UNIVERSITY OF TARTU

Faculty of Social Sciences

School of Economics and Business Administration

Karoliine Tatunts, Nadežda Lebedeva

TEAM PERFORMANCE IN RELATION TO DIFFERENT BASES OF POWER AND TASK TYPES

Master's thesis

Supervisor: Krista Jaakson, PhD

Co-supervisor: Veiko Valkiainen

Tartu 2024

Name and signature of supervisor: .....

Allowed for defense on: .....

(date)

We have written this master's thesis independently. All materials, viewpoints from literature, and other sources used to write this thesis have been referenced.

.....

(authors' signatures)

Acknowledgments

We would like to express our deepest appreciation to our supervisor, Krista Jaakson, PhD, and co-supervisor, Veiko Valkiainen, for their invaluable guidance and advice throughout this study. We are also grateful to the reviewer, Kristel Pinn, for their insightful feedback.

Special thanks to Teadusteater OÜ for providing valuable insider information on the Rakett69 TV show, including details on the show's organizational process.

We extend our gratitude to our classmates for their moral support and inspiration throughout this journey.

Lastly, we wish to acknowledge the unwavering support and belief in us from the parents, spouses, and children of each author.

Abstract

Purpose – This study explores the relationship between bases of power and team performance across different task types.

Design/methodology – Employing an experimental design, data were collected from three seasons of the Rakett69 TV show spanning 2020 to 2022. The sample comprised nine teams with 42 contestants aged 15 to 21. A total of 113 task instances were analyzed, with team decisions coded based on high and low levels of expert and legitimate power in speed-based and quality-based tasks, resulting in 465 decisions for subsequent analyses.

Findings – Higher proportions of expert power in quality-based tasks correlate positively with outcomes. Our analysis found no statistically significant correlation between legitimate power and team outcome.

Research limitations – Limitations include the condensed portrayal of competition, the nature of the simulated game, and the influence of public exposure and social pressure, cautioning the interpretation of results.

Practical implications – The study provides insight into the complex relationship between bases of power and team performance, deepening understanding of effective leadership frameworks in modern organizational settings.

Originality/value – This study innovatively explores the bases of power and team performance within a science TV show, employing experimental methodology and examining various task types, thus enriching existing knowledge on leadership dynamics.

Keywords: power, bases of power, team performance, shared leadership, task type

CERCS: S189, S190

Introduction

Understanding the interplay between power bases and task outcomes is essential for effective leadership and organizational success in team dynamics and performance. Previous research has examined various aspects of power and leadership within organizational contexts. French and Raven's (1959) seminal work identified five bases of power: legitimate, expert, coercive, reward, and referent. Subsequent research has expanded upon this framework, exploring the nuances of different power bases and their effects on team dynamics. Studies conducted by Bergman et al. (2012), Hoch (2013), and Sweeny (2024) have highlighted the importance of shared leadership and the role of expert power in decision-making processes. However, gaps remain in understanding the specific impact of power bases on team performance in competitive environments. Drawing from the scientific literature on power dynamics, team effectiveness, and shared leadership, this study addresses this gap, offering theoretical advancements and practical insights for understanding how different power bases manifest in team-based competitions, particularly in quality and speed-based tasks.

This study aims to explore the relationship between bases of power and team performance across different task types within the competitive environment of the Estonian science challenge TV show Rakett69. By analyzing three seasons of the show spanning 2020-2022, encompassing numerous episodes and task instances, we endeavor to shed light on how different power bases influence team decision-making and ultimately impact task outcomes.

The Theoretical Framework of this study, drawing from West's (2012) conceptualization of team dynamics, emphasizes two key dimensions: the task at hand and the social dynamics among team members. Our understanding of power bases, particularly legitimate and expert power, is informed by Song and Gu's (2024) research, which highlights the significance of these factors in empowering behaviors and shared leadership. While Song and Gu focused on the interplay of these power bases within individual leaders, our study focuses on their distribution within shared leadership teams.

To guide our inquiry, we have formulated two research sub-goals. The first sub-goal is to explore the relationship between the proportion of legitimate power and team performance in tasks prioritizing speed of completion (speed-based tasks). The second sub-goal is to examine the relationship between the proportion of expert power and team performance in tasks emphasizing superior quality outcomes (quality-based tasks).

Specifically, our research tasks are as follows:

1. Examine existing theoretical frameworks and literature on power conception and bases of power to gain a comprehensive understanding of the conceptual foundations.
2. Investigate how power bases affect team performance by analyzing research and theories to identify key mechanisms influencing team effectiveness. Develop hypotheses within a theoretical framework.
3. Provide a detailed description of the Estonian science challenge TV show Rakett69 and outline the methodology used to analyze team dynamics, including data collection methods and coding procedures.
4. Present the findings of the empirical analysis, focusing on the distribution of power bases within teams and their association with task outcomes across quality- and speed-based tasks within the competitive context of the Estonian science challenge TV show Rakett69.
5. Discuss the implications of the empirical findings within established theoretical frameworks.

We utilize a comprehensive analytical approach to achieve these objectives, including coding team decisions based on power base proportions and conducting statistical analyses to examine the relationship between power bases and task outcomes. By leveraging data from the TV show and applying rigorous methodological techniques, we aspire to provide valuable insights into the complex dynamics of power and leadership within teams.

Our study seeks to enrich the existing knowledge on team effectiveness and shared leadership, especially in competitive contexts. By elucidating the role of power bases in team decision-making and performance, we aspire to provide guidance for leadership practices and enhance organizational effectiveness across diverse settings.

In the subsequent sections, we will explore the theoretical foundations of our study, focusing on the theory and bases of power and the effect of power on team performance. We will then review relevant literature to contextualize our research within existing scholarship. Following this, we will detail the methodology employed in our empirical study on Rakett69 teams, including a description of the show and our analytical approach. Subsequently, we will present the results of our empirical analysis, followed by a discussion of the implications and insights derived from our findings. Through this research, we endeavor to enhance our understanding of team performance in competitive environments and lay the groundwork for future exploration.

1. Theoretical Foundations of Power and Team Performance

1.1 Theory and Bases of Power

Power, a fundamental concept in organizational theory and management studies, is pivotal in comprehending human behavior, organizational dynamics, and social relations. Its significance lies in its capacity to shape and direct the behavior of individuals and groups. Throughout history, the concept of power has evolved, with scholars and researchers offering various definitions and perspectives. (Keltner, 2017)

The notion of power traces back to ancient philosophical and political discourse. Over time, scholars from diverse disciplines have contributed to understanding power, examining its manifestations, mechanisms, and effects. From early conceptualizations by thinkers such as Plato and Machiavelli to modern theories in social psychology and organizational behavior, the concept of power has undergone extensive theoretical development. In this section of our study, we delve into the multifaceted nature of power, exploring various definitions and conceptualizations, along with bases of power, presented by scholars and researchers, seeking to understand its complex dynamics and significance to our study on team performance.

Table 1 provides an overview of power definitions from various scholars and researchers, highlighting key dimensions and components of this complex phenomenon. Some definitions, such as those by Bierstedt (1950) and Tawney (1931), emphasize force or coercion, portraying power as control over others. Others focus on the ability to influence behavior, emphasizing the role of persuasion, negotiation, and social dynamics.

Notably, power definitions in the table also underscore the importance of emotions and interpersonal connections in understanding power dynamics within organizations. Scholars such as Lewin (1951) introduce the concept of resistance alongside force, while Magee and Galinsky (2008) highlight the asymmetric control over valued resources in social relations.

In our study, we propose the following definition of power tailored to team dynamics, building upon prior scholarly contributions: Power is one person's ability to influence another person's actions. This definition underscores the intricate interplay between individual contributions, team structures, and strategic objectives, emphasizing the strategic implications of power dynamics for team performance.

Having established the theoretical foundation of power, the subsequent section will explore the bases of power as conceptualized by scholars in the field.

Table 1

Definitions of Power by Various Authors

Author	Definition of Power	Unique Features
Tawney (1931)	Power may be defined as the capacity of an individual or group of individuals to modify the conduct of other individuals or groups in the manner that they desire.	Modification of conduct, desires, individual or group
Russel (1938)	Power may be defined as the production of intended effects.	Production of intended effects
Bierstedt (1950)	Power is the ability to employ force.	Employing force
Lewin (1951)	The power of b over a is the quotient of the maximum force b can induce on a and the maximum resistance a can offer.	The ratio of force to resistance
Simon (1957)	For the assertion, "A has power over B," we can substitute the assertion, "A's behavior causes B's behavior".	Behavior causality
Dahl (1957)	A has power over B to the extent that he can get B to do something B would not otherwise do.	Getting others to act
Cartwright (1959), French and Raven (1959)	The power of O over P concerns O's ability to perform acts that activate forces in P's life space.	Activating forces in life space
Winter (1973)	The capacity of one person to produce consciously or unconsciously intended effects on the behavior and emotions of another person.	Consciously or unconsciously, behavior and emotions
Raven et al. (1998)	Social power can be conceived as the resources one person has to influence another to do what that person would not have done otherwise.	Resources for influence
Keltner et al. (2003)	An individual's relative capacity to modify others' states by providing or withholding resources or administering punishments.	Modify others' states, providing or withholding resources, punishments
Magee and Galinsky (2008)	Asymmetric control over valued resources in social relations.	Asymmetric control, valued resources, social relations
Keltner (2017)	Power is about making a difference in the world by influencing other people.	Making a difference in the world, influencing others

Note. Source: compiled by the authors.

