

Müller, Maximilian; Bodea, Constanta-Nicoleta; Radujković, Mladen

Article

A process framework of shared leadership emergence in product development project teams

Project Leadership and Society (PLAS)

Provided in Cooperation with:

International Project Management Association (IPMA), Zurich

Suggested Citation: Müller, Maximilian; Bodea, Constanta-Nicoleta; Radujković, Mladen (2023) : A process framework of shared leadership emergence in product development project teams, Project Leadership and Society (PLAS), ISSN 2666-7215, Elsevier, Amsterdam, Vol. 4, pp. 1-14, <https://doi.org/10.1016/j.plas.2023.100104>

This Version is available at:

<https://hdl.handle.net/10419/339847>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

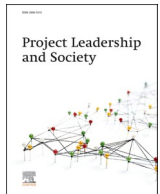
Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/4.0/>



Empirical Research Paper

A process framework of shared leadership emergence in product development project teams

Maximilian Müller^{a,b,*}, Constanta-Nicoleta Bodea^{a,c,d}, Mladen Radujković^a^a Alma Mater Europaea ECM, Slovenska 17, 2000, Maribor, Slovenia^b EDAG Engineering GmbH, Vehicle Electronics Department, Steinauer Straße 20, 36100, Fulda, Germany^c The Faculty of Economic Cybernetics, Statistics and Informatics, The Bucharest University of Economic Studies, 6 Piata Romana, 1st District, Bucharest, 010374, Romania^d Centre for Industry and Services Economics, COSTIN C. KIRITESCU", National Institute for Economic Research, Romanian Academy, Romania

ARTICLE INFO

Handling Editor: Martina Huemann

Keywords:

Shared leadership
 Leadership emergence
 Leadership function
 Product development project team
 Case study
 Process framework

ABSTRACT

Shared leadership is a complex phenomenon as it is a dynamic, interactive, and cyclic process that is shared among several team members at different times. The focus of research on shared leadership is on the pre-conditions and consequences of shared leadership, but little is known about the process of its emergence. In our study, we take a process perspective to gain deep insights into the emergence of shared leadership. In an exploratory case study, data were collected through observation of team meetings, semi-structured interviews and internal project documents and analysed via a coding process and content analysis. Based on our findings, we develop a process framework for the emergence of shared leadership in a product development project team. We make several contributions. First, we extend the theory of shared leadership by adding a process framework for the emergence of shared leadership in product development project teams. Second, we enhance the leadership emergence theory to include additional antecedents and process mechanisms. Third, we extend the functional leadership theory by identifying the occurrence of leadership functions. The practical contributions we make are relevant for project managers/sub-project leaders and team members to promote and develop shared leadership in product development project teams.

1. Introduction

The today's unpredictable world is also called "VUCA world" (Bennett and Lemoine, 2014). VUCA is the acronym for volatility, uncertainty, complexity and ambiguity. In such a world, both practitioners and researchers acknowledge that it is unlikely that a single leader will possess all the knowledge and skills necessary to successfully cope with emerging threats and opportunities (Day et al., 2004; Pearce and Conger, 2003a). Many researchers answered the call of the critics, and several new leadership concepts emerged that shift leadership from the appointed leader to the whole team. One such concept that has emerged in the field is shared leadership, introduced by Pearce and Conger (2003a). Pearce and Conger (2003a, p. 1) define shared leadership "as a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organisational goals or both". Two decades and some empirical research later,

studies on shared leadership have found in three meta-analyses that shared leadership has a positive relationship with outcomes such as team effectiveness (Wang et al., 2014) and team performance (D'Innocenzo et al., 2016; Nicolaides et al., 2014).

Much attention has been paid to the study of shared leadership over the past two decades, and empirical research shows that shared leadership adds value, particularly in complex business environments (e.g. Scott-Young et al., 2019). It is also very well-known why shared leadership emerges, but more is needed to know about how shared leadership emerges. In the literature on the 'how' of shared leadership emergence, much research has been done on the antecedents that contribute to the emergence of shared leadership (team environment, empowering leadership, etc.), but very little is known about the underlying processes of shared leadership emergence (Acton et al., 2019).

To fill this research gap, our research question is: How does shared leadership emerge in product development project teams? To address

* Corresponding author. Alma Mater Europaea ECM, Slovenska 17, 2000, Maribor, Slovenia.

E-mail addresses: maximilian.muller@almamater.si, maximilian.mueller@edag.com (M. Müller), bodea@ase.ro (C.-N. Bodea), mladen.radujkovic@almamater.si (M. Radujković).

<https://doi.org/10.1016/j.plas.2023.100104>

Received 25 September 2023; Received in revised form 7 November 2023; Accepted 10 November 2023

Available online 28 November 2023

2666-7215/© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

this question, we conduct a longitudinal explorative case study. The case we examine is a team in a product development project at EDAG between April and December 2022. EDAG is an international company headquartered in Germany, with approx. 8200 employees (as of July 2023) and generates revenue in the automotive industry through product development projects (EDAG, 2023). The aim of the project was to develop a braking system, and the project team was responsible for defining and describing the braking system from an electrical point of view. We use different data collection methods: Semi-structured interviews, observation by outsiders and internal documents to identify the process of the emergence of shared leadership through the distribution of leadership functions within the team.

The study's contribution is to extend the theory of shared leadership and the theory of leadership emergence by giving a further perspective on the emergence of shared leadership based on the following definition: Shared leadership is an emergent process by sharing leadership functions between two or more people (Small and Rentsch, 2010). In addition to the person-oriented view (emergence of leader/follower identities), our research follows the task-oriented approach by looking at the emergence of leadership functions in teams.

This leadership functional perspective has advantages for research on the emergence of shared leadership because all team members are considered who will take over leadership functions, not just the formal leaders or persons with leadership identities.

Following this introduction, we provide theoretical insights based on the literature to identify the intersection of shared leadership, leadership emergence and functional leadership. We then explain our research approach and highlight the findings. Based on that, we discuss the results and give directions for future research.

2. Literature review and theoretical background

In this section, we provide basic insights into what is important from the theoretical perspective and the perspective of relevant literature on the subject. We start with context and continue with the leadership constructs.

2.1. Product development projects

Product development is central to companies in global markets as it achieves sustainable competitive advantages (Kleinschmidt et al., 2007). However, today's world of product development is characterised by a fast-moving and highly competitive market (Takeuchi and Nonaka, 1986). On the one hand, customers' demands for the product are increasing, and there are more and more technical possibilities to fulfil these wishes. On the other hand, competition is getting more challenging as globalisation and digitalisation allow suppliers to compete for customers worldwide. The result is, among other things, technically more and more complicated products. A modern passenger car, for example, now has 1200 functions (a function can be tire pressure monitoring) executed by about 10,000 individual parts and 100 million lines of software code. The forecast is showing approx. 300–500 million lines of software code in self-driving cars. In addition to the complicated product, product development is exposed to uncertainties. Uncertainty arises because customers' preferences change and competitors' products influence the product's specifications, thus already influencing the development (Bhattacharya et al., 1998). Added to this is the lack of a precise understanding of the specific tasks, their sequence, interdependencies and the time required before execution (Tatikonda and Rosenthal, 2000). Developing products that are complicated and characterised by uncertainty is primarily organised in project or programme teams. New product development projects are growing increasingly complex (Yang et al., 2014). Besides the complicated technology of the product and the uncertainty in product development projects, there are reasons why a project is complex (not specific to product development), e.g. the interdependence and interrelationships between tasks, the many

different stakeholders and their different goals and intentions, and the number of project participants and the flow of information between them, to name a few (San Cristóbal et al., 2018). We want to use the tyre pressure control as an example here to show which tasks and dependencies arise. The development of the function involves the Chassis team (responsible for the tires and the relevant electrical control unit and software), the Instrument Cluster team (an icon is needed when the pressure is too low), the Design team (responsible for creating the icons in the display), the Electrical Architecture team (signals must be defined for communication between the electrical control units), cyber security (to protect the system from external influences), controlling (will the planned cost are met), release team (will the timing met) and the legal team (tire pressure control is a law). The example clearly shows the interdependencies of the task. Many teams are involved in fulfilling the tasks. There is also an increased level of complexity for the task. The complexity of the task is due to the lack of knowledge prior to the development of the product and the fact that any changes in the requirements have/can impact other areas.

A higher degree of creativity is necessary to complete the tasks. Creativity is needed when developing innovative solutions, defining goals or when problems and decisions must be made during a project. This is the case when it comes to finding compromises because cross-functional teams have different aims and requirements for product development. Managing the development of products is a complex task (Bhattacharya et al., 1998). Shared leadership is a valuable mechanism for managing complex environments (Sweeney et al., 2019; Wang et al., 2014).

2.2. Shared leadership

Much research has been done on shared leadership over the last two decades. Empirical research shows added value at different levels (people, teams, projects and organisations) and in different teams. For example, empirical research has shown that shared leadership has a positive impact on individual performance (Liu et al., 2014), team effectiveness (Pearce and Sims Jr, 2002), task performance in a project (Hoch et al., 2010) and organisation effectiveness (Pearce and Sims Jr, 2002). Furthermore, an added value of shared leadership in different teams has been demonstrated, including agile teams (Hofman et al., 2023), a defence acquisitions project team (Novikov, 2016), engineering design teams (Wu and Cormican, 2016), information systems development teams (Hsu et al., 2017), industrial construction projects (Ali et al., 2020), student project teams (Aubé et al., 2018), military teams (Cakiroglu et al., 2020) and globally distributed new product development teams (Muethel and Hoegl, 2016).

Shared leadership in new product development teams has a common history. Since its inception, there has been a belief in the added value of shared leadership in new product development (Cox et al., 2003). Pearce (2004) underlines that shared leadership is most appropriate when the tasks are highly interdependent, require a great deal of creativity, and are complex. These task characteristics of shared leadership fit very well with the task characteristics in product development projects.

