



SCHOOL OF ECONOMICS AND MANAGEMENT

The Contributing Role of Reflexivity to Innovation in Tech Teams

How Leader Humility and Team Proactivity Can Facilitate The
Process

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Preface

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Contents

Preface	i
Abstract	iv
1 Introduction	1
1.1 Background	1
1.2 Research Focus	2
1.3 Research Gaps	4
1.4 Research Aim and Questions	4
1.5 Significance	5
1.6 Limitations	5
1.7 Thesis Outline	6
2 Theoretical Background	7
2.1 Innovation	7
2.2 Factors Contributing to Innovation	9
2.2.1 Reflexivity	9
2.2.2 The Humble Leader	10
2.2.3 Team Proactivity	12
2.2.4 Psychological Safety	14
2.3 The Integrative Model	16
2.4 Summary	17
3 Methodology	18
3.1 Research Design	18
3.2 Data Collection Procedure	19
3.3 Variable Measures in Survey	20
3.3.1 Leader Humility (TM)	20
3.3.2 Team Proactivity (TM)	21
3.3.3 Psychological Safety (TM)	21
3.3.4 Reflexivity (TL and TM)	21
3.3.5 Innovation (TL)	22
3.3.6 Control Variables (TL and TM)	22
3.4 Data Aggregation from Individual to Team Level	22
3.5 Statistical Analysis on Team Level	23
3.6 Validity, Reliability, and Generalizability	23
4 Analysis and Discussion	25

4.1	Profile and Descriptive Statistics of Final Data Set	25
4.2	Analysis of Correlation Matrix of Study Variables	28
4.3	Visualization of Correlations of Study Variables	29
4.4	Validation of Theoretical Framework with SPSS PROCESS	30
4.4.1	Relationship Leader Humility and Team Proactivity	32
4.4.2	Relationship Leader Humility, Reflexivity, and Innovation	32
4.4.3	Relationship Team Proactivity, Reflexivity, and Innovation	33
4.4.4	Conclusions Based on Analysis with SPSS PROCESS	35
4.5	Validation of Theoretical Framework with SmartPLS	35
4.5.1	Model 1	36
4.5.2	Model 2	37
4.5.3	Model 3	38
4.5.4	Model 4	39
4.5.5	Model 5	39
4.5.6	Conclusions Based on Analysis with SmartPLS	40
4.6	Summary of Findings	41
4.7	Discussion	44
4.7.1	Justifications of the Theoretical Model	44
4.7.2	Limitations of This Study	47
5	Conclusion	49
5.1	Managerial Implications	50
5.2	Directions for Future Researches	51
A	Overview Survey Content	53
B	Overview of Final Dataset	62
C	Results of Data Analysis with SmartPLS	65
	Bibliography	69

Abstract

As most companies and organizations rely on their tech teams to drive their business, staying innovative becomes a crucial challenge in this context. The present study explores this strive for innovation by considering team reflexivity, defined as the ability of a group to communicate and ponder together. This concept is placed at the center of the proposed theoretical model, acting as a mediator between personal behaviors and innovation. In particular, the theoretical model places leader expressed humility and team proactivity as fueling factors for reflexivity. Besides this, the role of psychological safety is also investigated to explore the significance of this phenomenon. To support the proposed model, the thesis presents a field study including 33 tech teams from all over Europe, which serves the purpose to determine the statistical relationship between the variables. The analysis includes results from SPSS PROCESS and SmartPLS. The main findings indicate that leader humility and team proactivity have a positive correlation with reflexivity and that these three variables are positively correlated with innovation. Additionally, the positive relationship between psychological safety and innovation is confirmed. Even though the mediating effect of reflexivity in this theoretical model was expected, it could not be proven on a statically significant level (5% confidence interval). However, additional statistical analysis indicates that this effect might be present if the study included a larger sample. In the conclusions, the academic and managerial contributions are highlighted, along with suggestions for future research directions.

