin P Hollander, 2006) is used as a framework to describe how specific agile team members acquire credits by exerting influence over their teammates. Aggregation (aggregated scores) and social network (in-degree and between centrality

scores) approaches are used to identify emergent agile leaders. An individual who has the highest scores in both approaches receives the most credits and is deemed an emergent leader. According to our findings, our study makes the following extensions.

First, the literature highlighted four approaches to identifying emergent leaders; however, previous research typically used only one of these approaches to identify emergent leaders within self-managed teams. We contribute here to the literature on emergent leadership by providing methodological triangulation by using multiple methods (social-network and aggregation approaches) to identify emergent leaders. Second, network analysis reported that emergent leaders receive high in-degree scores and are considered hubs (Goldenberg et al., 2009; Rogers Everett, 1995). On the other hand, emergent leaders receive high between-ness scores and are considered "gatekeepers/bridges". According to our findings, emergent leaders are persons who serve as both hubs and gatekeepers, earn most of the credits, and become emergent agile leaders.

Third, we add to the literature on emergent leadership by exploring roles (coach, liaison), leadership styles (supportive), skills (culturally intelligent, strategist), network behaviors (hubs, gatekeepers), and influencing factors (personality, technical knowledge, social circle) of emergent leaders. Fourth, existing literature does not shed light on leadership styles of emergent leaders. We identified that emergent leaders adopt supportive leadership style. Fifth, we also rate emergent leaders' traits and skills in terms of their importance for emergent leadership. Finally, the network approach is generally used to understand the network dynamics within different contexts, such as children's discussion groups (Reding et al., 2016), teacher advice networks (Hangül & Şentürk, 2022), global virtual teams (Nordbäck & Espinosa, 2019), informal social groups (Carnabuci et al., 2018), and in self-organized teams (Gerpott et al., 2018; Kalish & Luria, 2021; Lynn Shollen & Cryss Brunner, 2016; MacLaren et al., 2020; Truninger et al., 2021; Wolff et al., 2002). Our

study, however, is the first to apply network analysis to understand leadership patterns in the context of agile teams.

One of our findings challenge the existing literature with identifying more than one emergent leader in one team (team C) - existing research often restricts the identification of emergent leaders to one person (Hawkins, 1995), while in reality, multiple individuals may emerge as leaders in a team (Hanna et al., 2021).

A few of our findings are consistent with the existing literature. Prior studies show that emergent leaders have the traits such as openness to experience, conscientiousness (Taggar et al., 1999), agreeableness (Cogliser et al., 2012), extraversion (Ensari et al., 2011; Spark et al., 2018; Taggar et al., 1999), as and emotional intelligence (Côté et al., 2010; Hong et al., 2011). Our respondents also ranked these traits for emergent leaders. Similarly our findings also confirm the prior studies that emergent leaders have good communication skills (Gerpott et al., 2019).

**7) Theoretical Implications**

This study's key theoretical contribution is that we explored emergent leadership for agile teams. Rather than generalizing from research on standalone teams, we developed our conceptual framework from the literature on emergent leadership and network analysis. We went beyond what each of those pieces of literature alone could offer, showing that informal leaders emerge and are identified with network analysis and aggregation approaches and their early identification is helpful for strategic benefits.

Our work provides a meaningful extension to the burgeoning work on the theory of idiosyncrasy credit in the management literature (Edwin P Hollander, 2006). The theory of idiosyncrasy credit suggests that individuals can earn credit when they meet group expectations

(Tariq et al., 2023). We extend the theory of idiosyncratic credit by identifying different ways for emergent leaders to gain credit.

First, we identify several network behaviors of emergent leaders who gain credits by serving as 'hubs' and 'gatekeepers' inside their team network. When emergent leaders act as a hub in the team network, they become a vital part of the team network. Everyone approaches them for help and inquiry. When they respond well, they can influence other team members and gain credit. Similarly, when emergent leaders act as gatekeepers, they become communication channels for other team members. This role allows emergent leaders to earn credits by managing team communication for conflict resolution, information management etc. Second, emergent leaders are credited when they serve as coaches and liaisons. They can guide and lead team members for different tasks and can earn credits. Third, we identify some other sources (personality, technical knowledge, and social circle) that influence team members and develop credit. Team members said that their emergent leaders had a positive personality. They are great people, humble and gentle. With such characteristics, team members find it easier to interact with emergent leaders and offer them credit. Fourth, we extend this theory by identifying the supportive leadership style that emergent leaders should adopt. Similarly, when emergent leaders choose a supportive leadership style rather than an authoritarian one, they build stronger relationships with their followers. As a result, team members give credit.