Besides the advantages mentioned above, shared leadership is more complex than traditional leadership structures (D'Innocenzo et al., 2016) because shared leadership sees the world as a complex entity and tries to adapt this complexity in leadership to a certain degree (Lichtenstein et al., 2006). Shared leadership adopts a dynamic social-interactive influence perspective (Pearce and Conger, 2003b). In a dynamic social process, group members' interactions can influence who emerges as a leader (Lord and Dinh, 2014), leading to formal and informal leaders (Morgeson et al., 2010). The emergence of leaders through the interactions of people leads to the concept of shared leadership because many team members lead (and follow) each other (Pearce and Conger, 2003b). The phenomenon of emergence plays a crucial role in the study of shared leadership (D'Innocenzo et al., 2016; Nicolaidis et al., 2014; Wang et al., 2014).

2.3. Shared leadership emergence

In researching the emergence of shared leadership, various considerations have been made, especially about the antecedents of shared leadership and the process of the emergence of shared leadership. Most effort is in the antecedents of shared leadership. Antecedents refer to the factors, conditions, or elements that come before or precede the emergence of shared leadership within a team or organisation. Antecedents are the underlying influences or circumstances that set the stage for shared leadership to develop and thrive. Antecedents of shared leadership include internal team environment (shared purpose, social support, and voice) (Carson et al., 2007), team empowering (Fausing et al., 2015), and task ambiguity (Serban and Roberts, 2016) to name a few. Considerably less research lies in looking at the emergence of shared leadership research from a process perspective.

DeRue and Ashford (2010) describe a process that leads to the construction of leadership identities that may change over time and in different situations. Individuals internalise an identity as a leader or follower, which is relationally recognised through mutual role-taking and collectively affirmed in the organisational context. The research of DeRue and Ashford (2010) influences current research as the process focuses on the emergence of leader and follower identities (Acton et al., 2019; Badura et al., 2022; Lyndon and Pandey, 2021).

2.4. Leadership functions

In a leadership functional approach, all those who take responsibility for satisfying the critical team needs of a team can be considered team leaders (Marks et al., 2001; Morgeson et al., 2010; Zaccaro et al., 2001). The accomplish of the leadership functions leads to effective team performance and team success. Several meta-analyses underlined the evidence of the leadership functions and team effectiveness (Bell, 2007; Hülsheger et al., 2009; Klein et al., 2009; LePine et al., 2008; Mathieu et al., 2019). For our explorative study, we used the leadership functions defined by Morgeson et al. (2010) as a framework for analysis. Morgeson et al. (2010) developed a comprehensive taxonomy of team leadership functions by examining 85 articles and book chapters spanning 60 years (roughly 1950–2010) to compile a pool of possible team leader behaviours. They identified 517 behaviour items relevant to team leadership and coded them to 15 leadership functions (see Table 1).

3. Research methodology

To answer the research question - “How does shared leadership emerge in product development project teams?” - we decided to conduct a longitudinal exploratory case study, as we are breaking new ground in shared leadership theory and leadership emergence theory. Semi-structured interviews, observation by outsiders and internal documents were used as methods of data collection in order to capture different

perspectives and to ensure appropriate quality through triangulation. The research period was from April 2022 to December 2022. The analysis is split into two phases. For the first phase, we chose a three-order coding concept (Gioia et al., 2012) to identify and create the process of the occurrence of leadership functions, and for the second phase, quantitative content analysis to create the process of shared leadership emergence.

My research philosophy is based on the assumptions and beliefs from an ontology or, more specifically, “Becoming ontology”. Becoming ontology assumes that processes fully constitute our world, including the objectives or things people refer to. Thus, from a becoming perspective, an organisation or a project is viewed as a process, bringing into existence the activities (e.g. communicating, acting, meeting. Carrying out tasks, etc.) (Brunet et al., 2021).

We chose an exploratory case study because we seek increased understanding, a detailed description, and an in-depth illustration of a phenomenon by having as the researchers an outsider’s position to the case.

In order to explain the case study comprehensively, the case (unit of analysis), the phenomenon, the level of analysis and the context should be described in detail (Martinsuo and Huemann, 2021).

The phenomenon to be explored in the case study is the emergence of shared leadership. The underlying definition for the emergence of shared leadership is an emergent process in which two or more people share leadership functions (Small and Rentsch, 2010).

The level of analysis is process (process as activity). We chose a process perspective because it implies that actors and entities should not be the focus of how phenomena emerge (Langley, 1999). It focuses on how things are done (e.g. the activities required to archive shared leadership emergence). Brunet et al. (2021) distinguish between four process perspectives applied to project studies. We have chosen the perspective of the process as an activity because this type of perspective focuses on how a phenomenon is (re) constituted in and through activity (e.g. Sergi et al., 2020).

We chose a German company called EDAG because EDAG has many PDPs and lives in a turbulent and dynamic environment. EDAG is a stock company that was founded in 1969 and is an international engineering service provider for the automotive industry with approximately 8000 employees (Status End of 2022). Most projects at EDAG are product development projects, and the range can be the development of a software unit for an electrical control unit or the development of a total vehicle. EDAG is in the role of the contractor for the projects. EDAG works for various customers such as Porsche, Daimler, BMW, Continental, Bosch, etc. and works mainly under fixed-price contracts. The chosen PDP is in the electric electronic department. The electric/electronic department has a matrix organisation with team leaders and project leaders. The research benefits from the fact that one of the authors has been an employee at EDAG for eight years, and access to the project teams and documents is guaranteed. In the past, it could be shown in a study at EDAG that shared leadership was used in product development teams (Mueller, 2021b).

We chose a product development project team for two reasons. First, the environment of a product development project team provides suitable conditions for the emergence of shared leadership. And secondly, the emergence of shared leadership in product development project teams has been less researched. In the project, EDAG is in the role of the contractor, and the client is a German supplier. The chosen product development project team is responsible for the definition and description (model-based system engineering) of an electrical brake for passenger cars. The project team is selected randomly but on the condition that it run in 2022 and at EDAG. During the research period, the project was in the initiation, planning and execution phase. The project will run for two years, starting in March 2022, and the team will be needed throughout the project. The team size is seven, it is located at three German locations (it is worth noting that about 90% of the working time was done in the form of home office), and the team in this composition is

Table 1
Leadership functions according to Morgeson et al. (2010).

1)	Composing the team
2)	Defining the mission
3)	Establish expectations and goals
4)	Structuring and planning
5)	Training and developing the team
6)	Sensemaking
7)	Providing feedback
8)	Monitoring the team
9)	Managing the team boundaries
10)	Challenging the team
11)	Performing team tasks
12)	Solving problems
13)	Provide resources
14)	Encourage team self-management
15)	Supporting social Climate

working together for the first time. The language is German. Table 2 shows the demographical and professional data about the project team members.

3.1. Data collection

In our exploratory study, we used three collection methods: semi-structured interviews, outsider observation, and internal documents and reports. The use of multiple sources enables the triangulation of information which enhances the quality and credibility of qualitative research (Yin, 2018). The mix of the different data collection methods increased the quality of the paper (through triangulation) because we were able to cross-check the information and were able to clear the correctness.

3.2. Semi-structured interview

Semi-structured interviews provide insights into individuals' personal histories, perspectives, and experiences. The aim of the interview was to understand individuals' perceptions of their responsibilities, roles and current activities of each person, what they have done to become responsible for a particular topic/area, and their experiences of the emergence of leadership positions at EDAG. But also, to capture information that is not included in the observation or the documents. We conducted seven one-to-one semi-structured interviews between May 2022 and October 2022 with all members of the project team. Each interview lasted between 50 min and 1 h. The interview questions (see Fig. 1) focus on general information about the team member and the project, perceptions of the team member's and the team's strengths and weaknesses, the team member's daily actions and interactions, and their experience or opinion of becoming a leader for different topics/areas. The semi-structured is conducted virtually via MS Teams. In total, we collected 385 min of interview material from seven people, resulting in 84 pages of transcription. The cameras were on, and the spoken words were transcribed.

3.3. Observation by outsiders

If the observer is not a member of the team, then it is an observation by an outsider. The strength of the observation lies in the real-life data provided. Our aim was to collect accurate and detailed data about individual and team behaviour and interactions in the PDP team between April and December 2022, which took place via MS Teams.

We observed 150 meetings (Meeting name: Daily Team Meeting) between April 2022 and December 2022. Each meeting lasted around 30 min. As a rule, all team members participated (exceptions were (public) holidays and illness) in the meeting, and the aim was to share the status especially when there were any issues, get an overview of the activities of the team, plan the next days and coordinate each other. The observations of the Daily Team Meeting were conducted virtually via MS Teams and transcribed. In total, we collected 4350 min of video material, resulting in 1208 pages of transcription. The cameras were off, and the spoken words were transcribed. During the meeting in MS teams, team members shared their documents on the screen, and this helped the authors of the paper to identify the relevant internal documents for the

collection. An observation protocol was created for each appointment, showing the participants, the date and a brief summary in order to find specific situations retrospectively.

We observed three meetings (Meeting name: Job split) with three team members (subproject leader, sprint planner, development engineer) between September and October 2022. The meetings lasted about 30 min with the aim of exchanging speaking about their activities (mainly on leadership functions like cost monitoring and problem-solving) and how they can balance the workload. In total, we collect 145 min of video material resulting in 24 pages of transcription. The cameras were on, and the spoken words were transcribed. During the meeting in MS teams, team members shared their documents on the screen, and this helped the authors of the paper to identify the relevant internal documents for the collection.

3.4. Internal project and team documents

We collected the content from the following documents with the aim of creating a better understanding, especially of the context and confirmed and compared with other data through the cross-checking of the transcriptions from interviews and observation with the information from the internal project and team documents.