Chapter 1

Introduction

In the age of digital transformation, tech teams are everywhere (Mims, 2018). In most companies or organizations, having a brilliant tech group is not a luxury, but an essential need to survive. Due to the rapid technological advancements and increased reliance on tech solutions, these teams enable organizations to leverage technology effectively, stay competitive, and navigate the complexities of the digital era (Cascio & Montealegre, 2016; Mims, 2018). The fast-changing environment requires people in tech teams to closely collaborate to produce and implement innovation. Then, how can these people achieve their innovative objectives while coping with a fast-changing environment, different opinions, backgrounds, and personalities? We believe it all depends on the degree their teams implement reflexivity processes (Shippers et al., 2015; Yang et al., 2020).

1.1 Background

As mentioned, tech teams' goals are strongly linked to innovation. Technological advances proceed at a fast-moving pace, which has a huge impact on how tech teams work and develop over time. In this type of context, staying on the crest of the hottest new wave of technology is not enough to secure a stable future for the organization (Damanpour & Evan, 1984). In just a blink of an eye, others can reach and even surpass one's achievements. Hence, the technological innovative advantage could only last for a small amount of time and be easily replicable in most cases (Kogut & Zander, 1992; The National Bureau of Asian Research, 2013). Competition is tough, and innovation trespasses on companies' borders easily. In this context, being left behind can even signify leaving the market for good. For this reason, engineers and software developers represent the key to companies' competitive success (Medcof & Rumpel, 2007). Because of performative pressures, they tend to frequently adopt shortcuts in their daily tasks, which can impact the overall quality (Austin, 2001; Yli-Huumo et al., 2015). At the same time, because of the uncertainty and unpredictable nature of the context, turnout rates result to be quite high (Thatcher et al., 2003). People tend to change the working environment after a few years depending on new opportunities, in an attempt to chase a better context in which to strive for

a better career and earn better salaries (Thatcher et al., 2003). Being unfamiliar with the environment and knowing its instability influence the attitude these people tend to adopt when working. Limited interaction, individualistic working style, and diffidence are some of the outcomes of this situation, which fuel negative stereotypes regarding people in tech teams (Chattopadhyay et al., 2021).

Taking all this into consideration, we asked ourselves whether positive attitudes and behaviors in tech teams can boost innovation outcomes. As far as we know, innovation has roots in the interaction between people. It lies in establishing a work environment that motivates individuals to contribute their views and skills and welcomes mistakes. Research articles (Medcof & Rumpel, 2007; Thatcher et al., 2003) support this statement by proving that job motivation, satisfaction, and rewards improve the working environment and learning development, and have a more significant role in retaining tech workers than what high salaries can do. In particular, reflexivity processes, defined as the ability to communicate, share information, reflect, evaluate, and come up with shared objectives, strategies, and processes in a group setting (El Baroudi et al., 2019; Leblanc et al., 2022; Shippers et al., 2015), appear to us as a potentially important component that can greatly affect innovation outcomes in these contexts. It is a way to enrich workers' perspectives, upgrade their creative capabilities, and lower stress levels by improving the expressed team support (Salanova et al., 2002).

Since reflexivity depends on group interactions, we deduced the importance of individuals' behaviors in team settings, from both the leaders' and the team members' sides. In particular, two features appeared particularly interesting for our study and with a potential influence on this topic. The first is leader humility, defined as an expressed personal behavior that relies on appreciating others' strengths and contributions and demonstrating learning orientation (Kelemen et al., 2023; Owens et al., 2013). The second is team proactivity, identified as the inclination a group has to take anticipatory actions that have an impact on its work (El Baroudi et al., 2019; Leblanc et al., 2022).

1.2 Research Focus

When exploring the concepts of reflexivity and innovation in literature, the challenge around the breadth of this field quickly becomes apparent. A vast space of team-internal variables (e.g. certain behaviors) and external circumstances (e.g. industries) are considered relevant when it comes to stimulating reflexivity and innovation in teams and organizations.