Our work also extends the theory of informal leadership by suggesting that agile teams are one of the favorable contexts for informal leaders to emerge. We also add to the theory of agile leadership showing that multiple informal leaders may emerge within agile teams. Existing emergent leadership theories inform us that emergent leaders are emotionally intelligent. However,

we refine this idea by highlighting that emergent leaders are not only emotionally intelligent but also culturally intelligent.

Moving towards the line of inquiry where the findings challenge the existing literature. For example, According to Kalish and Luria (2021), leader nomination behavior shifts over time from easily detectable traits (gender, facial beauty, and extraversion) to covert personality traits (conscientiousness). The findings contradict this line of research in which leaders are nominated based on gender, facial appearance, and other factors. Emergent Leadership is not based on surface-level diversity i.e. gender, race, ethnicity, and appearance (Harrison, Price, & Bell, 1998). Rather emergent leaders are recognized for their traits, skills, behaviors, leadership style, and abilities.

**8) Practical Implications**

While emergent leadership can have practical implications in many contexts, including workplaces, community organizations, and even informal group settings, our study has significant implications for organizational human resource management. Current human resource practices prioritize developing leadership skills; however, identifying and maintaining these leadership talents receive less attention (Rathi & Lee, 2015). Emergent leaders are informal leaders who emerge with the support of their unique characteristics, emerging as team champions. Our study has implications for the HR department in terms of designing policies that identify team members who are responsible for providing leadership within the team. This will save costs, as instead of hiring from outside, the HR department can develop an internal talent pool of these emergent leaders and promote them to formal leadership positions.

Human resource departments can develop policies that facilitate the identification of emergent leaders through the following strategies: first, developing clear competency frameworks

outlining the key attributes required for effective leadership within the organization. These may serve as a reference point for assessing and identifying emergent leaders. Second, implement 360-degree feedback assessments where team members and supervisors evaluate an individual's leadership abilities from multiple perspectives. Finally, encourage employees to take the initiative in proposing and implementing innovative ideas, leading special projects, or mentoring junior team members.

Our study also offers implications for the technical departments. When discussing project progress, managers of technical departments should include emergent leaders in their meetings. According to our findings, emergent leaders possess capacities to strategize, and, hence, emergent leaders may offer insights on task planning, task allocation, optimal solutions, and meeting deadlines.

Management can use network analysis as an evaluative tool for other programs that intend to produce sustainable communities and networks of practices. Managers may engage with emergent leaders identified through social network analysis to gauge their interest in formal leadership positions, such as leading agile teams, facilitating workshops, or spearheading community initiatives. Social network analysis can identify individuals who serve as knowledge brokers within the agile community, bridging gaps between different teams or departments. Communities of practice within the organization where emergent leaders actively participate and contribute can be identified. These communities often serve as hubs for knowledge sharing and collaboration, making them ideal places to identify potential leaders.

Our study also has implications for agile teams. Our findings indicate that rather than using self-ratings, formal leadership selection procedures for self-managed teams, such as agile teams, should be based on other ratings (such as those of coworkers and supervisors), as these ratings are

more reliable and are stronger predictors of leadership emergence. Assessment criteria should consider technical skills, personality (relationships, attitude), social circle (networking), leadership styles, coaching, liaison work, and cultural intelligence.

Lastly, our findings have some implications for organizational design, team building, and leadership development initiatives, particularly for organizational change professionals and behavioral researchers studying team processes and techniques for transforming from vertical structures to horizontal structures or self-managed teams. Making the transition to self-organization is referred to as difficult for both the team and the broader organization (Dikert, Paasivaara, & Lassenius, 2016), and it necessitates the emergence of emergent leadership, in which team-internal leadership is not formally assigned but emerges inside the team (Przybilla et al., 2019).

Implementing emergent leadership can also present several barriers. Shifting towards emergent leadership requires a cultural shift, which can be challenging to achieve, especially in organizations with long-standing traditions. Implementing emergent leadership may be more challenging in larger organizations where there are more layers of hierarchy and bureaucracy to navigate. Developing leadership skills through training and development programs may be necessary but takes time and resources. Miscommunication or lack of clear communication channels can impede the emergence of leadership within groups.

## 9) Limitations and Future Research

There are several constraints to consider. Our first limitation is related to team size. Usually, the average size of agile teams is 4-8 members (Modi & Strode, 2020). Most of our teams were

relatively small. We did not capture the typical limitations that are associated with survey methods, such as reference bias. Reference bias occurs when a respondent is under the influence of various standards when making comparisons among different respondents (West, 2014), and we only selected agile teams from the IT sector. There is a limitation in the generalizability of the study, particularly regarding its applicability beyond the specific context of agile teams in the IT sector.