The team chat in Microsoft Teams. MS Teams has the function that people can chat with each other. The team has agreed to use only one chat. The chat was used for exchanging information in the team, but also between two members. This information is collected. Volume approx. 340 pages.

Role description. The client provides several role descriptions for the team. This information was collected. Volume approx. 5 pages.

Specification list of the project. The team has a work area to work through. Volume approx. 10 pages.

List open points. The team has an area in MS SharePoint where they store and maintain a list of their daily tasks. Later this list changed from a list to a two-week plan. But at least both variants contain the who is doing what. Volume approx. 84 pages.

Q&A List. The team has an area in MS SharePoint where they store and maintain a question-and-answer list. When a team member has a question, that question is added to this list. Volume approx. 15 pages.

3.5. Transcription process

After the collection of the content from semi-structured interviews and the observations, we start with the transcription process. Due to the consequences of the COVID-19 pandemic (the offer to do home office) and the fact that the team is distributed in different locations, interviews and meetings were conducted virtually, recorded, and automatically transcribed. We used the MS Teams function to transcribe spoken words in the meeting. The documents produced were checked for accuracy and revised as MS Team misunderstood some words. Rework includes that all transcriptions were read and in parallel listened again to the recorded meetings. The transcribed words were adapted to the spoken word or added if not done (this happened when people spoke in parallel). The interviews and observations were transcribed in the project language, which was German. After that, the codes were translated into English for the matter of this research paper. If words or sentences were not fully

Table 2
Demographical and professional data about the project team members.

	Subproject manager	System Engineer	Sprint Planner	Junior System Engineer	Functional Safety Expert	Functional Safety Expert	Senior Electrical Architect
Age	31	30	32	28	29	28	63
Experience at EDAG in years	9	5	7	5	4	3	21
Gender	male	male	female	male	female	male	male
Nationality	German	German	German	German	Korean	Korean	German

Introduction part When do you join the project? What is currently your role in the project team? What is your scope of work? What are your challenges? Perception What do you believe are the strengths/weaknesses of your team? What do you believe is your strength/weakness? Detailed understanding of activities and interactivities Could you please describe in detail what are your daily actions? Could you please describe in detail what are your daily interactions? Leadership Emergence Can you describe step-by-step how you became a leader/follower for topics A, B, and/or C (based on the answer before)? Is your team leader or someone outside of your team involved in these activities? Do you believe there is a pattern / are many patterns behind when a leader/follower emerges in this project team? What do you have in your mind when speaking about a good leader/follower? Conclusion Before we finish, is there anything you would like to discuss on the topic of the emergence of shared leadership?

Fig. 1. Semi-structured interview protocol.

understood, it was cross-checked with the available collected internal team and project documents.

3.6. Data analysis

The analysis of the data was done in two steps. Since we use the concept of shared leadership as the occurrence of leadership functions among several people, we first focused on the occurrence of a leadership function (and the driving factors that promote its occurrence) and then looked at the occurrence of all the functions assumed by the team members. This was done in the first step through the three-order coding concept to identify the occurrence of the leadership function from a process perspective. Quantitative content analysis was done in a second step to identify all the leadership functions that occurred and link them to the people and a timestamp to build the process framework for the emergence of shared leadership.

3.7. First step: data coding

Based on the transcripts from the interviews, the observations and the chat protocols of the team were examined with the help NVivo using a multi-step process (Neuman, 2014). We used the Gioia method (Gioia et al., 2012) by conducting an analysis to develop first-order codes, process them into second-order codes and finally transform them into aggregated dimensions.

In the first step, open coding was carried out by analysing the interview transcription to find out the key ideas (Strauss and Corbin, 1998), later with the transcription of the observation and chat protocol.

The focus of the open coding was always on the fact that people undertook activities in the direction of taking on leadership functions. Here, a retrospective perspective often had to be taken. At the end of the first step, we put all first-level codes from the interview and observation transcription and chat protocol together. In the second step, second-order concepts are developed from the first-order concepts by grouping together similar first-order concepts. And finally, in the third step, all similar second-order concepts were aggregated into the three-order coding concept (Gioia et al., 2012). Figs. 4-9 in the appendix provides an overview of the first-, and second-order concepts and the aggregate dimension.

3.8. Second step: quantitative content analysis

We made a quantitative content analysis (Krippendorff, 2018) to identify the process of shared leadership emergence. We conducted this in several steps. First, we took the revised transcription and created a code for when a team member (independent from the project role in the team) took on successful leadership functions. We formed categories based on Morgeson et al. (2010) leadership functions. Categories included the name of the leadership function, the person performing that leadership function, the area in which the leadership function takes place, and the point in time when the leadership function came into existence, e.g. structure and plan, sub-project manager, cost, CW 25. The categories can be used to determine who took on which leadership functions and when during the study period.

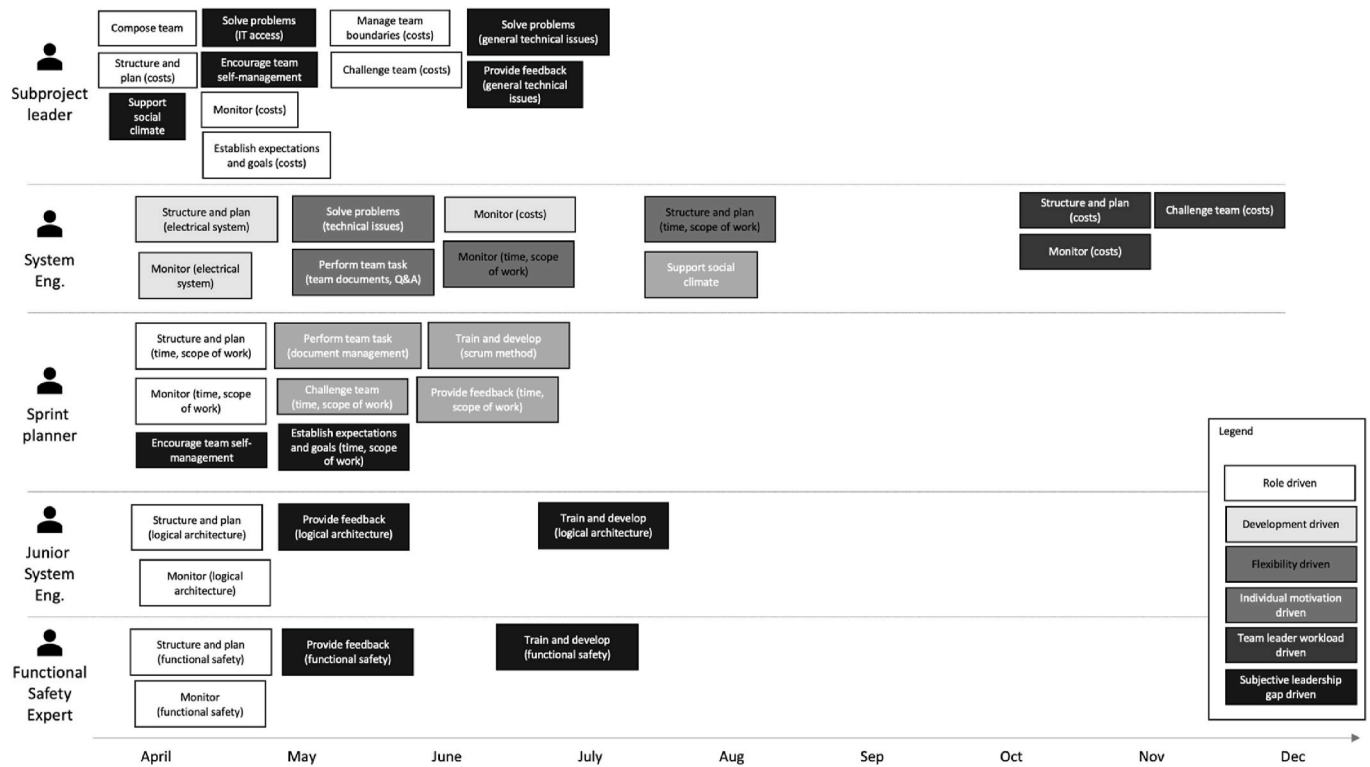


Fig. 2. Schematic representation of the leadership function assigned according to time, person and factors that promote the emergence of leadership functions.

4. Results

Based on the available data from the semi-structured interviews of the team, the observations of team meetings and the internal project and team documents of our research, we have created a process framework for the emergence of shared leadership.

For illustrative purposes, we have divided the presentation of the findings into three stages, with the third stage showing the process framework.

- Stage1: The process for the occurrence of a leadership function in product development project teams
- Stage2: The leadership functions in the product development project team
- Stage 3: A process framework for the emergence of shared leadership in product development project teams

4.1. Stage1: the process for the occurrence of a leadership function in product development project teams

Based on the collected data and the analyses via the three-order coding concept, we defined seven process steps called (1) recognition, (2) claiming, (3) selection, (4) acceptance by the executor, (5) starting activities, (6) acceptance by the followers, and (7) consolidation for the emergence of leadership functions in product development project teams. It is important to emphasise that we only focus on a successful way of assuming leadership functions or performing leadership activities that amount to leadership functions.

4.1.1. STEP1: recognition

The process starts with the recognition of the leadership function or just the recognition of leadership behaviour. We have identified six driving factors that promote the recognition: role-driven, development-driven, flexibility-driven, individual motivation-driven, subproject

leader workload-driven, and subjective leadership gap-driven. The first three factors (role-driven, flexibility-driven, and development-driven) are top-down through rules and descriptions from the organisation. The last three factors (team leader workload-driven, individual motivation-driven and subjective leadership gap-driven) are bottom-up from the team's individuals.