To get hold of the situation, the presented study was inspired by the research article "Leader humility and team innovation: The role of team reflexivity and team proactive personality" by Pierre-Marc Leblanc, Vincent Rousseau, and Jean-François Harvey, published in 2022 in the *Journal of Organizational Behavior*. The article aimed to investigate in what modalities leader humility fosters innovation. It proposed team reflexivity as a mediator of this relation, and team proactive personality as a contextual condition of leader humility. For this reason, team proactivity is seen as a

moderator of the relationship between leader humility and reflexivity. The research took place in a university-affiliated hospital located in Canada. It included 71 teams and a total of 434 team members having different functions in the institution, such as primary care, administration, technical services, and maintenance.

The research was particularly inspiring since the proposed model was putting in relations several variables we were interested in. However, our study cannot be regarded as a simple replication, but rather as a starting point to which we applied several modifications. We based our study on a data set that consists of 33 teams with a total of 189 team members. We particularly focused on a precise context, which is tech teams. They are defined as groups of professionals responsible for developing and implementing technology solutions for an organization. In particular, the areas of expertise are software development, engineering, and data analysis. Those teams are characterized by situational peculiarities connected to the industry's fast-changing and highly competitive environment. Since tech skills and knowledge are continuously and rapidly evolving, these professionals are forced to stay up to date with the latest evolutions and seek better opportunities for career growth (Thatcher et al., 2003). It can result in burnout and high turnover rates dangers. Consequently, reflexivity and psychological safety processes seem to face repercussions, which may result in scarce innovation output. In this setting, the challenge is to motivate and retain people longer, establishing a positive working environment and working culture in which people feel motivated and supported.

In general, the main distinctions between our work and the one of Leblanc et al. (2022) are the following:

- We do not focus on the health sector but rather on a different one, i.g. technology, defined as engineering and software development;
- The teams participating in the study come from organizations from all around Europe, mostly in Sweden, Germany, Belgium, Italy, and France. Hence, not from a single country nor a single organization (i.e. one university-affiliated hospital in Canada);
- We modified Leblanc's model by proposing a different kind of relationship between leader humility, team proactivity, and reflexivity. In our model, there is an intercorrelation between team proactivity and leader humility, and both of them influence team reflexivity;
- We investigate psychological safety as an additional variable;
- We adopted the same survey questions for the variable to test as some of the concepts could be interpreted in a slightly different way than in the hospital sector (e.g. innovation), adding a highly renowned set of questions from Edmonson for psychological safety;
- In addition to SPSS PROCESS, we also use SmartPLS for data analysis.

Throughout our study, similarities and differences between Leblanc’s article and our study will be further addressed. Furthermore, its findings and results will be used as a valuable tool to test part of our results’ validity, since we adopted its perspectives and most of its methodology.

1.3 Research Gaps

Addressing Leblanc’s article in the previous section already highlighted some research gaps in the field. Firstly, there is a vast space of variables (e.g. specific behaviors) potentially influencing the processes (e.g. reflexivity) and outcomes (e.g. innovation) in teams. As a result, an incremental process is required to investigate a subset of potentially interesting variables. For this reason, similarly to Leblanc, we identified leader humility, team proactivity, reflexivity, and innovation as main variables, with the addition of psychological safety. A second research gap appears when looking at already-existing studies in the field. Recent studies around leader humility mainly focus on the geographical regions of North America and China (Kelemen et al., 2023). As a result, there is a limited amount of studies investigating the concept of leader humility outside these two geographical hotspots. Moreover, most studies focus on a specific sector (e.g. Leblanc et al. (2022)), which leads to the problem that only a limited number of professional work settings have been investigated. Performing additional studies like ours could help to fill these gaps within the landscape of geographical regions and work sectors. Indeed, different cultural aspects might have a notable influence on the effectiveness of some of our variables (Kelemen et al., 2023).