French and Raven (1959) proposed a framework for understanding social influence and power dynamics, delineating five primary bases of power: legitimate, reward, coercive,

referent, and expert power. Their work laid the foundation for subsequent research into interpersonal influence and organizational dynamics.

Legitimate power originates from an individual's formal authority within a social or organizational hierarchy, relying on established norms for influencing behavior. ***Expert power*** is rooted in the agent's possession of specialized knowledge or expertise, with targets granting influence based on the agent's perceived competence and credibility. ***Reward power*** involves an agent's ability to offer rewards to induce compliance or desired actions, ranging from tangible incentives to intangible forms such as praise. ***Coercive power*** operates through the threat or imposition of punishment for non-compliance, contingent on the target's perception of the severity and likelihood of punishment. ***Referent power*** stems from the target's admiration, emotional connection, or identification with the agent, leading to voluntary alignment with the agent's goals and values. (French & Raven, 1959)

In addition to the primary bases of power elucidated by French and Raven (1959), Raven (1965), Allison (1971), and Minzberg (1983) offer insights into four additional bases: informational power, resource power, connection power, and reciprocal power. These expand upon the foundational framework, offering nuanced insights into the multifaceted nature of social influence dynamics within organizational contexts.

Raven (1965) expanded upon French and Raven's framework by introducing ***informational power***, which derives from an agent's capacity to provide valuable or new information, enhancing the target's decision-making or problem-solving skills.

Resource power stems from an individual's control over critical resources essential for organizational functioning, fostering dependency among organizational members. ***Connection power*** originates from an individual's access to influential networks within and outside the organization, facilitated by personal relationships or alliances. (Allison, 1971; Mintzberg, 1983)

As Minzberg (1983) outlined, ***reciprocal power*** stems from mutual exchanges among organizational members. It operates on the principle of reciprocity, where individuals gain influence by reciprocating favors or concessions. Cohen and Bradford (1989) further elaborate on this concept, recommending its application to foster mutual assistance and cooperation in organizations.

Also, the original French and Raven (1959) and Raven (1965) models underwent refinement, expanding the original six bases of power by differentiating the categories. The refinement of the original model resulted in a total of fourteen bases of power, encompassing reward (personal and impersonal forms), coercion (personal and impersonal manifestations),

legitimate power (including position, reciprocity, equity, and dependence), expert power (positive and negative), referent power (positive and negative), and informational power (direct and indirect). (Raven et al., 1998; Elias, 2008)

Table 2 compiles various bases of power as proposed by French and Raven (1959) and other researchers. While several authors agree on three primary bases of power, namely legitimate, expert, and referent, other bases are subject to differing interpretations.

Table 2

The Bases of Power as Proposed by French and Raven (1959) and Other Researchers

Base of power	Short description	French and Raven (1959), Raven (1965)	Allison (1971)	Mintzberg (1983)	Elias (2008)	Singh (2009)	Bertrand and Lozenski (2023)
Legitimate	Seniority of position	X	X	X	X (position, reciprocity, equity, and dependence)	X	X
Reward	Ability to offer inducements	X			X (personal and impersonal)	X	X
Coercive	Ability to impose sanctions	X			X (personal and impersonal)	X	X
Referent	Personal characteristics, charisma	X	X	X	X (positive and negative)	X	X
Expert	Skills and expertise	X	X	X	X (positive and negative)	X	X
Informa-tional	The knowledge one can access	X	X	X	X (positive and negative)		X
Resource	The ability to control access to resources		X	X			
Connection	The people one can access		X	X			
Reciprocal	Favours traded, quid pro quo			X		X	

Note. Source: compiled by the authors.

1.2 Effect of Power on Team Performance

A team is a cohesive group of two or more individuals tasked with a clearly defined and challenging objective that is best accomplished through collective effort rather than individual or parallel work. These individuals share common, challenging goals directly derived from the task, necessitating close interdependence to achieve them. Each member operates within distinct roles, though some may overlap, and possesses the requisite authority, autonomy, and resources to fulfill the team's objectives. (Woods & West, 2010; Kozlowski & Ilgen, 2006)

The effectiveness of a team, as highlighted by West (2012), encompasses various components essential for achieving objectives:

A. Task Effectiveness: This metric measures the team's success in accomplishing task-related goals.

B. Team Member Well-being: This encompasses mental health, stress levels, and team members' personal growth and development.

C. Team Viability: Reflecting the sustainability of a team's collaborative efforts and ability to operate effectively over time.

D. Team Innovation: This evaluates the team's capacity to generate and implement novel and improved processes, products, and procedures.

E. Inter-team Cooperation: Assessing the team's effectiveness in collaborating with other teams to deliver products or services.

Our study focuses explicitly on task effectiveness in the context of the competitive Rakett69 TV show, where teams either win or lose each game.

Furthermore, West (2012) emphasizes two fundamental dimensions of team functioning: *the task* the team must carry out and *the social factors* influencing how members work together as a social unit. The study conducted by Salcinovic et al. (2022) identified four key variables associated with team function and performance across various industries: leadership roles and styles, supportive team behavior, communication, and performance feedback.

In this theoretical section of our study, we initially explore the description of various task types as per one of West's (2012) fundamental dimensions of team functioning.

Following this, we investigate the social factors in alignment with another fundamental dimension outlined by West (2012). Specifically, our focus lies on the leadership approach and the basis of power in shaping team dynamics. Our subsequent sections elaborate on shared leadership, a collaborative approach where leadership responsibilities and

decision-making are distributed among team members. Additionally, legitimate and expert power emerge as prominent bases of power. Our study investigates these social factors and their impact on team operations and interactions.

Following this exploration, we hypothesize about the influence of various bases of power on each task type. This entails examining how different power dynamics manifest within the context of different tasks and their potential impact on team performance and outcomes.

Understanding the dynamics and implications of ***task types*** is essential for comprehensively analyzing team behavior, decision-making, and performance. Various team performance models note that task characteristics are significant in team outcomes. The productivity of outcomes varies depending on the task type. (Przybysz, 2014)

Hackman (1968) proposed a classification of task types into three categories: production, discussion, and problem-solving tasks. Similarly, Wildman et al. (2014) introduced their classification system, encompassing managing others, advising others, human service, negotiation, psychomotor action, defined problem-solving, and ill-defined problem-solving tasks. Our study mainly deals with the "defined problem-solving" category, characterized by tasks with predetermined or conclusive solutions.

Numerous studies have examined how time pressure affects group task performance across different task types, such as problem-solving, conflict-resolution, and production-rate tasks (Kelly & McGrath, 1985). Gracia et al. (2000) conducted a study examining the impact of time pressure on group work, focusing on task types (intellective, creative, and bargaining) and communication channels. Their research aimed to examine how these factors affect the quality of group performance under time constraints, and the results showed the relevance of task type and communication channels in understanding the relationship between time pressure and the quality of group performance.

Our study concentrates on competitive environments characterized by tasks carried out under time constraints and in conditions resembling sports games. Lebed's (2006) classification of games and competitive play offers valuable insights into this context. Our focus is conflict scenarios where all participating teams strive toward a shared goal amid cognitive strain and decision-making challenges. Conflict resolution in this setting typically involves indirect counteraction, characterized by an "objective" conflict form rather than direct "subject-to-subject" confrontation.

This study categorized the tasks into two types based on their characteristics. Both task types rely on quality and time parameters. In ***speed-based tasks,*** a team wins if they

achieve a solution or product in quality parameters faster than other teams. In ***quality-based tasks,*** a team wins if they achieve a solution or product superior in quality to other teams in a given timeframe.

Having explored task types, we delve into the shared leadership approach. Shared leadership is a team phenomenon characterized by the distribution of leadership roles and influence among team members (Sweeney, 2024). It facilitates expressing a wide range of task-oriented, relationship-oriented, and change-oriented leadership behaviors (Sweeney, 2022). According to Hoch (2013), shared leadership reflects a situation where multiple team members engage in leadership and is characterized by collaborative decision-making and shared responsibility for outcomes.

Empirical evidence suggests a positive relationship between shared leadership and team performance (Carson et al., 2007; Mathieu et al., 2008; Muethel & Hoegl, 2013; D'Innocenzo et al., 2021; Masaeid & Upadhyay, 2023), along with an increase in the quality of problem-solving skills (Pearce, 2004). According to Bergman et al. (2012), two primary reasons support the adoption of shared leadership. Firstly, in today's complex work settings, even highly experienced or educated leaders may lack the diverse knowledge and skills needed to fulfill all leadership functions adequately. Thus, leadership responsibilities should shift according to which member's expertise is most relevant to the task. Secondly, high-performance teams, particularly those composed of knowledge workers, demand a participative approach to decision-making. Additionally, the research conducted by Song and Gu (2024) found a positive relation between the interaction of team vertical leader position power and expert power with empowering behaviors, which were positively associated with shared leadership.

Legitimate power is unique to formal vertical leaders, whereas expert power is crucial for effectiveness, particularly in increasingly complex team tasks (Goodall & Pogrebna, 2015; Langfred & Rockmann, 2016). As per Xue (2022), individuals wielding power dominate the decision-making process at the team level. According to Singh (2009), different management phases benefit from different power bases. Legitimate power is more effective in initiating action, while expert power is more effective in planning, organizing, and persuading. These observations lead to hypotheses that a higher proportion of legitimate power may lead to greater success in tasks requiring quick decisions (speed-based tasks), whereas planning and organizing play a larger role in tasks focused on achieving optimal results, thus suggesting that higher proportions of expert power may result in better outcomes in quality-based tasks.