The role-driven is at the beginning of the project. The management and/or project manager and/or subproject leader screen the documents and collect the relevant information for the (project) team roles, which include leadership functions. This can be explicit or implicit in the role description.

Development-driven is when managers see potential in persons working in a project team and want to develop their skills. The management (or subproject leader) recognises leadership functions to develop the team members during the project.

Another way of recognising a leadership function or activity is when the subproject leader or the team member recognises roles that need substituting, for example, in case of illness, holiday or paternity leave. The reason is to increase the flexibility of the team.

When the workload is too high for the subproject leader (or another team member), they start by identifying leadership functions that must be handed over.

The recognition of a leadership function can also be individual motivation driven. The subproject leader recognises the individual motive and finds a leadership function. Or team member recognises a leadership function.

The last factor that promotes leadership recognition is what we have called the subjective leadership gap. We would especially like to emphasise the word subjective because it may be that the leadership function already exists, but a team member/leader either does not perceive it or thinks it could be better. However, team member(s) or subproject leader recognise(s) the leadership function that needs to be added or changed.

4.1.2. STEP2: claiming

The next step is to demand this recognised leadership function. This can be done in a formal address at a meeting or simply in people's minds. A formal way is when the management and/or project manager and/or subproject leader define and claim the roles, including leadership functions for the team. The management or the subproject leader claims leadership functions to develop the team members. Subproject leader or team members claims the leadership function which needs to increase flexibility. Subproject leader claims the leadership function, which s/he wishes to hand over for handling their workload.

The next two claims of leadership functions can (not must) only stay in people's minds and never be made transparent to other team members. This can be because the subproject leader or team member claims the leadership function influences individual motivation. Or subproject leader or team member claims the leadership function, which will close the individual leadership gap.

4.1.3. STEP3: selection

The third step (Step 3) is called selection. It can be distinguished between a "transparent path" and an "in-transparent path". A transparent path is when team members (and subproject leader) speak in a meeting and decide together who should take over the leadership function/activity or an in-transparent path is when a team member selects him-/herself for the leadership function without sharing his/her attention to other members. In the transparent path, one team member will be selected for the leadership function or activity from management, subproject leader or other team members. This can also happen in different ways. The management and/or project manager and/or subproject leader select the team member(s) for the identified project roles in the team. Management (including the project manager) or the subproject leader selects the team members to develop the defined leadership functions. Subproject leader or team members select(s) another team member(s) who should take over the defined leadership function/activity to increase flexibility. The subproject leader selects the team member(s) who should take over the defined leadership functions/activity to handle the workload. In the next two selections, this can be in a transparent and in an in-transparent path. The subproject leader selects the team member, or the team member selects himself/herself for the defined leadership functions/activity to catch the individual motives. Subproject leader (s) selects himself/herself or another team member, or the subproject leader selects the team member(s) to close the subjective leadership gap.

4.1.4. STEP4: acceptance by executor

Leadership is always a way of leading and following. In the fourth step, the team member who should take over the leadership functions/activities should accept it and the other team members (and subproject leader) should accept and follow the selected team members. In the case of the in-transparent path, the team member has already accepted it in a selection step (Step 3). Furthermore, it can be distinguished between explicit and implicit consent. Explicit consent could be observed when the team members agree in a meeting that s/he or another team member will take over leadership functions/activities. Implicit consent could be observed when a team member accepts to take over the leadership function/activity without explicitly agreeing on it or saying anything. Or when other team members don't explicitly agree to follow the person who will take over the leadership function/activities.

4.1.5. STEP5: start leadership behaviour

Until this step, the leadership function/activity is identified, tagged to a person and accepted by the team member(s). Step 5 is relevant because the team member starts with the leadership activities. This can be to initiate a technical meeting with all team members to collect all relevant technical issues and to discuss how to deal with them. This can be developing a plan for a domain or the whole team, monitoring the team activities or performing team tasks like creating a holiday plan or

templates that the whole team will use.

For the "in-transparent path," now it is the first time that other team members (and the subproject leader) will recognise that a team member will execute leadership activities.

4.1.6. STEP6: acceptance by the followers

Again, leadership is a way of leading and following. In this step (Step 6), the follower(s) (the member(s) who will follow to fulfil the leadership activities) are the focus. The team members who take over leadership activities start the activities, and followers must accept it and assist him/her. For example, joining the technical meeting and sharing their experience in the meeting. Or the team members give input to another team member who creates a plan for the team's activities. The in-transparent path ends because the follower can now recognise the leadership function/activities.

4.1.7. STEP7: consolidation

The last step is the leadership function's consolidation (Step 7). In this step, the team member continues or expand their leadership behaviour. S/he gets feedback for his/her for the execution of the leadership activities. Based on the feedback or experience, the team member adapts the leadership function/activities. When a new leadership function is missing, a team member will be perceived as someone with "more" responsibility and a first contact person for the other team members.

4.2. Stage 2: the leadership functions in a product development project team

We have established how a leadership function emerges and have identified the leadership functions in the product development project team for the period under consideration. In stage 2, we zoom out and classify the emergent leadership functions in terms of time and personnel.

The results are shown in Fig. 2 based on the quantitative content analysis. Fig. 2 shows a schematic representation of the leadership function assigned according to time, person and driver for the emergence of the leadership function. Each box represents a leadership function's occurrence and contains the function's name and the area, e.g. monitor (costs). We realised that the same leadership functions in different areas occur and to distinguish the function regarding the areas.

In total, 38 leadership functions emerge, and most functions are structure and plan (7) and monitor (8). It can be seen from the figure that leadership functions arise in parallel for several people. The leadership functions were identified in 5 out of 7 persons. At the subproject manager (11), the system engineer (11) and the sprint planner (8), most leadership functions emerged. Many leadership functions emerged at the beginning of the observation (which is also the beginning of the project team) and decreased over time. It can be seen that after a certain time, a saturation state occurs, and no further (or only very few) leadership functions arise. The subproject manager has the most leadership functions in the area of costs, while the sprint leader is in time and the scope of work of the team. During the further course of the project, the system engineer assumes management functions in the cost, time and scope of work areas for reasons of development, flexibility and subproject leader workload-driven. It should be noted that three of the seven team members share leadership functions in the area of (time, cost, and scope of work). The system engineer, junior system engineer and functional safety expert take on the leadership functions in technical areas. The system engineer takes on a special role here, as he takes over leadership functions from the sub-project manager and sprint manager over time. The different colours of the boxes show the reason for the emergence of the leadership function. The most important drivers for the emergence of leadership functions are the role description and its adoption (12) and the subjective leadership gap (11). Especially at the beginning of the project, the leadership functions emerge through the

description of the roles and are mainly in the time, costs and scope of work, but also and in technical areas. The leadership functions that emerge through the subjective leadership gap are distributed in the first half of the project and are more at home in the technical areas.

4.3. Stage 3: a process framework for the emergence of shared leadership in product development project teams

With the results from phases 1 and 2, we can now answer the research question by creating a process framework for the emergence of shared leadership. The process starts with team composition, continues with the needs of leadership functions, followed by the occurrence of leadership functions and ends with the emergence of shared leadership.

4.3.1. Team composition

At the beginning of the product development project team, the subproject manager collects the relevant role descriptions based on the planning and adds to these roles as needed. The leader of the sub-project starts to look for people who would take over the tasks in his/her organisation by asking the team leaders. The team leaders (Germany-wide) check their teams and offer different members to choose from depending on the availability, skills, experience and strategy of the employee's supervisor to the subproject leader. The subproject leader decides who will join the team and who not. This is how the team is put together.

"After screening the project specification, I defined the project team based on the expected roles from the client and the additional roles we need to fulfil the project specifications. (...). The team leaders send me their candidates, and I select the best-fitting people from my point of view." (the subproject leader).

4.3.2. The need for leadership functions

The subproject leader invites the team for a Kick-off to discuss the project and team documents with them. As a rule, this is information about the client, the project content, the goals, processes, roles, expectations and the time frame. The team starts to organise itself, and the team members take on the defined roles. By taking on the roles, the need for leadership functions already arises (role, development and

flexibility-driven). Relatively simultaneously, the team starts activities that correspond to the tasks and goals of the project team. Due to the interdependencies of the tasks, the team members interact with each other. Through these interactions, further leadership needs are awakened by the team members (team leader workload, subjective leadership gap-driven).

"After the internal kick-off, we (team members) discussed all the relevant topics to understand the project." (the subproject manager).

"It was expected from my role to plan the sprint every two weeks. (...). My (she he gives the name of the sub-project manager) expects that I should have an overview of all ongoing activities in the team." (the sprint planner).

4.3.3. The emergence of leadership functions

Due to the different needs, several leadership functions arise in the team. The occurrence of leadership functions proceeds in the following steps: Recognition, claiming, selecting, acceptance by the executor, start activities, acceptance by the followers, and consolidation.

We identified the emergence of 38 leadership functions in our study. Especially at the beginning of the project, most leadership functions emerge.

"After one month, we still didn't have a meeting to discuss all the technical issues. So, I created an invitation for a meeting with all members. I facilitated the meetings and summarised all the problems in a prepared document. We thought about the next steps in the team and partly found a solution." (the system engineer).

"The (he gives the name of the sub-project manager) asked me to take over cost management because he has too much work. I said, of course, I can try it". (the system engineer).