In response to these limitations, we suggest some research avenues. Future work may seek to minimize the effects of reference bias. To avoid reference bias in surveys, use unambiguous wording, include context information, scenarios, and examples, and pretest with a small sample of diverse respondents to uncover any potential reference bias in the questions. We encourage future research to apply social network analysis and aggregation approaches for relatively larger team sizes. Similarly, both approaches can be used with different agile methodologies, such as Kanban and extreme programming. We also recommend collecting data from other sectors, including oil and gas, training and education, industrial supply distribution, and personal care (Gren & Ralph, 2022).

When expanding data collection efforts and methodologies, future researchers may encounter several potential resource constraints. To address those, we suggest that the data could be collected in two phases: the first to identify emergent leaders, and the second to explore further the phenomena. Time constraints and limited availability of support staff might have an impact on the duration and frequency of data collection activities. Future researchers must ensure that the time gap between the two data collection stages is minimal enough, as some of the resources accessible during the first phase of data collection may have been depleted and may no longer exist. Recruiting a diverse agile sample can be difficult, especially for research with specialized demographics and agile frameworks.

Future research could investigate how cultural factors impact the emergence of informal leaders with various cultural backgrounds. The characteristics such as team cohesion, task interdependence, and organizational culture, which this study did not consider, may also have an impact on emergent leadership.

## 10) Conclusion

This study explores emergent leadership in agile software teams and highlights the effectiveness of network analysis and aggregation approaches in identifying emergent agile leaders. We interviewed 40 agile team members and identified 17 emergent agile leaders from five organizations. Our findings contribute to the theory of idiosyncrasy credit by indicating that emergent leaders can earn credits by becoming 'hubs', 'gatekeepers', and performing the roles of coach and liaison, by adopting supportive leadership styles, possessing cultural intelligence and strategist skills, and by influencing their team members through their personality, technical knowledge, and social circle. Additionally, we also ranked different traits and skills of emergent leaders.

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## TABLES AND FIGURES

**Table 1: Participant Information**

| Firm | Team | Team Size | Emergent Leaders | Agile Framework | Type |
|---|---|---|---|---|---|
| Firm1 | A | 4 | **2** | Scrum | S/W Development |
| Firm1 | B | 4 | **2** | Scrum | S/W Development |
| Firm2 | C | 5 | **2** | Dynamic Systems Development Method (DDSM) | S/W Development |
| Firm3 | D | 8 | **3** | Scrum | S/W Development |
| Firm3 | E | 4 | **2** | Scrum | S/W Development |
| Firm4 | F | 3 | **1** | Kanban | Technical Support |
| Firm4 | G | 4 | **2** | Scrum | S/W Development |
| Firm4 | H | 4 | **2** | Kanban | Technical Support |
| Firm5 | I | 4 | **1** | Scrum | S/W Development |

**Table 2: Team Members' Scores**

| Teams | In-degree Centrality | Between-Centrality | Aggregated Score |
|---|---|---|---|
| **Team A** | **2** | **2** | **17** |
| | **2** | **2** | **17.3** |
| | 0 | 0 | 13.33 |
| | 0 | 0 | 13 |
| **Team B** | **3** | **3** | **24** |
| | **3** | **3** | **24** |
| | 0 | 0 | 17 |
| | 1 | 0 | 15 |
| **Team C** | **2** | **2** | **23** |
| | **2** | **2** | **22.75** |
| | 1 | 0 | 14.8 |
| | 1 | 0 | 21.4 |
| | 1 | 0 | 11.4 |
| **Team D** | **3** | **3** | **24** |
| | **3** | **3** | **24** |
| | **3** | **3** | **24.33** |

| | | | |
|---|---|---|---|
| | 0 | 3 | 11 |
| | 1 | 1 | 14 |
| | 3 | 1 | 11 |
| | 1 | 2 | 15 |
| | 2 | 0 | 11 |
| **Team E** | **3** | **2** | **23** |
| | **3** | **2** | **23.3** |
| | 0 | 0 | 11 |
| | 0 | 0 | 11 |
| **Team F** | **2** | **1** | **18** |
| | 1 | 1 | 17 |
| | 0 | 0 | 11 |
| **Team G** | **3** | **1** | **20** |
| | **3** | **1** | **20.33** |
| | 0 | 0 | 15 |
| | 0 | 0 | 11 |
| **Team H** | **3** | **1** | **20** |
| | **3** | **1** | **19.8** |
| | 1 | 0 | 15 |
| | 0 | 0 | 11 |
| **Team I** | **3** | **1** | **23** |
| | 2 | 1 | 23 |
| | 1 | 0 | 16 |
| | 1 | 0 | 18 |