1.3 Theoretical Framework

The Theoretical Framework of this study, as depicted in Figure 1, is based on West's (2012) delineation of two fundamental dimensions of team functioning: the task at hand and the social factors that influence how members work together as a social unit. Additionally, the specific bases of power — legitimate (position) power and expert power — were informed by the findings of Song and Gu (2024), who highlighted the positive relationship between team leader position power and expert power with empowering behaviors and shared leadership. In this study, we utilize West's conceptualization and insights from Song and Gu's study to examine the effect of independent variables representing social factors, specific bases of power and task types, on the dependent variable, team performance.

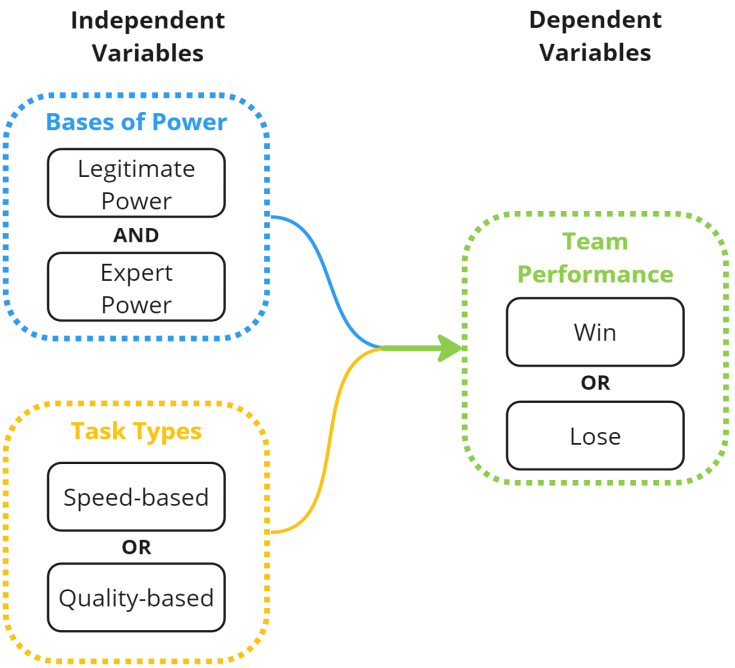
The following hypotheses were developed from the findings of past studies:

H1: Within tasks prioritizing speed of completion (speed-based tasks), we hypothesize that the winning teams' decisions are predominantly influenced by individuals with legitimate power.

H2: In tasks emphasizing superior quality outcomes (quality-based tasks), we hypothesize that the winning teams' decisions are predominantly influenced by individuals with expert power.

Figure 1

Theoretical Framework



Note. Source: compiled by the authors.

2. Empirical Study on Rakett69 Teams

2.1 Rakett69 Description

Rakett69 is an Estonian science challenge TV show that has been running for 14 years since premiering in 2011. One of the program's main goals is science popularisation in Estonia, and it has an average of 80,000 viewers per episode in the first week of airing, making up 6% of the Estonian population. In 2012, the show was named the best educational television program by the European Broadcasting Union. The Estonian Research Council financed the show, produced by Vesilind OÜ. An Estonian science communication agency, Teadusteater OÜ, makes the science challenges. The format of the show has been the same since the 4th season. The show's winner receives a cash prize that in 2024 was 15,000 €. Some extra awards change yearly, such as best-performing contestants, best-performing girls, etc. The top three contestants are offered a place in four Estonian universities.

To qualify as a contestant, individuals must be between the ages of 15 and 21 and enrolled in educational institutions in Estonia. Each season, around 100 young people fill out a form to get to be on the show, and all of them are called to the casting, where their knowledge, handicraft abilities, team player, and self-expression skills are evaluated. About 30 candidates are chosen to compete in the first episode - Science Labyrinth - and 12 or 15 contestants, depending on the season, get on board the show. The contestants in the show have knowledge-intensive skill sets covering multiple science fields.

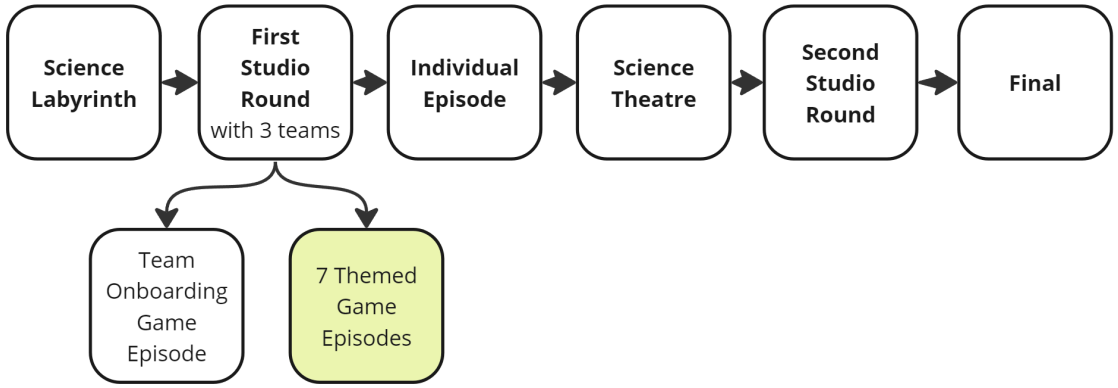
The first episode in a season is the science labyrinth, where about 30 candidates compete individually in four short tasks, and the best solvers move on to the next episodes. In the second episode, the candidates are divided into three teams, namely the Blue, Green, and Red, competing for the next six to eight episodes until the show moves on to individual tasks again. The production team assembles the teams to maintain equitable gender representation and balanced diversity in educational backgrounds. This ensures that each team comprises similar proportions of both male and female participants, as well as individuals with varying levels of education, and this is done to keep the playing field level. This also removes gender and education level as a factor in team performance. The day before the second episode's filming, contestants discover their team composition, learning who their teammates are. Revealing this at the last moment means that they all have to manage teamwork with people they are not familiar with. The contestants are neither experts in teamwork nor given tips about making teamwork more efficient. The contestants are thus acting based on what comes naturally to them.

After the science labyrinth, a team tasks round of the show - the first studio round - consists of six to eight episodes filmed consecutively, two per day. Each episode has a central theme, and the only recurring constant is that the first episode in this round (the second episode in the season) is a communications and teamwork episode. All episodes in the first studio round have two team tasks, and all the teams compete with each other. The third task is a duel. The duel is between two contestants from the weakest performing team in a particular episode. Whoever loses the duel cannot continue in the show. This short time frame, long hours on set, and the extra pressure of someone losing and going home create a stressful environment for the contestants. In finals, two contestants go head-to-head in completing a long task, and they get to form their four-person teams out of the contestants in their season.

Figure 2 depicts the season's scheme of the TV program Rakett69, highlighting 7 themed game episodes analyzed in this study. The team onboarding game episode was excluded from our research due to its unique nature. This episode focuses on teamwork and communication rather than knowledge-intensive problem-solving. It thus differs from others regarding the role of expert power, which could alter or influence the results. Additionally, starting from the individual episode, there is less emphasis on teamwork, with more individual work becoming predominant. While new teams are formed in some later episodes, the overall trend leans towards individual tasks.

Figure 2

Scheme of the Season of the TV Program Rakett69



Note. Source: compiled by the authors.

The team tasks in the first studio round last 15 minutes to 3 hours, depending on the challenge. There are two types of challenges. The first type is a quality-based task where the teams are given a certain amount of time to complete a task, and their results are then ranked.

The second type is a speed-based task, where the teams get a challenge, and whichever team completes it the fastest within a given margin of error wins. The first type gives out first, second, and third place; the second type distinguishes one winner while the other teams are losers. However, regarding game dynamics, securing second place in a quality-based task offers no advantage, as only task winners are exempt from the risk of elimination from subsequent TV show episodes.

Everyone hears the task at the same time. While the challenge is given, the contestants are lined up and cannot immediately discuss the task. After hearing the task for the first time, the task makers review any safety requirements to ensure that everyone understands the task. Once this is done, the judges say the task once more, and then the contestants run to their stations, so the beginning of the task is the first time they get to discuss the task at hand with their team; before that, they only get to think in their head.

In every episode, the teams chose a captain for that episode. To do this, they know the episode theme. The captain is chosen only by the team, and production does not influence them in any way. The team can select their captain from everyone, whether or not they have already been a captain. Contestants on the show often provide their reasons for the choice, ranging from acknowledging expertise in a particular field to assessing leadership abilities in challenging situations or simply wanting to see how they perform. An example of this is given in Appendix 1, example 1.

In Rakett69, teams maintain a tradition of shared leadership across seasons of the show, where multiple members actively guide and influence fellow members and team activities to enhance overall effectiveness. This aligns with the principles Carson et al. (2007) and Sweeney (2024) outlined. While shared leadership is not formally designated before each task, team members still follow these principles. Each member voluntarily and actively suggests solutions or directions for the team, and decisions are promptly made due to time constraints without formal voting. If consensus is reached, team members act immediately; otherwise, discussions ensue.

While Song and Gu (2024) explored the interplay between a leader's legitimate power and expert power (high and low position power and high and low expert power) within individual leaders, our study focuses on the distribution of these power bases within shared leadership teams. Despite selecting a captain for each episode, Rakett69 teams do not adhere to traditional hierarchical structures; decision-making and power are distributed among team members based on skills, expertise, and suitability for the current task. Figure 3 depicts the scenario where multiple individuals hold power simultaneously within a single task.