4.3.4. The emergence of shared leadership

Shared leadership emerge because the sub-project leader and other team members divide and assume the various leadership functions that have arisen. In our study, 5 team members took on the 38 leadership functions, with 3 team members already taking on 30 leadership functions. The sub-project leader's leadership functions arise in the area of costs. Three of the seven team members shared leadership functions in the area of time, cost and scope of work. This shows that the team members have leadership functions as Followers and Executors at the

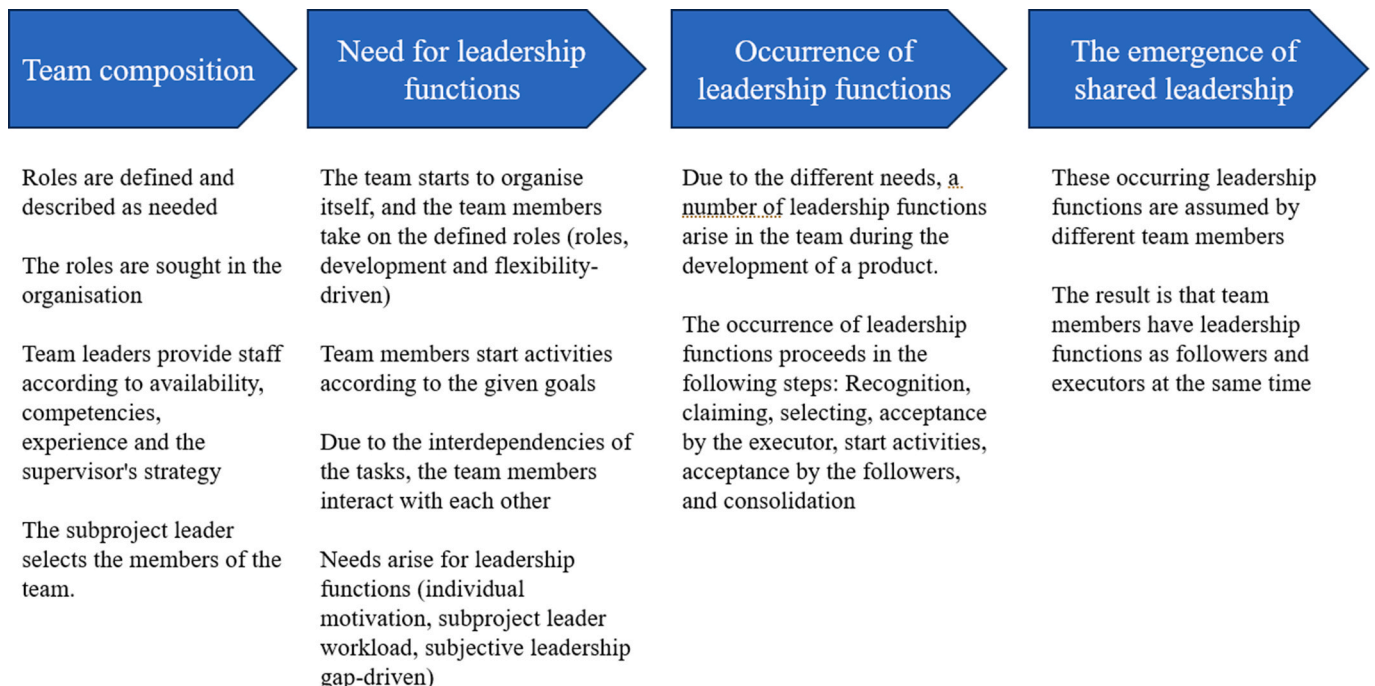


Fig. 3. A process framework for the emergence of shared leadership.

same time.

An extract from the interview:

“On the one hand, I’m responsible for planning the sprint. On the other hand, I write requirements and work with and for the electrical architect.” (the sprint planner).

Fig. 3 shows a process framework for the emergence of shared leadership in product development project teams.

5. Discussion

Our research follows the research stream of shared leadership in complex environments. This study adopted an inductive approach to explore shared leadership emergence in product development project teams by focusing on sharing leadership functions between team members.

Our theoretical contribution is to show the links between shared leadership, emergent leadership and leadership functions and to extend these concepts with empirical data and a process framework. Our research offers added value for practice because it supports the involved parties in understanding the process mechanisms to foster shared leadership in their product development project teams.

5.1. Theoretical contribution

The identified process framework of shared leadership emergence adds value to several existing theories.

5.1.1. Shared leadership theory

In project management research, applying person-centred leadership theories is very common compared to pluralistic leadership concepts such as shared leadership. For an overview of leadership theories in project management see [Turner and Müller \(2005\)](#) or [Clarke \(2012\)](#). This study contributes by following the research stream of shared leadership and bringing it into project management research. This may have implications for research on leadership in projects. For example, [Müller et al. \(2023\)](#) do with the theory of balanced leadership.

The study adds value to the literature on shared leadership theory ([Pearce and Conger, 2003b](#)) by understanding how shared leadership emerges in product development project teams based on the definition of shared leadership as an emergent phenomenon by sharing leadership functions between two or more people ([Small and Rentsch, 2010](#)).

Shared leadership emerges as a dynamic process ([D’Innocenzo et al., 2016](#)). We can offer an explanation as to why this is the case. We find that bottom-up and top-down factors lead to the emergence of shared leadership. The top-down approach prevails at the beginning of the project, and after that, the bottom-up approach occurs. It could be shown that after a certain time, a saturation state occurs and no (or very few) leadership functions occur. In the project team, the subproject team and four additional persons take over leadership functions in the team during the project.

5.1.2. Leadership emergence theory

The paper enhances the leadership emergence theory ([Clinton, 1988](#)), which has been gaining popularity in recent years (e.g. [Acton et al., 2019](#); [Badura et al., 2022](#)) by adding a different perspective on the emergence of leadership. Most of the research on leadership emergence is person-oriented and concentrates on the emergence of leader/follower identities by a claiming and granting process ([DeRue and Ashford, 2010](#); [Lyndon and Pandey, 2021](#)). We followed the path of the emergence of leadership by focusing on the emergence of leadership functions, which are content-oriented. Our framework still contains a process of claiming and granting, but not for the emergence of identities, but for the emergence of leadership.

The identified process framework for the emergence of shared leadership can be considered as an additional mechanism in the state of research on the emergence of leadership ([Acton et al., 2019](#)). The factors

we have identified that promote the emergence of leadership functions add value to current research on the antecedents of shared leadership ([Wu et al., 2020](#)).

Leadership emergence is described as a multilevel phenomenon (individual, relational and collective level) ([Acton et al., 2019](#)). When focusing on the emergence of leadership functions, this is still the case because the occurrence of a leadership function contains the individual and relational levels. The fact that many leadership functions occur in parallel leads to shared leadership, representing the collective level.

Much of the empirical research has been conducted with students ([Cox et al., 2021](#)) and less in a business environment, although research assumes that leadership emerges differently in different contexts ([Kozłowski et al., 2013](#)). For example when team members work in projects ([Carson et al., 2007](#)). Our study extends the empirical literature on the emergence of shared leadership with data from a real project.

5.1.3. Functional leadership theory

In general, our findings are based on the leadership functions according to [Morgeson et al. \(2010\)](#). Part of our process framework describes the process of the occurrence of leadership functions. This brings a theoretical contribution to understanding how this function occurs. So, we have found that the same leadership functions are created, but the area is different (like cost or time). Functional leadership research should take this into account. We have also noticed that some leadership functions occur more frequently, some do not occur at all, and some team members take on leadership functions and others do not. The antecedents of shared leadership may give explanations for this phenomenon.

5.2. Practical implication

First of all, the theory of shared leadership has emerged because researchers have done empirical research. Due to its added value, shared leadership is already being applied in teams of product development projects ([Mueller, 2021a](#); [Muethel and Hoegl, 2016](#)). Our case study has important practical implications and is relevant for companies that run product development projects or temporary organisations that work in complex environments. The role of (project) managers, sub-project leaders and team members is particularly important as they are part of the process and can directly influence the emergence of shared leadership. Depending on the organisation, other parties may also be involved, e.g. a project management office.

On the one hand, much empirical research has shown the benefits of shared leadership on individual performance ([Liu et al., 2014](#)), team effectiveness ([Pearce and Sims Jr, 2002](#)), task performance in a project ([Hoch et al., 2010](#)) and organisation effectiveness ([Pearce and Sims Jr, 2002](#)) as well as on team member satisfaction ([D’Innocenzo et al., 2016](#); [Robert Jr and You, 2018](#)) which leads us to say that shared leadership should be practised or at least be thought through in teams when they are working in a complex environment. On the other hand, it is difficult for practitioners to grasp the phenomenon of shared leadership emergence because many things happen during a project that influences it ([Mueller et al., 2023](#)). This makes it all the more important to take time to prepare the concept of shared leadership and its implications for practitioners. Many companies today are still characterised by the traditional person-oriented hierarchical leadership concepts.

It takes effort to shift the focus from the leaders to the leadership functions. This way of looking at leadership will be new to many practitioners but will provide a broader understanding. People will become more sensitive when looking at the concept of shared leadership because they focus on what people are doing not what people should do ([Crevani et al., 2010](#)). This has several advantages. For example, if the leader is unavailable for the team, you should divide the leadership into smaller parts and share the load among many team members. In a study by [PMI \(2021\)](#), the demand for professional project staff will increase steadily over the next few years, and the gap between demand and supply is

expected to widen. The concept of shared leadership can help narrow this gap. Furthermore, people will look at the leadership functions (and activities) rather than the role when replacing people. In addition, looking at employee leadership activities rather than roles or competencies allows for the identification of team members with high potential. In other words, the people who efficiently and effectively perform or take on leadership functions. This transparency helps to staff future project teams and to achieve a better fit between the requirements of the project and the people.

The view away from a leader to leadership should change the view of leadership development in practice. If specific people receive training today, the whole team should be empowered in the future.

Based on the process of the occurrence of the leadership functions, we have identified the different roles (manager, project manager, sub-project leader and team members) that influence it. The process steps of recognising (Step 1) and claiming (Step 2) have the greatest impact on the emergence of shared leadership.