**Table 3: Sub-Themes and Narratives**

| Sub-Theme | *Narratives* |
|---|---|
| **Personality** | *I selected him not because of his technical expertise, but because of his personality trait. (C2)*<br>*I think an element of friendship is good. (D4)* |
| **Technical skills** | *I was new to the team, and he was the core person who was working from the start of that project, he has a much technical knowledge of the project flow and like each and everything. I got the help from him on the front-end side and back-end side of the application. (E3)* |
| **Social Circle** | *Social circle is very important because you become the average of those persons with whom you live. (A1)*<br>*We even work online 80%, and still do not know some of them they came and asked me about different matters and said oh you are 'name omitted' though even I do not know them. So, they have heard about me from the company. (B3)* |
| **Empathy** | *Junior resource considers him as a support, he I so humble and empathetic. (C1)*<br>*He is very cooperative. (D3)* |

| Sub-Theme | *Narratives* |
|---|---|
| **Patience** | *Very important that leaders should be emotionally intelligent, and they should have control over their reactions. (A10)*<br>*How to control your anger because if you have developed your relationship with your team members from last year and you suddenly know how to show your anger then that relationship would be affected. (E3)* |
| **Knowledgeable** | *He has a much technical knowledge of the project flow. (E7)*<br>*He should know domain challenges. (D1)* |
| **Considerate** | *Have a one-on-one discussion with team members and ask them if they're having any problems and he consider their point of views. (B2)*<br>*At sprint planning, we use it to discuss the tasks, because the success of the sprint depends on sprint planning. He used to discuss the details of tasks such as time required, complexity level etc., and with the mutual agreement of the team, sprint is designed. (A6)* |
| **Task Allocation** | *Task allocation according to the capability of a team member. (A3)* |
| **Efficient Task Implementation** | *We focus on minimum data and maximum information. (C3)*<br>*He designs the optimal algorithm for the best results. (D3)*<br>*He provides design structures for very authentic projects. (E2)* |
| **Coach** | *He provides advice to junior team members I followed this way, and you should adopt this way. (C4)*<br>*Guide junior team members about career paths. (E2)* |
| **Liaison** | *The mid-level engineers feel shy, or you know they don't feel comfortable directly communicating or talking to the offshore team members. So, one thing I usually you know do with the team members is to take them on the calls with the product manager who is sitting in the UK and have that problem sorted out within no time. (B3)*<br>*He is like a medium to approach the CEO if things are not manageable. (C4)* |
| **Diversity Acceptance** | *He can handle people of multiple cultures. (B4)*<br>*A leader should never be biased toward anyone based on gender religion or any kind of cultural background. (C3)* |
| **Understand Members' Personalities** | *A leader should know the personality traits of team members as well as their skills. (A9)*<br>*To come at the level of the team members so that they perform well. (D2s)* |

**Table 4: Ranking of Emergent Leaders by Team Members**

| | Traits | Skills |
|---|---|---|
| 1 | Consciousness | Communication Skills |
| 2 | Open to Experience | Problem-Solving Skills |
| 3 | Emotionally Intelligence, Extraversion | Conflict Management |
| 4 | Agreeableness | Risk Management |

**Table 5: Demographics of Emergent Leaders**

| No | Team | Gender | Designation | Age | Experience | Qualification | Similar Projects | Agile Experience | Expertise |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Male | Senior Developer | 37 | 8 | BS-CS | 50+ | 3 | Full Stack |
| 2 | A | Male | Frontend Developer | 36 | 8 | BS-SE | 10+ | 7 | Frontend Development |
| 3 | B | Male | Senior QA Engineer | 31 | 9 | BS-CS, MS(EM) | 0 | 5 | Testing, Agile Trained |
| 4 | B | Female | Software Developer | 25 | 1.5 | BS-SE | 4 | 1.5 | MERN, Stake Dev |
| 5 | C | Male | Frontend Developer | 36 | 8 | BS-SE | 10+ | 7 | Frontend Development |
| 6 | C | Male | Network Consultant | 37 | 10 | BE-CSE | 0 | 6 | Network and DevOps |
| 7 | D | Female | Principal QA Engineer | 38 | 13 | BS-CS | 0 | 4 | Testing |
| 8 | D | Male | Principal QA Engineer | 38 | 14 | BS-CS | 2 | 5 | Testing |
| 9 | D | Male | Senior Architect | 36 | 12 | BS-CS | 4 | 5 | Project security and design |
| 10 | E | Male | UI/UX Engineer | 37 | 13 | MCS | 0 | 4 | UI/UX |
| 11 | E | Male | Full Stake Engineer | 26 | 2 | BS-CS | 0 | 1 | Development |
| 12 | F | Male | Development Consultant | 31 | 7 | BS-CS | 0 | 2 | Java |
| 13 | G | Male | Full Stake Engineer | 27 | 4 | MS-CS | 0 | 0 | Development |
| 14 | H | Male | Software Developer | 27 | 3 | BS-SE | 3 | 0 | Development |
| 15 | H | Male | Development Consultant | 28 | 5 | BS-CS | 0 | 1 | Java, J2EE |
| 16 | I | Male | Software Developer | 26 | 4 | BS-CS | 0 | 0 | Development |
| 17 | G | Male | Software Developer | 28 | 5 | BS-SE | 0 | 2 | Development |