Finally, one could argue that it is infeasible to cover all aspects in this vast space of relevant variables. We recognize that considering only a subset of those can be perceived as simplifying the state of reality and that other behaviors and external factors can impact reflexivity in teams significantly. However, investigating a subset of variables allows researchers to establish an understanding of the selected behavioral phenomena, and can be regarded as a small step to grasp the reality. For this reason, we argue that our selection of variables (i.e. leader humility, team proactivity, team reflexivity, psychological safety, and innovation), geographical focus (i.e. Europe), and selected sector (i.e. tech sector) are a helpful puzzle piece contributing to creating a better understanding of behavioral challenges in teams.

1.4 Research Aim and Questions

The study aims to understand how certain behaviors in leaders and team members can improve reflexivity processes and innovation. In particular, the scope is exploring if leader humility and team proactivity have a direct positive correlation on the development of team reflexivity, and how these components enhance innovation in the selected teams.

To achieve this result, our research question is:

What is the role of leader and team behaviors in establishing innovation in technology teams?

Furthermore, we identified the following three sub-questions:

- What is the relationship between reflexivity and innovation in team settings?
- What is the role of leader humility and team proactivity in improving reflexivity?
- Are leader humility and team proactivity correlated with each other?

1.5 Significance

Besides filling the highlighted research gaps, we hope the results of the study could offer relevant insights into reflexivity, expressed humility, and team proactivity, by presenting a concrete application of their theories in a before not explored context, i.g technological teams. Present theories on these topics mostly focus on general discussions, which do not have a contextual application. Hence, our ambition is to improve the generalizability of the study variables, by proving the adopted theories in specific settings. Furthermore, we would like this thesis to represent a helpful tool for leaders to reflect on how their behavior can affect the engagement and motivation of their team members in everyday activities, but also what role a member's proactive personality plays.

In general, we aspire to enrich all stakeholders' perspectives regarding the impact reflexivity can have in enhancing innovation, and how this can be achieved through personal behaviors. From the human resources department and the managerial section to the leaders and members of teams, we hope everyone can find some benefits and inspiring insights by reading this thesis.

1.6 Limitations

When considering limitations, some methodological issues must be taken into consideration. Firstly, the rather small sample size we were able to put together (i.e. 33 teams compared to up to 70 teams in other studies) reduces the statistical power of the analysis. Indeed, as Hair (2022) indicates, a higher sample size is required when considering more complex theoretical frameworks. A second issue regards the fact that we personally approached the participating teams of this study. It implied the use of non-probability sampling and convincing techniques (such as promising a final debrief about the general results of the study), which might be considered to impair the results' validity. The third methodological limitation is the partition of survey questions between participants. Some variables were asked solely to the team leaders (i.e. innovation) or the team members (i.e. leader humility). This could lead to the supposition that the responses might be biased as the respondents perceive reality subjectively.

Furthermore, some conceptual limitations must be addressed. First of all, only a subset of variables was considered in this study. As previously mentioned, this was because an infeasible amount of variables could be considered relevant when it comes to behavioral studies. Hence, a selection is required to guarantee a proper investigation despite time constraints. Second, the study focused on a specific sector (i.e. technology) and a certain geographical region (i.e. Europe). Because of the vast space of potentially relevant circumstances, the scope of the study had to be narrowed down. Limiting the study to a small area had the positive effect of supporting its meaningfulness culturally-wise. To conclude, the last conceptual limitation is the researchers' personal bias. Here, the previous experiences (e.g. personal and professional) and the prior education (i.e. sociology-international relations and electrical engineering) could have led to a bias in this research. Additionally, none of the researchers had any prior experience in conducting a large-scale field study related to behavioral science.

The following chapters will provide further elaborations on significant limitations.