(Project) Managers and subproject leaders can explicitly divide leadership tasks among different roles rather than assigning one person as a dedicated leader with the expectation that this person will take on all leadership tasks, as is usually the case. With this approach, a balance of leadership functions can be distributed among team members with roles. In addition to roles, managers can create organisational rules like having a high flexibility of the project team or developing people with potential for leadership or managerial roles, which also influences the emergence of shared leadership. For the subproject leader, the process can be relevant because s/he is aware of what to do to share leadership functions when the workload is too high. Or to motivate other team members to find leadership gaps (empowered team members are likely to perceive more gaps). The subproject leader will also realise that leadership tasks arise without his or her influence and that it is not possible to control everything.

Finally, team members become aware of what they can do to become a person with leadership function(s). Team members have the greatest impact when they recognise a leadership gap (Step 1). They can also get an idea of what else is needed (Steps 2–7) to successfully take on a leadership function and become part of the shared leadership team.

6. Conclusions

This paper provides a contribution by exploring shared leadership emergence in a product development project team based on the shared leadership concept as an emergent process by sharing leadership functions between people.

Product development project teams are complex systems as different roles and experts must work together due to the interdisciplinarity of the tasks, the complicated technology and the uncertainty and ambiguity (customer needs can change/will add during the project). Shared leadership is a valuable approach for managing these teams, but little is known about how shared leadership emerge.

Previous research on the emergence of shared leadership has focused

on the emergence of identities between leaders and followers, whereas our approach looks at the emergence of leadership functions. The approach we have taken has advantages because we look at leadership as the sum of functions rather than focusing on individuals. This gives us a broader perspective on leadership as we can identify all individuals who perform leadership functions.

Based on the findings we create a process framework of shared leadership emergence in product development project teams. These results are relevant for research because we extend the concepts of shared leadership, the emergence of leadership and leadership functions, and practitioners like managers, sub-project leaders and team members who are directly or indirectly involved in product development projects.

Our study has limitations that require further research to refine and extend this study. The context in which shared leadership emerges plays a crucial role. We studied the phenomenon of the emergence of shared leadership in product development project teams at EDAG, a German company in the automotive industry. The team we studied has less hierarchy and fewer predefined processes and is confronted with complexity and uncertainty. For mega projects with more hierarchy and many processes, the emergence process can be totally different. The post-Corona situation and the socio-cultural dynamics of the country might influence the results of our study. Since our research was initially exploratory in nature and served the purpose of matching theoretical findings outlined by the literature with insights from practices through the case study, we do not claim to make any generalisation.

Our qualitative research findings described here are a first step and can be further deepened through several case studies. Additional teams from different organisations and countries can also provide insights and added value. Furthermore, other/additional leadership functions should be considered and contrasted in the future.

Ethical statement

All procedures performed in this study involving human participants were in accordance with the ethical standards of AME University, Slovenia and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent: An informed consent was obtained from all individual participants included in the research, and the data used in this study are completely anonymised.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Appendix

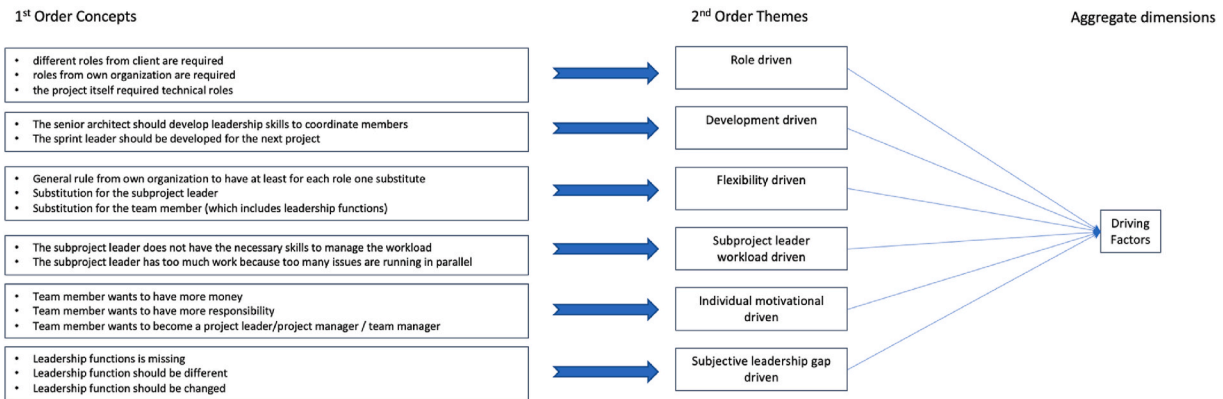


Fig. 4. First, second order and the aggregate dimension of the driving factors.

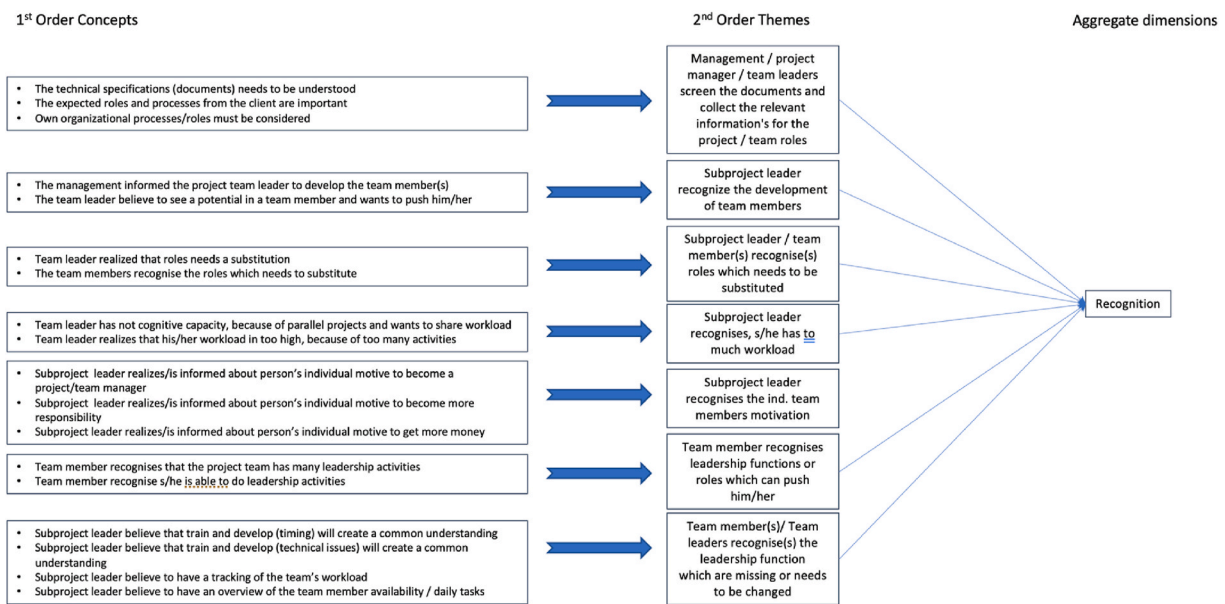


Fig. 5. First, second code and aggregate dimension: Process step "Recognition".

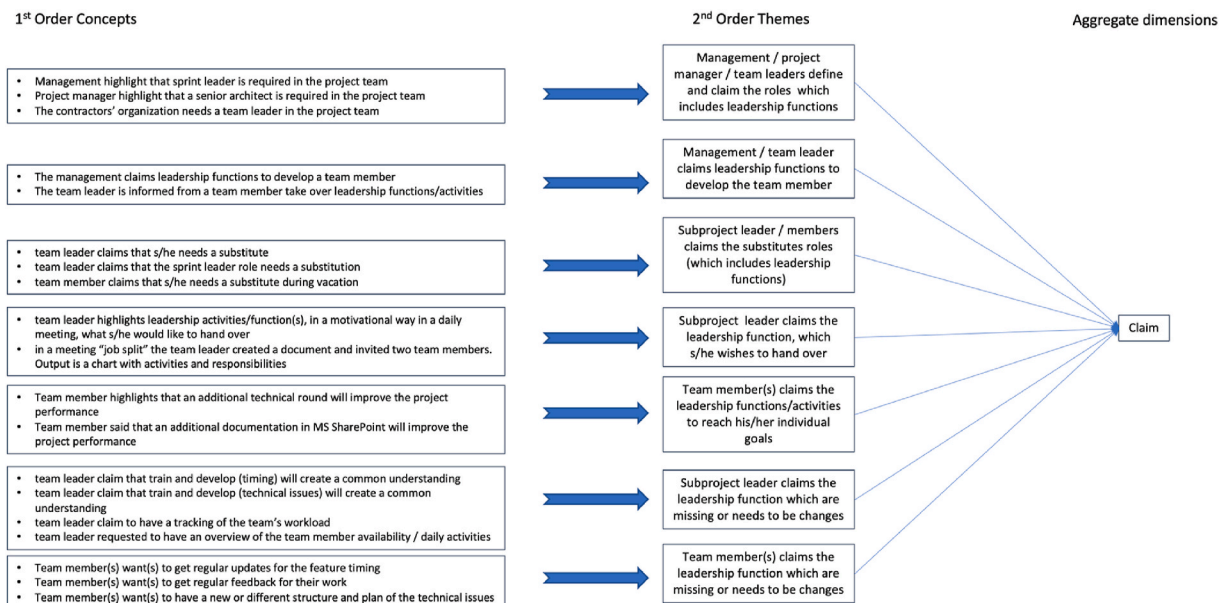


Fig. 6. First, second code and aggregate dimension: Process step "Claim".