## Figure 1: Data Structure

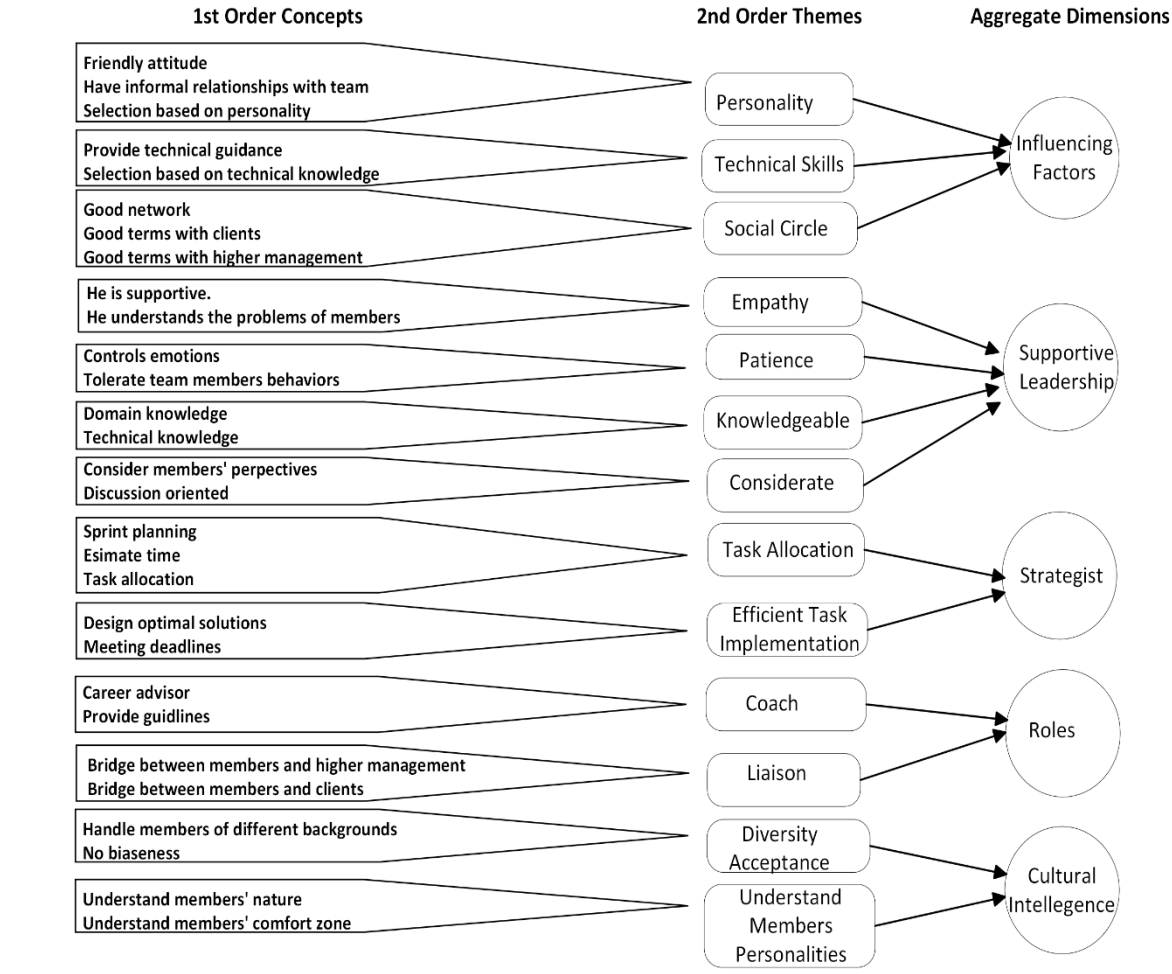

**Figure 2: Emergent Leadership Model**