Figure 3

Illustration of Multiple Individuals Exercising Power Within a Single Task

Note. Season 12, Episode 3: The Red team's captain initiates the brainstorming process during the first task. Upon realizing another team member's greater expertise in the task, leadership seamlessly transitions to the more qualified individual. Source: ERR video archive, https://arhiiv.err.ee/video/vaata/rakett-69-tehnoloogia

The Integrated Model of Rakett69 Team Performance (Figure 4) illustrates the relationship between power bases, task types, and team performance within the context of the Rakett69 competition. This model is based on the Input-Process-Outcome (IPO) model by McGrath (1964). It provides a comprehensive framework, comprising Input, Process, and Team Performance components, for understanding team dynamics and their impact on outcomes. Inputs encompass various internal and external resources available to the team, while processes represent mechanisms affecting resource utilization. Outcomes encompass the criteria used to assess the effectiveness of team actions.

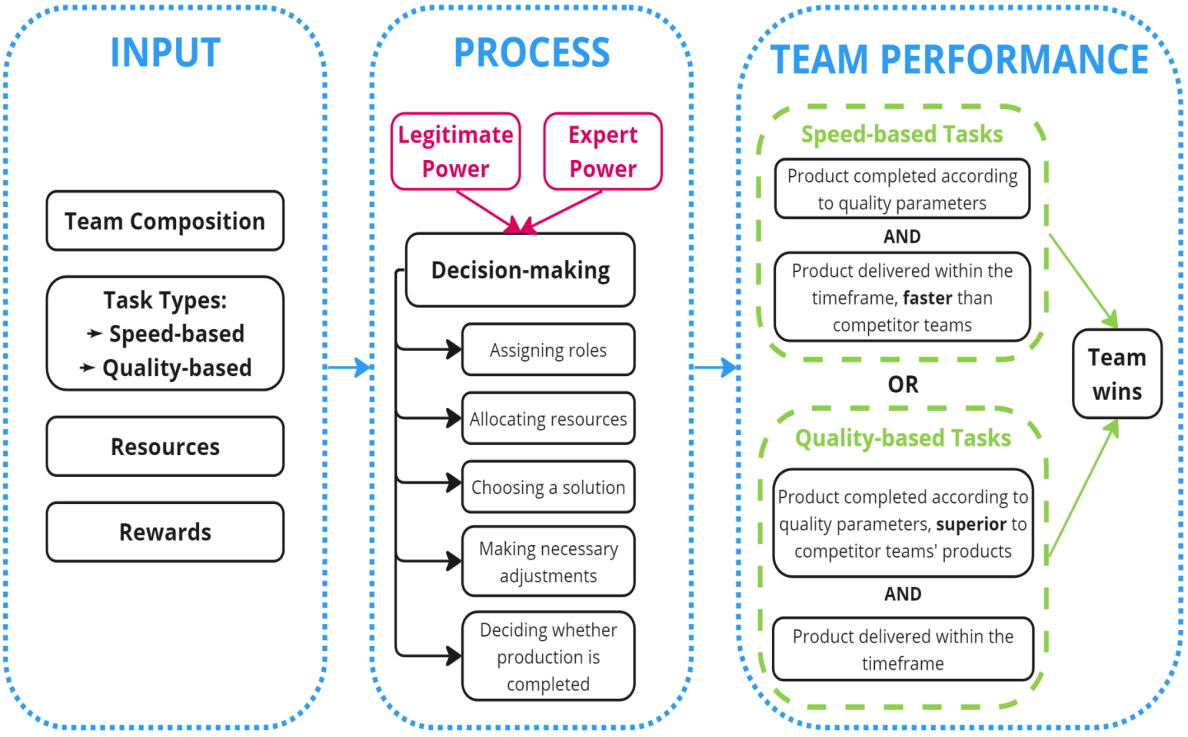
In the ***Input*** section of The Integrated Model of Rakett69 Team Performance, factors influencing teamwork include team composition, task types (speed-based and quality-based), resources, and rewards. These elements serve as foundational inputs that shape the subsequent processes and outcomes within the team environment.

The ***Process*** component outlines the decision-making processes within the team, influenced by power bases, specifically legitimate and expert power. Individuals wielding power dominate the decision-making process at the team level, as highlighted by Xue (2022).

Decision-making includes assigning roles, allocating resources, choosing a solution, making necessary adjustments, and deciding whether production is completed. Legitimate and expert power, derived from the theoretical framework, play significant roles in shaping team dynamics and influencing decision-making processes. When considering the potential power sources available to contestants, these two power bases distinctly emerge as the primary options. Teams autonomously elect a captain each episode, granting them legitimate power, while the challenges primarily require scientific expertise for resolution. Although referent power could sway perceptions toward others as experts, ultimate decision-making authority stems from perceived expertise. Informational power is excluded as the challenges center on school-acquired knowledge application rather than exclusive information. Due to the competitive nature of the show, contestants have limited control over the environment and game rules, which are predominantly governed by judges. Connection, reciprocal, reward, coercive, and resource power primarily reside with the judges.

Figure 4

Integrated Model of Rakett69 Team Performance in the Context of Bases of Power and Task Types



Note. Source: compiled by the authors, based on McGrath's (1964) Input-Process-Outcome (IPO) model.

Finally, ***Team Performance*** delineates the outcomes of team functioning, categorized into two task types: quality-based and speed-based. The team's success in these tasks ultimately determines whether they win or lose the competition.

The Integrated Model of Rakett69 Team Performance offers a structured framework for examining the interplay between power bases, task types, and team outcomes. Grounded in the Theoretical Framework, this model provides a theoretical lens through which to analyze and understand the dynamics of team performance within Rakett69's competitive environment.

2.2 Methodology of the Study

The data analyzed in the study was gathered from the Estonian TV show Rakett69. The television show archive is publicly available in ERR video archive via the link https://arhiiv.err.ee/video/seeria/rakett-69. The sample comprises 42 contestants proficient in the Estonian language, who advanced to later stages of the competition by winning qualifying rounds.

The study employs an experimental approach, gathering data through systematic observation of team task performance featured in archived episodes of Rakett69. Specifically, tasks from 7 themed game episodes were analyzed within seasons 10 to 12, covering the years 2020 to 2022.

This study measures the presence of power and its utilization through decision-making. While completing tasks, teams continuously make decisions that impact teamwork or determine solutions. The data collected in this study map out the bases of power individuals possess when making decisions. Each instance where the team encountered multiple possible courses of action and made a choice was noted as a decision point. The individual responsible for making the decision could influence the actions of others and thus wield power, consistent with the definition of power outlined in the theoretical section of this study.

Data collection involved meticulously viewing episodes, registering decisions made, and writing up the type of base of power the decision-makers had. Data were collected into an MS Excel spreadsheet, where every decision of every task of every team was marked up separately. 113 instances of task solving were viewed, resulting in 465 decisions for subsequent analyses. Of the 113 tasks, 56 were speed-based, and 57 were quality-based.

Each episode underwent a thorough viewing process, with one researcher viewing the tasks multiple times while the other reviewed some episodes to validate and ensure data validity. For review, both researchers took detailed notes for chosen episodes, documenting

each pivotal decision-making moment and then comparing the results. Compared results matched up for 90% of the decisions.

For each episode, the task code, captain of every team, decisions made, task type, task outcome, and a summarising comment written by the researcher were marked up, as seen in the example table in Appendix 2. Task code can be read as SSEE-T, where SS marks a season, EE marks an episode, and T marks a task number in a particular episode. The type of task is either 0 or 1; 0 indicates that it is a quality-based task, and 1 indicates a speed-based task. The task outcome is 0 (loser) or 1 (winner) for speed-based tasks and 0, 0.5, or 1 for quality-based tasks where a clear ranking is formed (3rd place, 2nd place, and 1st place). In some quality-based tasks, only the winner was announced because other teams had no results or equal results. Every time a decision was made, the type of base of power the decision maker had was written down as 0 (low) if they did not have a certain base of power and 1 (high) if they did.

The legitimate power is considered to be held by the contestant elected to be the team captain in a particular episode. They could have good leadership instincts and specialist insight in the field, or neither. Since the team does not know the exact task that will be solved at the moment of choosing the captain, the captain is not considered to have expert power unless there is an indication of them being viewed as an expert from a comment or reaction from the team during the task or in the interview.

The contestant whose ideas the team goes along with is recognized as possessing expert power if the teammates demonstrate clear trust in their expertise while solving the task or during an interview. It is important to note that having expert power does not mean that the person is an expert on the subject or makes useful decisions. If there are comments about the team not agreeing with the decision, it is clear that no one knows if the idea would work or if it is a last-minute rushed effort with little chance of success; there is no expert power (Appendix 1, example 2).

Table 3 presents a coding method used to analyze the influence of different bases of power on team decision-making within the context of the Rakett69 TV show. The codes categorize scenarios based on the levels of legitimate power (high or low) and expert power (high or low) observed during team interactions. The content examples illustrate how these bases of power manifest in team interactions, as observed through discussions, reactions, and post-task interviews. This coding method allows for a nuanced examination of power dynamics within teams, shedding light on how different power configurations influence decision-making processes and overall team performance.

Table 3

Coding Method for the Bases of Power: Descriptions and Sample Content for Each Code

Code	Bases of Power	Code Description	Sample Content
11	Legitimate power high (1) Expert power high (1)	The team follows the captain's instructions, perceiving them as authoritative and expert.	A team member's comment about the Captain: “Kaarel, as the team captain, knows how to solve this task. He draws exactly the right diagram on the board.”
10	Legitimate power high (1) Expert power low (0)	The team complies with the captain's directives, but there's uncertainty about the captain's expertise.	A team member’s comment about the Captain: “Our current solution is very idiotic, but Kevin just takes this idea and runs with it.”
01	Legitimate power low (0) Expert power high (1)	The team follows someone other than the captain, perceiving them as experts.	The captain's comment about the team member: “Since the chemistry assignment has come, I will give the lead to Liis.”
00	Legitimate power low (0) Expert power low (0)	The team follows someone other than the captain, but there's uncertainty about their expertise.	Comment from the Judges: “During the first minutes, the Green Team has been engulfed in real chaos.” Comment from the team's perspective: “There is no really good chemist in our team.”