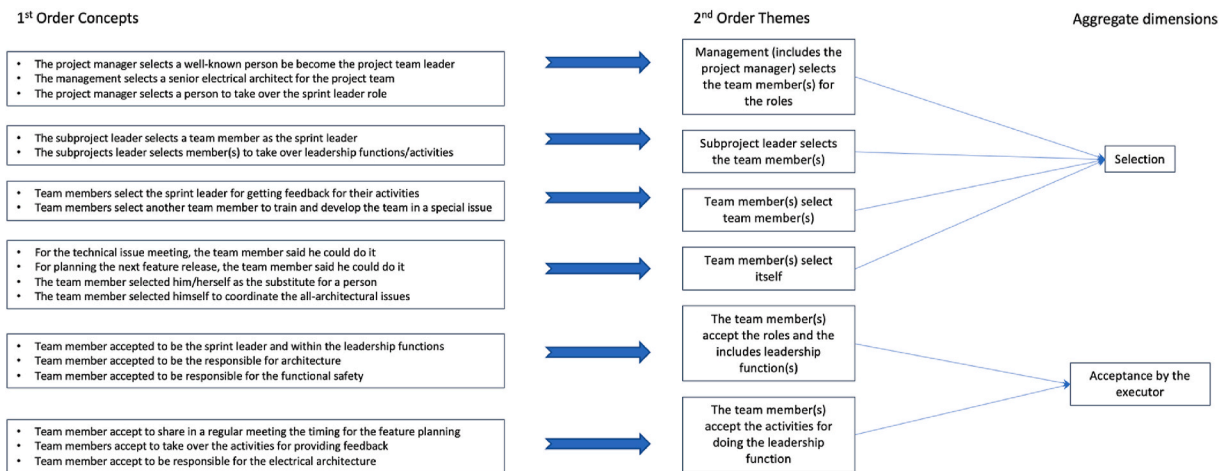


Fig. 7. First, second code and aggregate dimension: Process step “Selection” and “Acceptance by the executor”.

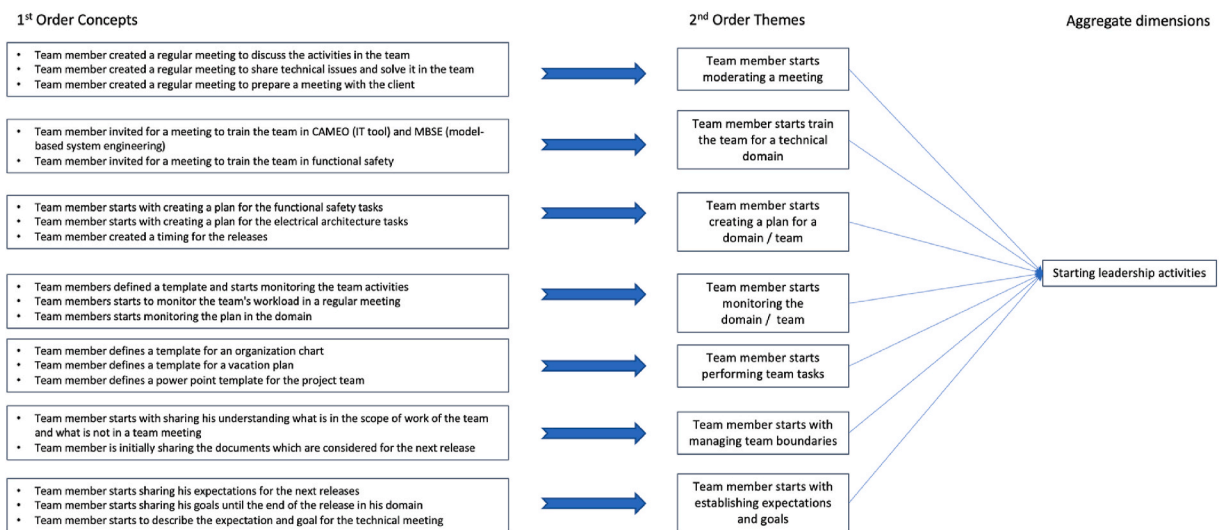


Fig. 8. First, second code and aggregate dimension: Process step “Starting leadership activities”.

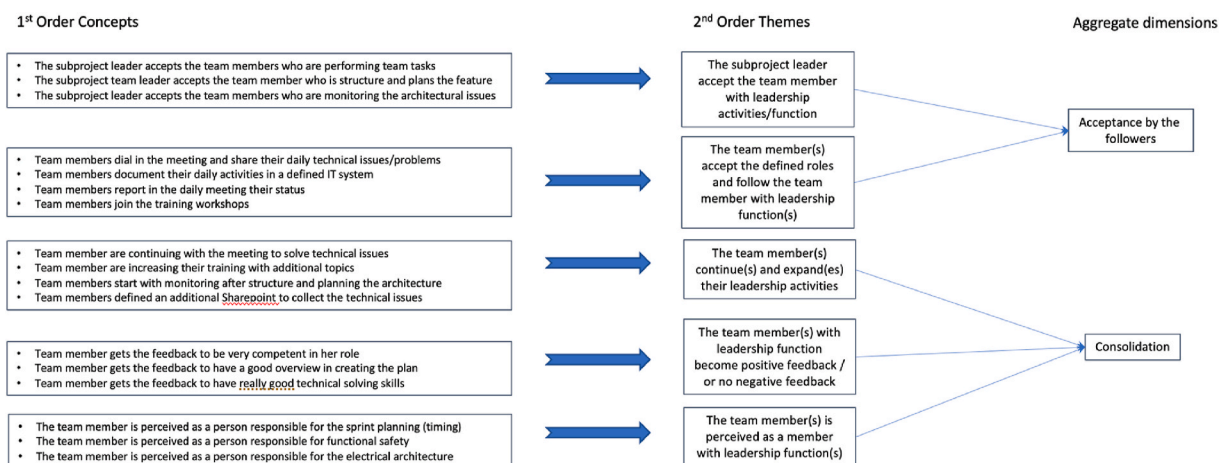


Fig. 9. First, second code and aggregate dimension: Process step “Acceptance by the followers” and “Consolidation”.