Note. The samples of differently coded decisions are detailed in Appendix 1, examples 2-6.
Source: compiled by the authors

Codes 11 and 10 represent a team's legitimate power, while codes 11 and 01 signify the team's expert power. Code 00 indicates that there is neither legitimate nor expert power within the team, which means there is a base of power outside the two main power bases viewed in the study.

2.3 Results

Mapping out the power proportions during both speed and quality-based tasks without taking into account the outcome of the tasks (Table 4), it can be seen that in both cases, elected captains make almost half of the decisions, and persons with perceived expert power make three out of four decisions. Putting the data through the Student t-test does not indicate ($p < .05$) that the power proportions would have any significant deviation based on the type of the task if both winning and losing teams were included.

Table 4

Proportions of Bases of Power by Task Type

Expert power	Legitimate power		Total
	Low	High	
	Speed-based tasks		
High	35.68%	38.10%	73.77%
Low	18.46%	7.77%	26.23%
Total	54.13%	45.87%	
	Quality-based tasks		
High	43.81%	34.49%	78.30%
Low	12.40%	9.30%	21.70%
Total	56.21%	43.79%	

Note. Source: compiled by the authors.

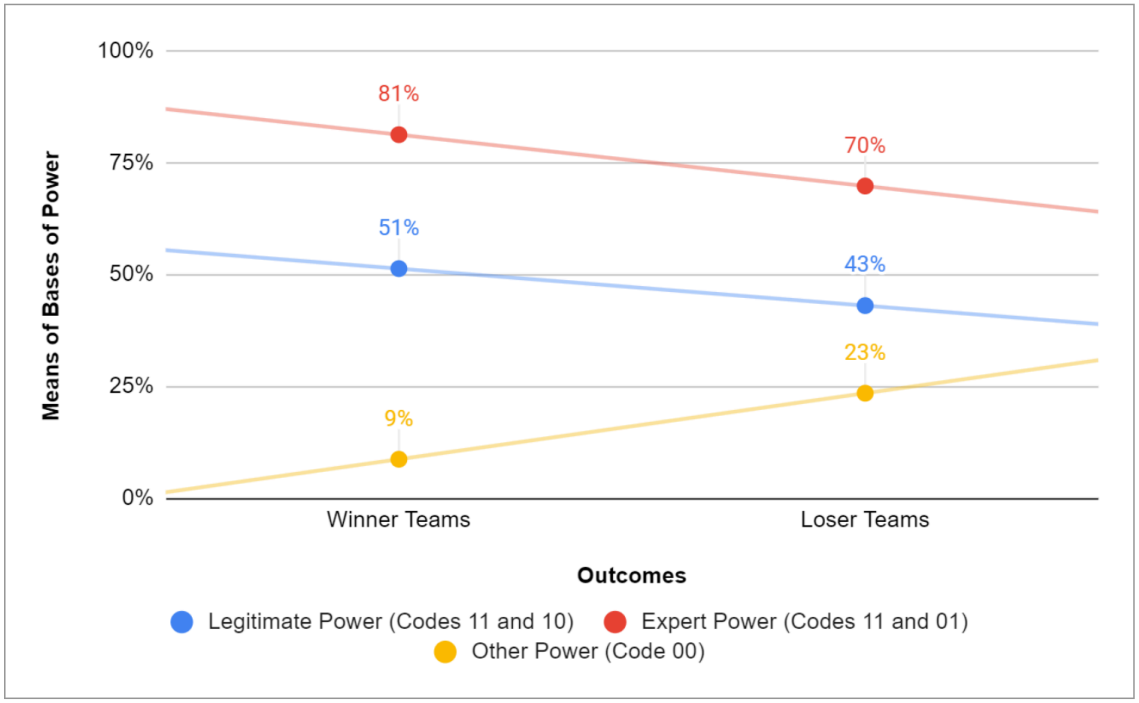
Upon closer examination of the results and their breakdown by task type and outcome, it can be seen that there are differences in the proportions of bases of power (Appendix 3). For speed-based tasks, the proportion of legitimate and expert power is higher for winning teams. In quality-based tasks, both winning and losing teams exhibit comparable proportions of legitimate power. However, similar to speed-based tasks, variations in the distribution of expert power are evident among teams of different rankings.

Figure 5 visually represents the means of bases of power in speed-based tasks among winning and losing teams. Figure 6 illustrates the means of bases of power in quality-based tasks among teams placed first, second, and third. In both cases, employing a scatter chart format with trendlines provides insight into the relationship between power dynamics and task outcomes.

In speed-based tasks, winning teams demonstrate a higher reliance on both expert power (81%) and legitimate power (51%) than losing teams (70% and 43%, respectively). This higher reliance on expert and legitimate power among winning teams suggests an emphasis on knowledge, expertise, and formal authority, indicating that both forms of power play crucial roles in determining team success in speed-based tasks. Conversely, losing teams show a higher proportion of other power (Code 00) utilization, suggesting a potential reliance on alternative power tactics. These findings underscore the significance of expert and legitimate power in determining team success in speed-based tasks.

Figure 5

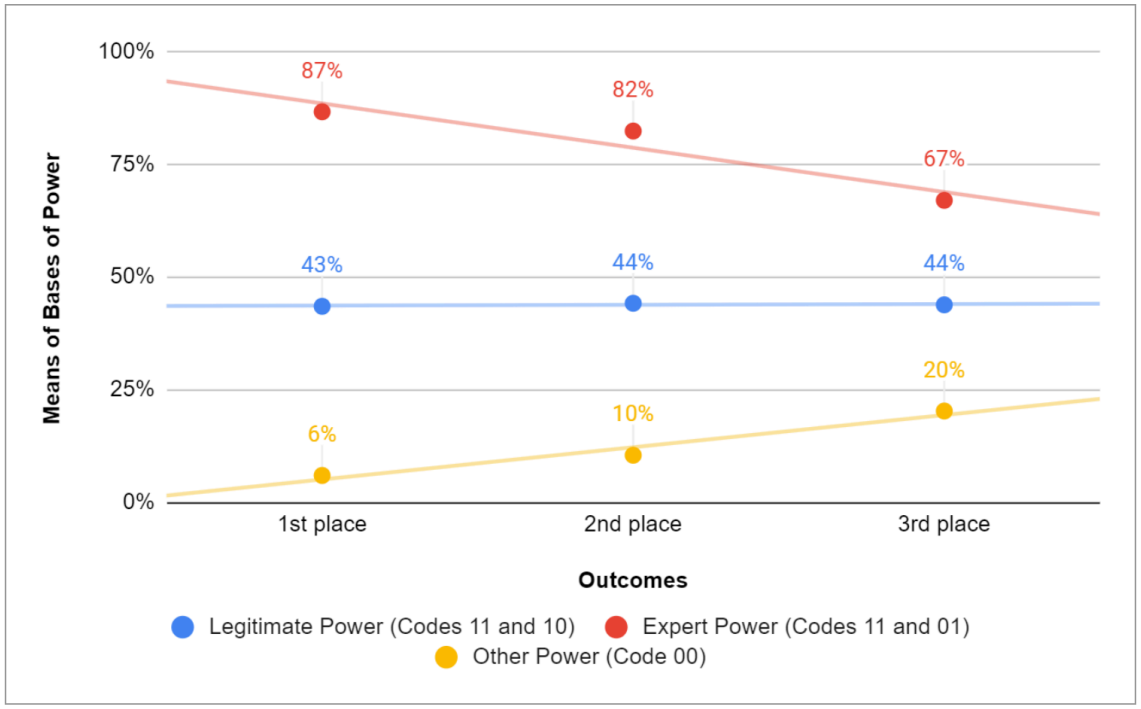
Comparison of Mean Power Base Distribution in Speed-based Task Outcomes



Note. Source: compiled by the authors.

Figure 6

Comparison of Means of Bases of Power Distribution in Quality-based Task Outcomes



Note. Source: compiled by the authors.

Teams that placed first in quality-based tasks, representing the winning teams, demonstrate a higher reliance on expert power (87%) compared to teams placed second (82%) and third (67%). Unlike in speed-based tasks, all teams exhibit a consistent level of legitimate power utilization, suggesting a uniform distribution of formal authority across the competition. Furthermore, the utilization of other bases of power increases from 6% for the first-place teams to 10% for the second-place teams and 20% for the third-place teams. Other bases of power (Code 00) represent a lack of expert and legitimate power, indicating a reliance on alternative power tactics. The observed trend suggests that as the reliance on other power increases, the quality of task outcomes decreases, highlighting the importance of expert power in achieving success in quality-based tasks.

Although trendlines look promising, most rho values do not indicate a significant relation between bases of power and task outcome (Table 5).

Table 5

Means, Standard Deviations, and Zero-order Correlations between Bases of Power and Outcome of the Task Based on the Type of Task

Bases of Power combinations	Mean	Stdev	Calculated rho-value
Speed-based task[a]			
Codes 11 and 10	45.87%	0.27	0.14
Codes 11 and 01	73.77%	0.25	0.21
Code 11	38.10%	0.29	0.08
Code 10	7.77%	0.15	0.11
Code 01	35.68%	0.26	0.12
Code 00	18.46%	0.24	-0.29*
Quality-based task[b]			
Codes 11 and 10	43.79%	0.27	-0.01
Codes 11 and 01	78.30%	0.22	0.39**
Code 11	34.49%	0.28	0.08
Code 10	9.30%	0.13	-0.18
Code 01	43.81%	0.29	0.21
Code 00	12.40%	0.17	-0.35**

Note. Codes 11 and 10 make up the whole legitimate power of the team, and codes 11 and 01 make out the whole expert power of the team. Source: compiled by the authors.

[a] There are 56 speed-based task readings. [b] There are 57 quality-based task readings.

* $p < .05$ ** $p < .01$

Contrary to expectations, hypothesis 1, the correlation between legitimate power (Codes 11 and 10) and outcome in speed-based tasks, does not show a significant correlation. However, in support of hypothesis 2, the correlation between expert power (Codes 11 and 01) and outcome in quality-based tasks, there is a significant correlation between expert power (Codes 11 and 01) and outcomes in quality-based tasks. A significant negative relation exists between missing expert or legitimate power (code 00) and outcomes for speed-based and quality-based tasks. The relation is more prominent in quality-based tasks.

To test the tasks in the context of bases of power and outcomes more directly, the proportions were inspected using the Student t-test (Tables 6 and 7). This confirmed that the winners of speed-based tasks do not have a significantly higher proportion of legitimate or expert power than the losing teams. This is also true for legitimate power in quality-based tasks. However, there is a significant difference in quality-based tasks between the first and third-place expert power proportions. The teams that placed third have significantly lower expert power percentages. Both time- and result-based tasks losing teams show a significantly bigger proportion of power that is neither legitimate nor expert.

Table 6

Speed-based Task Outcome in the Context of Base of Power

Outcome	Mean	Stdev	Concerning winners	
			Df	Calculated t-value
Legitimate power (codes 11 and 10)				
winner	51.33%	0.27		
losers	43.06%	0.28	54	1.07
Expert power (codes 11 and 01)				
winner	81.29%	0.24		
losers	69.91%	0.29	54	1.56
Code 00				
winner	8.70%	0.12		
losers	23.47%	0.27	54	-2.80**

Note. Source: compiled by the authors.

** $p < .01$

Table 7

Quality-based Task Outcome in the Context of Base of Power

Outcome	Mean	Stdev	Concerning 1st place		Concerning 2nd place	
			Df	Calculated t-value	Df	Calculated t-value
		Legitimate power (codes 11 and 10)				
1st place	43.49%	0.29				
2nd place	44.17%	0.24	34	-0.076		
3rd place	43.82%	0.21	40	-0.042	34	0.045
		Expert power (codes 11 and 01)				
1st place	86.67%	0.34				
2nd place	82.39%	0.26	34	0.428		
3rd place	67.01%	0.25	40	2.169*	34	1.774
		Code 00				
1st place	5.95%	0.13				
2nd place	10.44%	0.16	34	-0.917		
3rd place	20.25%	0.19	40	-2.825**	34	-1.674

Note. Source: compiled by the authors.

* $p < .05$ ** $p < .01$

2.4 Discussion

When the findings are evaluated within the framework of the hypotheses, it is evident that the study has yielded insights into the interplay between power bases and task outcomes within Rakett69's competitive setting.

The analysis revealed consistent patterns in decision-making, with elected captains contributing significantly to the decision-making process across task types. However, data indicates that over half of every decision is made by a non-captain. Individuals with perceived expert power (there can be more than one in a team) also played a predominant role in decision-making. Both of these results indicate that power and responsibility are divided into teams, and thus, the teams have shared leadership, according to Sweeney (2024) and Hoch (2013). High numbers of decisions made by expert power wielders further confirm Bergman et al. (2012) conclusion that individuals within high-performance teams, comprised of specialists, seek involvement in decision-making processes. The fact that none of the contestants are considered specialists in teamwork or team management and still develop shared leadership indicates that they are naturally inclined to do so.

Hypothesis 1, proposing that teams predominantly influenced by individuals wielding Legitimate power (Captain) would secure victory in tasks prioritizing speed of completion, is not supported by the results. Despite expectations, the analysis revealed that the differences in scores between teams with varying levels of Legitimate power were not statistically significant. This suggests that the teams performing better in time-evaluated tasks do not get stuck trying to perfect their solution and do not rely on legitimate power to make fast decisions. The team's power distribution alone does not determine success in tasks emphasizing swift completion. The teams naturally drift toward shared leadership and would thus expect responsibilities and decision-making to be commonly distributed, as Carson et al. (2007) indicated. Having this mindset, they are not expecting the captain to always choose and thus are not getting stuck deciding on a course of action.

Similarly, our findings do not fully support Hypothesis 2, which suggested that teams predominantly influenced by individuals possessing Expert power would triumph in tasks emphasizing superior quality outcomes. The data showed a correlation between lower percentages of expert power in the team and lower positions in the ranking. However, in a more detailed investigation, the difference between first and second place is too small to be considered statistically significant, so only the difference between first and third place is influenced by the proportion of expert power in the team. The fact that expert power influences the outcome aligns with Goodall and Pogrebna's (2015) and Langfred and Rockmann's (2016) findings that expert power is particularly influential in effectively solving increasingly complex team tasks.

When examining task outcomes more closely, we observed shifts in the proportions of bases of power among different ranking teams within each task type. While timed task winners exhibited slightly higher proportions of position-based and expert-based power than losers, these differences were not statistically significant. There were no differences in the outcome of quality-based tasks regarding proportions of legitimate power. In contrast, result-based tasks showed more distinct variations in proportions of bases of power among different ranking teams. Significant differences were observed in expert-based power between first-place and third-place teams. Most correlation coefficients did not reach statistical significance, suggesting that factors beyond bases of power may influence task outcomes, keeping in line with West's (2012) conclusion that multiple factors play into the effectiveness of teams.

Although the majority of the decisions are made by expert and legitimate power holders, in both task types, it becomes clear that individuals without either legitimate or

expert power also influence the team. That influence plays a bigger role in losing teams, with approximately every fifth decision made by such individuals, and negatively correlates with the task outcome. This indicates a clear shift in the workflow of losing teams, prompting further investigation into why these teams feel the need to follow individuals with neither expert nor legitimate power.

Our findings provide valuable insights into the interplay between bases of power and team performance within Rakett69's competitive environment. While power distribution influences team dynamics to some extent, its direct impact on task success remains nuanced and multifaceted. Shared leadership models are increasingly recognized for promoting collective decision-making and shared influence within teams. However, the role of individuals lacking legitimate or expert power in decision-making processes remains an underexplored domain. This underscores the need for further investigation into the underlying mechanisms driving team performance in knowledge-intensive tasks.

Limitations

While our research encompasses three seasons of the television show Rakett69 and employs diverse analytical methods, it is subject to certain limitations. Thus, the interpretation of our findings should be approached with caution.

Restricted View of Competition Process: Our analysis is confined to the condensed portrayal of the competition game in televised segments. As these segments typically compress lengthy events, viewers are provided with a limited perspective of the overall proceedings, omitting various events and decisions made within the teams that were not included in the final TV broadcast.

Time Pressure and Constraints: Both task types are constrained by time pressure. One requires swift completion within a limited timeframe, typically 10 to 45 minutes, favoring the fastest team. The other task, emphasizing quality outcomes, also faces time constraints, varying from 30 minutes to 2 hours, depending on the task.

Participant Demographics: Our study focuses exclusively on young individuals aged 15 to 21 who are proficient in the Estonian language. This demographic specificity may restrict the generalizability of our results to broader populations.

Selection Bias: Our sample consists of talented young individuals who have advanced to the competition's later stages by winning qualifying rounds. These individuals represent the top performers in practical science challenges across various disciplines. This selective sampling approach may introduce bias and affect the representativeness of our findings.

Simulation Environment: Our examination is based on observations made within the context of a game competition setting rather than real-life scenarios. As such, the applicability of our conclusions to real-world contexts may be constrained.

Public Exposure and Social Pressure: Participants in the competition are subjected to the additional stressors associated with public scrutiny as their actions and utterances are broadcast to a broader audience. The awareness of being observed and evaluated by acquaintances and strangers, potentially leading to public commentary, could influence participant behavior and outcomes.

Conclusion

This study has described and analyzed the relationship between bases of power and team performance in quality-based and speed-based tasks. Numerous studies have examined power and its bases extensively. However, this study contributes by addressing the gap in analyzing the connection between bases of power and team performance within competitive environments.

The data for the study was gathered from the Estonian science challenge TV show Rakett69, in which individuals aged 15 to 21 work in teams and individually to complete science-related practical tasks. Seasons 10 to 12, recorded from 2020 to 2022, were chosen for the study, and from every season, seven episodes with two team tasks were analyzed. 113 task instances were reviewed based on the influence of high and low expert and legitimate power levels. This process yielded 465 coded decisions, which were utilized for subsequent analyses.

The teams are made up of young people who are highly skilled in different science fields. The tasks involve solving knowledge-intensive practical problems, and the teams work in high-stress situations. The tasks are competitive, and for the purpose of this study, they have been divided into speed-based tasks, where the quickest good enough solution wins, and quality-based tasks, where in a given timeframe, the best overall solution wins.

Although the teams must choose a captain for every episode, they are not pushed to follow any leadership type and naturally gravitate towards shared leadership. Over half of the decisions are made outside of legitimate power.