References

- Acton, B.P., Foti, R.J., Lord, R.G., Gladfelter, J.A., 2019. Putting emergence back in leadership emergence: a dynamic, multilevel, process-oriented framework. *Leader. Q.* 30 (1), 145–164. <https://doi.org/10.1016/j.leaqua.2018.07.002>.
- Ali, A., Wang, H., Soomro, M.A., Islam, T., 2020. Shared leadership and team creativity: construction industry perspective. *J. Construct. Eng. Manag.* 146 (10), 04020122.
- Aubé, C., Rousseau, V., Brunelle, E., 2018. Flow experience in teams: the role of shared leadership. *J. Occup. Health Psychol.* 23 (2), 198.
- Badura, K.L., Galvin, B.M., Lee, M.Y., 2022. Leadership emergence: an integrative review. *J. Appl. Psychol.* 107 (11), 2069.
- Bell, S.T., 2007. Deep-level composition variables as predictors of team performance: a meta-analysis. *J. Appl. Psychol.* 92 (3), 595.
- Bennett, N., Lemoine, G.J., 2014. What a difference a word makes: understanding threats to performance in a VUCA world. *Bus. Horiz.* 57 (3), 311–317.
- Bhattacharya, S., Krishnan, V., Mahajan, V., 1998. Managing new product definition in highly dynamic environments. *Manag. Sci.* 44 (11-part-2), S50–S64.
- Brunet, M., Fachin, F., Langley, A., 2021. Studying projects processually. *Int. J. Proj. Manag.* 39 (8), 834–848.
- Cakiroglu, S.S., Caetano, A., Costa, P., 2020. How do mid-senior multinational officers perceive shared leadership for military teams? A qualitative study. *Team Perform. Manag.: An Int. J.* 25 (5/6), 301–318.
- Carson, J.B., Tesluk, P.E., Marrone, J.A., 2007. Shared leadership in teams: an investigation of antecedent conditions and performance. *Acad. Manag. J.* 50 (5), 1217–1234.
- Clarke, N., 2012. Shared leadership in projects: a matter of substance over style. *Team Perform. Manag.* 18 (3/4), 196–209. <https://doi.org/10.1108/13527591211241024>.
- Clinton, J.R., 1988. Leadership Development Theory: Comparative Studies Among High Level Christian Leaders. Fuller Theological Seminary, School of World Mission.
- Cox, J.F., Pearce, C.L., Perry, M.L., 2003. Toward a model of shared leadership and distributed influence in the innovation process: how shared leadership can enhance new product development team dynamics and effectiveness. In: *Shared Leadership: Reframing the Hows and Whys of Leadership*. SAGE Publications Inc, pp. 48–76. <https://doi.org/10.4135/9781452229539.n3>.
- Cox, J.W., Madison, K., Eva, N., 2021. Revisiting emergence in emergent leadership: an integrative, multi-perspective review. *Leader. Q.*, 101579.
- Crevani, L., Lindgren, M., Packendorff, J., 2010. Leadership, not leaders: on the study of leadership as practices and interactions. *Scand. J. Manag.* 26 (1), 77–86. <https://doi.org/10.1016/j.scaman.2009.12.003>.
- Day, D.V., Gronn, P., Salas, E., 2004. Leadership capacity in teams. *Leader. Q.* 15 (6), 857–880. <https://doi.org/10.1016/j.leaqua.2004.09.001>.
- DeRue, D.S., Ashford, S.J., 2010. Who will lead and who will follow? A social process of leadership identity construction in organizations. *Acad. Manag. Rev.* 35 (4), 627–647. <https://doi.org/10.5465/amr.35.4.zok627>.
- D'Innocenzo, L., Mathieu, J.E., Kukenberger, M.R., 2016. A meta-analysis of different forms of shared leadership–team performance relations. *J. Manag.* 42 (7), 1964–1991.
- EDAG, 2023. Company Homepage. <https://www.edag.com/en/>.
- Fausang, M.S., Joensson, T.S., Lewandowski, J., Bligh, M., 2015. Antecedents of Shared Leadership: Empowering Leadership and Interdependence. *Leadership & Organization Development Journal*.
- Gioia, D.A., Corley, K.G., Hamilton, A.L., 2012. Seeking qualitative rigor in inductive research: notes on the Gioia methodology. *Organ. Res. Methods* 16 (1), 15–31. <https://doi.org/10.1177/1094428112452151>.
- Hoch, J.E., Pearce, C.L., Welzel, L., 2010. Is the most effective team leadership shared? The impact of shared leadership, age diversity, and coordination on team performance. *J. Person. Psychol.* 9 (3), 105.
- Hofman, M., Grela, G., Oronowicz, M., 2023. Impact of shared leadership quality on agile team productivity and project results. *Proj. Manag. J.*, 87569728221150436.
- Hsu, J.S.-C., Li, Y., Sun, H., 2017. Exploring the interaction between vertical and shared leadership in information systems development projects. *Int. J. Proj. Manag.* 35 (8), 1557–1572.
- Hülshager, U.R., Anderson, N., Salgado, J.F., 2009. Team-level predictors of innovation at work: a comprehensive meta-analysis spanning three decades of research. *J. Appl. Psychol.* 94 (5), 1128.
- Klein, C., DiazGranados, D., Salas, E., Le, H., Burke, C.S., Lyons, R., Goodwin, G.F., 2009. Does team building work? *Small Group Res.* 40 (2), 181–222.
- Kleinschmidt, E.J., De Brentani, U., Salomo, S., 2007. Performance of global new product development programs: a resource-based view. *J. Prod. Innovat. Manag.* 24 (5), 419–441.
- Kozlowski, S.W., Chao, G.T., Grand, J.A., Braun, M.T., Kuljanin, G., 2013. Advancing multilevel research design: capturing the dynamics of emergence. *Organ. Res. Methods* 16 (4), 581–615. <https://doi.org/10.1177/1094428113493119>.
- Krippendorff, K., 2018. Content Analysis: an Introduction to its Methodology. Sage publications.
- Langley, A., 1999. Strategies for theorizing from process data. *Acad. Manag. Rev.* 24 (4), 691–710.
- LePine, J.A., Piccolo, R.F., Jackson, C.L., Mathieu, J.E., Saul, J.R., 2008. A meta-analysis of teamwork processes: tests of a multidimensional model and relationships with team effectiveness criteria. *Person. Psychol.* 61 (2), 273–307.
- Lichtenstein, B.B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J.D., Schreiber, C., 2006. Complexity leadership theory: an interactive perspective on leading in complex adaptive systems. *Emergence* 8, 2–12.
- Liu, S., Hu, J., Li, Y., Wang, Z., Lin, X., 2014. Examining the cross-level relationship between shared leadership and learning in teams: evidence from China. *Leader. Q.* 25 (2), 282–295.
- Lord, R.G., Dinh, J.E., 2014. What have we learned that is critical in understanding leadership perceptions and leader-performance relations? *Industrial and Organizational Psychology* 7 (2), 158–177. <https://doi.org/10.1111/iops.12127>.
- Lyndon, S., Pandey, A., 2021. Deconstructing the shared leadership emergence process in entrepreneurial teams. *J. Small Bus. Enterprise Dev.* <https://doi.org/10.1108/JSBED-04-2020-0136>.
- Marks, M.A., Mathieu, J.E., Zaccaro, S.J., 2001. A temporally based framework and taxonomy of team processes. *Acad. Manag. Rev.* 26 (3), 356–376.
- Martinsuo, M., Huemann, M., 2021. Designing case study research. *Int. J. Proj. Manag.* 39 (5), 417–421.
- Mathieu, J.E., Gallagher, P.T., Domingo, M.A., Klock, E.A., 2019. Embracing complexity: reviewing the past decade of team effectiveness research. *Annual Review of Organizational Psychology and Organizational Behavior* 6, 17–46.
- Morgeson, F.P., DeRue, D.S., Karam, E.P., 2010. Leadership in teams: a functional approach to understanding leadership structures and processes. *J. Manag.* 36 (1), 5–39.
- Mueller, M., 2021a. In: *Empirical Research into Shared Leadership in a Product Development Project in the Automotive Industry 9th Scientific Conference with International Participation. All about People: Digital Transformation in Science, Education and Arts, Maribor*. <http://press.almamater.si/index.php/amp>.
- Mueller, M., 2021b. *Empirical Research into Shared Leadership in a Product Development Project in the Automotive Industry ALL ABOUT PEOPLE: DIGITAL TRANSFORMATION IN SCIENCE, EDUCATION AND ARTS*.
- Mueller, M., Bodea, C.-N., Radujković, M., 2023. Shared leadership emergence in product development project teams—a reflective practice perspective. *Open J. Leader.* 12 (2), 144–159. <https://doi.org/10.4236/ojl.2023.122010>.
- Muethel, M., Hoegl, M., 2016. Expertise coordination over distance: shared leadership in dispersed new product development teams. In: *Leadership Lessons from Compelling Contexts*. Emerald Group Publishing Limited. <https://doi.org/10.1108/S1479-35712016000008012>.
- Neuman, W.L., 2014. In: *Basics of Social Research*, seventh. Pearson.
- Nicolaides, V.C., LaPort, K.A., Chen, T.R., Tomasetti, A.J., Weis, E.J., Zaccaro, S.J., Cortina, J.M., 2014. The shared leadership of teams: a meta-analysis of proximal, distal, and moderating relationships. *Leader. Q.* 25 (5), 923–942. <https://doi.org/10.1016/j.leaqua.2014.06.006>.
- Novikov, V., 2016. Shared leadership in a department of defense acquisition project management team. *The Coastal Business Journal* 15 (1), 15.
- Pearce, C.L., 2004. The future of leadership: combining vertical and shared leadership to transform knowledge work. *Acad. Manag. Perspect.* 18 (1), 47–57.
- Pearce, C.L., Conger, J.A., 2003a. All those years ago. *Shared leadership: Reframing the hows and whys of leadership* 1–18.
- Pearce, C.L., Conger, J.A., 2003b. *Shared Leadership: Reframing the Hows and Whys of Leadership*. Sage Publications.
- Pearce, C.L., Sims Jr., H.P., 2002. Vertical versus shared leadership as predictors of the effectiveness of change management teams: an examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynam.: Theory, research, and practice* 6 (2), 172.
- PMI, 2021. *Talent Gap: Ten-year Employment Trends, Costs, and Global Implications*. <https://www.pmi.org/learning/careers/talent-gap-2021>.
- Robert Jr., L.P., You, S., 2018. Are you satisfied yet? Shared leadership, individual trust, autonomy, and satisfaction in virtual teams. *Journal of the association for information science and technology* 69 (4), 503–513.
- San Cristóbal, J.R., Carral, L., Diaz, E., Fraguera, J.A., Iglesias, G., 2018. Complexity and Project Management: A General Overview, 2018. Complexity.
- Scott-Young, C.M., Georgy, M., Grisinger, A., 2019. Shared leadership in project teams: an integrative multi-level conceptual model and research agenda. *Int. J. Proj. Manag.* 37 (4), 565–581. <https://doi.org/10.1016/j.ijproman.2019.02.002>.
- Serban, A., Roberts, A.J., 2016. Exploring antecedents and outcomes of shared leadership in a creative context: a mixed-methods approach. *Leader. Q.* 27 (2), 181–199.
- Sergi, V., Crevani, L., Aubry, M., 2020. Process studies of project organizing. *Proj. Manag. J.* 51 (1), 3–10.
- Small, E.E., Rentsch, J.R., 2010. Shared leadership in teams: a matter of distribution. *J. Person. Psychol.* 9 (4), 203–211.
- Strauss, A., Corbin, J., 1998. *Basics of Qualitative Research Techniques*. Sage Publications.
- Sweeney, A., Clarke, N., Higgs, M., 2019. Shared leadership in commercial organizations: a systematic review of definitions, theoretical frameworks and organizational outcomes. *Int. J. Manag. Rev.* 21 (1), 115–136. <https://doi.org/10.1111/ijmr.12181>.
- Takeuchi, H., Nonaka, I., 1986. The new new product development game. *Harv. Bus. Rev.* 64 (1), 137–146.
- Tatikonda, M.V., Rosenthal, S.R., 2000. Technology novelty, project complexity, and product development project execution success: a deeper look at task uncertainty in product innovation. *IEEE Trans. Eng. Manag.* 47 (1), 74–87.
- Turner, J.R., Müller, R., 2005. The project manager's leadership style as a success factor on projects: a literature review. *Proj. Manag. J.* 36 (2), 49–61.

- Wang, D., Waldman, D.A., Zhang, Z., 2014. A meta-analysis of shared leadership and team effectiveness. *J. Appl. Psychol.* 99 (2), 181. <https://doi.org/10.1037/a0034531>.
- Wu, Q., Cormican, K., 2016. Shared leadership and team creativity: a social network analysis in engineering design teams. *J. Technol. Manag. Innovat.* 11 (2), 2–12.
- Wu, Q., Cormican, K., Chen, G., 2020. A meta-analysis of shared leadership: antecedents, consequences, and moderators. *J. Leader. Organ Stud.* 27 (1), 49–64.
- Yang, Q., Lu, T., Yao, T., Zhang, B., 2014. The impact of uncertainty and ambiguity related to iteration and overlapping on schedule of product development projects. *Int. J. Proj. Manag.* 32 (5), 827–837.
- Yin, R.K., 2018. *Case Study Research and Applications*. Sage.
- Zaccaro, S.J., Rittman, A.L., Marks, M.A., 2001. Team leadership. *Leader. Q.* 12 (4), 451–483. [https://doi.org/10.1016/S1048-9843\(01\)00093-5](https://doi.org/10.1016/S1048-9843(01)00093-5).