After analyzing the results, we found that quality-based and speed-based tasks do not have significantly different distributions of bases of power. This indicates a consistent balance of power in teams regardless of task type. However, differentiating based on the outcome of the task, there is a positive correlation between proportions of expert power and outcome in quality-based tasks. A high-significance negative relationship between the outcome of a task (quality and speed-based) and lack of expert and legitimate power can also be observed. Lower expert and legitimate power proportions lead to worse team performance. The study within the Rakett69 TV show has limitations, including the condensed portrayal of competition, the simulated game nature, and the impact of public exposure and social pressure. The results should, therefore, be interpreted with some caution.

The study uses the experimental methodology of working with prerecorded footage of teams competing in a TV show. The insight from the analysis shows a complex relationship between bases of power and team performance. The study provides a start to

understanding how shared leadership, power bases, and team performance interact, contributing to a deeper understanding of effective leadership frameworks in modern organizational settings.

Further research is needed to explore the underlying mechanisms driving team performance in knowledge-intensive tasks and the intricate relationships of bases of power in shared leadership. Given the clear correlation between fewer decisions made by experts and legitimate power holders and negative task outcomes, one of the crucial follow-up questions is the circumstances and motivations behind teams' tendency to follow individuals with neither base of power.

References

1. Allison, G.T. (1971). *Essence of Decision: Explaining the Cuban Missile Crisis*. Little, Brown & Co.
2. Bergman, J. Z., Rentsch, J. R., Small, E. E., Davenport, S. W., & Bergman, S. M. (2012). The shared leadership process in decision-making teams. *The Journal of Social Psychology, 152*(1), 17-42. https://doi.org/10.1080/00224545.2010.538763
3. Bertrand, M., & Lozenski, B. D. (2023). YPAR Dreams Deferred? Examining Power Bases for YPAR to Impact Policy and Practice. *Educational Policy, 37*(2), 437–462. https://doi.org/10.1177/08959048211019975
4. Bierstedt, R. (1950). An Analysis of Social Power. *American Sociological Review, 15*(6), 730–738. https://doi.org/10.2307/2086605
5. Carson, J.B., Tesluk, P.E., & Marrone, J.A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50*, 1217– 1234. https://doi.org/10.5465/amj.2007.20159921
6. Cartwright, D. (1959). A field theoretical conception of power. In D. Cartwright (Ed.), *Studies in social power,* 183–220. University of Michigan.
7. Cohen, A. R., & Bradford, D. L. (1989). Influence Without Authority: The Use of Alliances, Reciprocity, And Exchange To Accomplish Work. *Organizational Dynamics, 17*(3), 5–17. https://doi.org/10.1016/0090-2616(89)90033-8
8. Dahl, R. A. (1957). The concept of power. *Behavioral Science, 2*, 201–215. https://doi.org/10.1002/bs.3830020303
9. D'Innocenzo, L., Kukenberger, M., Farro, A. C., & Griffith, J. A. (2021). Shared leadership performance relationship trajectories as a function of team interventions and members' collective personalities. *The Leadership Quarterly, 32*(5). https://doi.org/10.1016/j.leaqua.2021.101499
10. Elias, S. (2008). Fifty Years of Influence in the Workplace: The Evolution of the French and Raven Power Taxonomy. *Journal of Management History 14*(3), 267–83. https://doi.org/10.1108/17511340810880634
11. French, J. R. P. Jr., & Raven, B. (1959). The bases of social power. In D. Cartwright (Ed.), *Studies in social power,* 150–167. University of Michigan.
12. Goodall, A.H., & Pogrebna, G. (2015). Expert leaders in a fast-moving environment. *The Leadership Quarterly, 26*(2), 123-142. https://doi.org/10.1016/j.leaqua.2014.07.009

13. Gracia, F. J., Arcos, J. L., & Caballer, A. (2000). Influencia de la presión temporal en el trabajo en grupo en función del tipo de tarea y del canal de comunicación [Time pressure influence on group work by task type and communication channel]. *Psicothema, 12*(2), 241–246.
14. Hackman, J.R. (1968). Effects of task characteristics on group products. *Journal of Experimental Social Psychology, 4*, 162-187. https://doi.org/10.1016/0022-1031(68)90040-1
15. Hoch, J. E. (2013). Shared Leadership and Innovation: The Role of Vertical Leadership and Employee Integrity. *Journal of Business and Psychology, 28*(2), 159–174. https://doi.org/10.1007/s10869-012-9273-6
16. Kelly, J. R., & McGrath, J. E. (1985). Effects of time limits and task types on task performance and interaction of four-person groups. *Journal of Personality and Social Psychology, 49*(2), 395–407. https://doi.org/10.1037/0022-3514.49.2.395
17. Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review, 110*, 265–284. https://doi.org/10.1037/0033-295x.110.2.265
18. Keltner, D. (2017). *The power paradox. How we gain and lose influence*. Penguin Books
19. Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest 7*(3), 77–124. https://doi.org/10.1111/j.1529-1006.2006.00030.x
20. Langfred, C.W., & Rockmann, K.W. (2016). The push and pull of autonomy: the tension between individual autonomy and organizational control in knowledge work. *Group and Organization Management, 41*(5), 629-657. https://doi.org/10.1177/1059601116668971
21. Lebed, F. (2006). System approach to games and competitive playing. *European Journal of Sport Science, 6*(1), 33–42. https://doi.org/10.1080/17461390500422820
22. Lewin, K. (1951). *Field theory in social science: selected theoretical papers*. Harper.
23. Magee, J. C., & Galinsky, A. D. (2008). Social hierarchy: The self‐reinforcing nature of power and status. *The Academy of Management Annals, 2*(1), 351–398. https://doi.org/10.5465/19416520802211628
24. Masaeid, T. A., & Upadhyay, D. (2023). Shared Leadership Practices on the Role of the Employees' Effectiveness. *2023 International Conference on Business Analytics*

for Technology and Security (ICBATS), Business Analytics for Technology and Security (ICBATS), 1–5. https://doi.org/10.1109/icbats57792.2023.10111379

25. Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: a review of recent advancements and a glimpse into the future. *Journal of Management, 34*(3), 410–476. https://doi.org/10.1177/0149206308316061
26. McGrath, J. E. (1964). Toward a "theory of method" for research on organizations. *New perspectives in organization research,* 533-547. Wiley.
27. Mintzberg, H. (1983). *Power in and around Organizations*. Prentice-Hall, Inc.
28. Muethel, M., & Hoegl, M. (2013). Shared leadership effectiveness in independent professional teams. *European Management Journal, 31*(4), 423-432. https://doi.org/10.1016/j.emj.2012.11.008
29. Pearce, C. L. (2004). The future of leadership: Combining vertical and shared leadership to transform knowledge work. *The Academy of Management Perspectives, 18*(1), 47-57. https://doi.org/10.5465/ame.2004.12690298
30. Przybysz, P. M., Duckwitz, S., & Schlick, C. M. (2014). Influence of task characteristics on team performance. *2014 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM),* 778–782. https://doi.org/10.1109/ieem.2014.7058744
31. Raven, B. H. (1965). Social influence and power. In I. D. Steiner & M. Fishbein (Eds.), *Current studies in social psychology,* 371–381. Holt, Rinehart, Winston.
32. Raven, B. H., Schwarzwald, J., & Koslowsky, M. (1998). Conceptualizing and Measuring a Power/Interaction Model of Interpersonal Influence. *Journal of Applied Social Psychology, 28*(4), 307–332. https://doi.org/10.1111/j.1559-1816.1998.tb01708.x
33. Russell, B. (1938). *Power: a new social analysis*. Allen & Unwin.
34. Salcinovic, B., Drew, M., Dijkstra, P., Waddington, G., & Serpell, B.G. (2022). Factors Influencing Team Performance: What Can Support Teams in High-Performance Sport Learn from Other Industries? A Systematic Scoping Review. *Sports Medicine - Open 8*(25) https://doi.org/10.1186/s40798-021-00406-7
35. Simon, H. A. (1957). *Models of man: social and rational*. Wiley.
36. Singh, A. (2009). Organizational power in perspective. *Leadership and Management in Engineering, 9*(4), 165–176. https://doi.org/10.1061/(asce)lm.1943-5630.0000018

37. Song, Z., & Gu, Q. (2024). An approach-inhibition model of shared leadership: the effect of vertical leader's multi-source power. *Journal of Managerial Psychology*. https://doi.org/10.1108/jmp-06-2023-0328
38. Sweeney, A. (2022). Looking within: A longitudinal qualitative analysis of shared leadership behaviours in organisational teams. *Team Performance Management, 28*(7/8), 441-460. https://doi.org/10.1108/TPM-02-2022-0013
39. Sweeney, A. (2024). Sharing the Leadership Space: Toward a Contextual Understanding of Shared Leadership Patterns in Organizational Teams. *Journal of Leadership & Organizational Studies, 31*(2), 166-191. https://doi.org/10.1177/15480518241246026
40. Tawney, R. H. (1931). *Equality*. Allen & Unwin.
41. West, M. A. (2012). *Effective Teamwork: Practical Lessons from Organizational Research*. John Wiley & Sons, Inc.
42. Wildman, J. L., Thayer, A. L., Rosen, M. A., Salas, E., Mathieu, J. E., & Rayne, S. R. (2012). Task Types and Team-Level Attributes: Synthesis of Team Classification Literature. *Human Resource Development Review, 11*(1), 97–129. https://doi.org/10.1177/1534484311417561
43. Winter, D. G. (1973). *The power motive*. Free Press.
44. Woods, S.A., & West, M.A. (2010). *The Psychology of Work and Organizations.* Cengage.
45. Xue, G. (2022). The power dynamics of crisis decision-making teams: A test of the threat-rigidity thesis. *Social Behavior and Personality, 50*(9). https://doi.org/10.2224/sbp.11714

Appendix 1

Examples of Data-gathering Decisions

Example 1.

Season 11, episode 6, time marker 3:15.

The episode's theme is the target board, and in the presenter's opening words, he talks about knowing exactly how to hit the mark. The blue team chooses their captain, and his teammate says he's always thinking mathematically and with numbers. The captain himself adds that since he's more of a theoretical person, then as a captain, he can be on the board and see how the others are working.

Original quotes:

"Ta alati mõtleb hästi matemaatiliselt ja numbritega."

"Kuna ma olen rohkem teoreetiline inimene, siis kaptenina saan olla rohkem tahvli juures ja vaadata, kuidas teised töötavad."

Example 2.

Season 12, episode 3, task 2, time marker 17:10

The team is at a loss for what to do, and the captain just starts doing something. The team says they don't believe in his idea and should be doing something different. In an interview, one of the teammates commented that our current solution is dumb, but our captain just takes this random thought and runs with it. This is coded as 10 because although the captain doesn't have expert power, they are still making decisions and doing things.

Original quote:

"Meie praegune lahendus on väga idiootne, aga Kevin lihtsalt võtab selle uitmõtte ja lihtsalt jookseb sellega."

Example 3.

Season 10, episode 3, task 1.

The episode's theme is earth sciences, and the captain has been selected because they participate in orienteering competitions. The comments given by the teammates during the task also support the team, viewing the captain as an expert.

At time marker 5:38, the captain presents the solution they will use; everyone on the team listens and nods in approval. There is also a comment made by one of the judges, who

says that the team captain takes the reins, knows how to solve the task, and draws the suitable scheme on the board. Since the decision of how the team is approaching the solution of the task is provided by the captain, who is also considered an expert in the theme, it is coded as an 11 decision in analysis.

Original quote:

“Kaarel meeskonna kaptenina haarab väga kenasti ohjad. Ta teab, kuidas seda ülesannet lahendada. Joonistab tahvlile täpselt õige skeemi.”

Example 4.

Season 10, episode 3, task 1.

The episode's theme is earth sciences; there is no indication that the captain is considered an expert. In the introduction of the captain, they say that they like robotics and software development. During the task, it is clear that the captain stands back a bit and allows people who have expert power to manage everything.

At time marker 10:37, the team worked on their solution for some time, and the people considered experts concluded the answer to the task. Once they pick an answer, the captain tells another teammate to push the button to lock it. The fourth teammate does as ordered. Since the captain makes the decision, but there is no indication of them having expert power during the task, the decision is coded as a 10 in analysis.

Original quote:

“Vajuta nuppu!”

Example 5.

Season 10, episode 3, task 2.

At time marker 16:38, the decision of how to solve the task and in what order is made by the person who is considered an expert in the theme of the task. The captain comments that since this is a chemistry task, they are giving the leader position to another teammate. The teammate then elaborates that they have taken part in multiple chemistry olympiads. The team follows that person's orders, and it is clear that this person is trusted in this field. Since the decision on how to proceed with the task is not made by a non-captain teammate considered an expert, the decision is coded as 01.

Original quotes:

“Kuna nüüd tuli keemia ülesanne, siis annan ma juhtpositsiooni Liisile”

“Keemia mulle sobib, näiteks olen päris edukalt osalenud mitmetel keemiaolümpiaadidel.”

Example 6.

Season 10, episode 3, task 2.

At time marker 17:12, it is shown how the whole team is just lifting things around, and everyone is doing something. One of the judges commented that it was obvious that the green team was in chaos. In an interview, one of the team members commented that no one is strong in chemistry in their team. This is further illustrated as they repeat each other and look at one another, waiting for reassurance. Since no one is viewed as an expert in the field and the person who finally takes more of a leadership role is not the team captain, this decision on how to approach solving the task is coded as 00 in the analysis.

Original quotes:

“Esimeste minutite jooksul on rohelist meeskonda haaranud tõeline kaos.”

“Otsest kõvat keemikut meie meeskonnas ei ole”

Appendix 2

Example Table Used to Collect Data for One Task

Table 8

The Table Used to Collect Data for Season 11, Episode 5, Task 2

	Red		Blue		Green	
	Legitimate power	Expert power	Legitimate power	Expert power	Legitimate power	Expert power
1105-2	Eva		Richard		Karl	
decision 1	0	1	1	1	0	1
decision 2	0	1	0	1	0	1
decision 3	0	0	1	1	1	1
decision 4	0	1	1	1	0	0
decision 5	1	1	0	0	1	0
decision 6	0	0			0	0
decision 7	1	0				
decision 8						
decision 9						
decision 10						
task type	0		0		0	
task outcome	0		0		1	
comments	They tested a bit but did not think further about whether they found something that worked. The team works calmly, and everyone contributes.		The captain thought they knew the solution but did not divide work tasks and wanted to do everything themselves.		They tested a lot, and there was much tension between the teammates, but in the end, they overcame it and worked together.	

Note. Source: compiled by the authors.

Appendix 3

Tables Describing Proportions of Bases of Power for Different Tasks

Table 9

The Base of Power Proportions for Speed-based Tasks by the Outcome of the Task

Expert power	Legitimate power		Total
	Low	High	
Speed-based tasks winning teams			
High	39.97%	41.32%	81.29%
Low	8.70%	10.01%	18.71%
Total	48.67%	51.33%	
Speed-based tasks losing teams			
High	33.47%	36.44%	69.91%
Low	23.47%	6.62%	30.09%
Total	56.94%	43.06%	

Note. Source: compiled by the authors.

Table 10

The base of Power Proportions for Quality-based Tasks by the Outcome of the Task

Expert power	Legitimate power		Total
	Low	High	
Quality-based tasks 1st place teams			
High	50.56%	36.11%	86.67%
Low	5.95%	7.38%	13.33%
Total	56.51%	43.49%	
Quality-based tasks 2nd place teams			
High	45.39%	37.00%	82.39%
Low	10.44%	7.17%	17.61%
Total	55.83%	44.17%	
Quality-based tasks 3rd place teams			
High	35.93%	31.08%	67.01%
Low	20.25%	12.74%	32.99%
Total	56.18%	43.82%	

Note. Source: compiled by the authors.

Resümee

MEESKONNA TULEMUSLIKKUSE SEOS ERINEVATE VÕIMUALLIKATE JA ÜLESANDETÜÜPIDEGA

Eesmärk – Käesolev uuring keskendub võimualuste ja meeskonna tulemuslikkuse seosele erinevate ülesannetüüpide kontekstis.

Metoodoloogia – Andmete kogumiseks kasutati eksperimentaalset disaini, mis hõlmas kolme "Rakett69" telesaate hooaega perioodil 2020–2022. Uurimisvalimisse kuulus üheksa meeskonda, milles osales kokku 42 võistlejat vanuses 15 kuni 21 aastat. Kokku analüüsiti 113 ülesannet, kus meeskondade otsused kodeeriti, võttes arvesse ekspert- ning ametivõimu kõrgete ja madalate tasemete mõju. Analüüs hõlmas nii ülesandeid, kus võidab kiireim õige lahenduse esitanud meeskond, kui ka neid, kus võidab parima kvaliteediga lahenduse esitanud meeskond. Kokku analüüsiti 465 otsust.

Tulemused – Ülesannetes, kus võidab parima lahenduse esitanud meeskond, olid kõrgemad ekspertvõimu tasemed positiivselt seotud tulemustega. Analüüs ei leidnud seost kumbagi tüüpi ülesande tulemuse ja ametivõimu koguse vahel. Selgelt joonistus välja seos ekspertvõimu ja ametivõimu puudumise ning negatiivse tulemuse vahel.

Uurimispiirangud – Uurimispiirangud hõlmavad võistluse kokkuvõtete lühendatud esitlust teleekraanil, arvesse tuleb võtta mängulise olukorra kunstlikkust ning samuti avaliku tähelepanu ja sotsiaalse surve mõju, kui tulemusi tõlgendatakse.

Praktilised rakendused – Uuring pakub sügavamat arusaama võimualustest ja meeskonna tulemuslikkuse keerukast seosest, rikastades seeläbi tõhusate juhtimisraamistike mõistmist kaasaegsetes organisatsioonilistes keskkondades.

Uuenduslikkus/väärtus – Käesolev uuring uurib innovaatiliselt võimualuseid ja meeskonna tulemuslikkust teadussaate kontekstis, kasutades eksperimentaalset metoodoloogiat ja uurides erinevaid ülesannetüüpe, rikastades seeläbi olemasolevat teadmist juhtimisdünaamika kohta.

Non-exclusive License to Reproduce Thesis and Make Thesis Public

We, Karoliine Tatunts and Nadežda Lebedeva,

1. Herewith grant the University of Tartu a free permit (non-exclusive license) to reproduce for the purpose of preservation, including for adding to the DSpace digital archives until the expiry of the term of copyright,

   Team Performance in Relation to Different Bases of Power and Task Types, supervised by Krista Jaakson and Veiko Valkiainen

2. We grant the University of Tartu a permit to make the work specified in p. 1 available to the public via the web environment of the University of Tartu, including via the DSpace digital archives, under the Creative Commons license CC BY NC ND 3.0, which allows, by giving appropriate credit to the author, to reproduce, distribute the work and communicate it to the public, and prohibits the creation of derivative works and any commercial use of the work until the expiry of the term of copyright.

3. We are aware of the fact that authors retain the rights specified in p. 1 and 2.

4. We certify that granting the non-exclusive license does not infringe other persons' intellectual property rights or rights arising from the personal data protection legislation.

Karoliine Tatunts and Nadežda Lebedeva
15 May 2024