1.7 Thesis Outline

The second chapter focuses on building the theoretical framework of the thesis research and presenting the study hypotheses. The variables are presented, discussed in detail, and related to each other and the innovation concept. The ending section discusses the chosen theoretical model.

The third chapter regards the methodology, in which the research design and the data collection method are described. It also presents a description of the data aggregation method and a discussion on validity, reliability, and generalizability.

In the fourth chapter, the gathered data is analyzed and discussed. Starting from a description of the team profile, we present a correlation matrix of the variables and several plots to create an understanding of the data set of this study. Additionally, this data set is analyzed with the help of SPSS Process and SmartPLS, which allows the validation of the proposed theoretical model. Afterward, the results are put into more context by discussing certain aspects of the findings.

The final chapter of the thesis is dedicated to the conclusions. Implications and contributions in the field are presented. Some future research directions are also proposed.

Chapter 2

Theoretical Background

In this chapter, we are first exploring the concept of innovation as our study aim is to investigate how humble leaders and team proactivity can lead teams to be ultimately innovative. Consequently, we are presenting a literature overview on contributing factors to the establishment of innovation in group settings. We identified them to be the presence of team reflexivity, leader humility, team proactivity, and psychological safety. In combination with the theoretical background, we propose eight hypotheses that support our claim. Finally, we discuss how the interaction of leader humility and team proactivity can influence the reflexivity practice, and how the latter can have a meditative role in innovation outcomes. We are presenting this through a model inspired by Leblanc et al. (2022), and with a ninth hypothesis related to this model.

2.1 Innovation

Identifying a single concept of innovation is difficult due to the fact that it can be outlined based on the context in which it is applied. In general, it can be defined as a problem-solving process oriented towards the search for new combinations of known elements, or as the act of putting together the most dissimilar and distant knowledge and skills (Ramella, 2016). Or even more, as an "idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003 cited in Smith, 2015, p. 4). These definitions highlight some recurring elements, including the centrality of human experience, the co-presence of skills and functions belonging to different spheres, the existence of an interactive process oriented towards problem-solving, and the need for a relational system between actors that makes possible the strategic integration of knowledge and skills of different kinds. Smith (2015) enriches the innovation concept by proposing it to represent the process of turning a creative idea (or invention) into a viable product. Hence, theorizing the duality of implementation and invention is at the base of innovation.

As both Ramella (2016) and Smith (2015) present, innovation can be of various types. It is incremental if the novelty introduces minor changes to an existing product or

practice. Alternatively, it can be radical if it contains elements that lead to changes that overturn pre-existing dynamics. In this latter case, to launch the innovation, the level of knowledge and skills has to be enhanced, to keep up with the process. For both authors, innovation can then be classified based on its modification target:

- **Product:** the change concerns the scope of the product itself, i.e. the goods or services that the company intends to market;
- **Process:** change in methods of production and construction of goods or services within the company, without this having important repercussions on the final product;
- **Organizational method:** change in the way people organize business activities, such as employee management, the type of interactions, and internal responsibilities;
- **Marketing:** changes related to the design, the packaging, and the ways of promoting the product.

Innovation can thus be perceived and defined as different outcomes depending on the industry and the function of the people involved in the process. However, whatever the innovation in a team context might be, it always spurs from what Amabile and Pratt (2016) define as *creativity*.

Creativity and Innovation

Scholars have largely debated the process of achieving innovation. Amabile and Pratt (2016, p. 158) define innovation as "the successful implementation of creative ideas within an organization". The researchers believe creativity and innovation are inextricably linked and cannot be separated, and classify creativity as the seed of innovation (Amabile et al., 1996), or the starting point of the whole innovation process. In their perspective, creativity results from new and valuable ideas combined unusually by individuals or a group of individuals working together. Differently from Ramella (2016), Amabile and Pratt go beyond the sole consideration of skills and knowledge to add a new piece to the puzzle, which is the elaboration of a personal idea. Amabile (1988) does not only consider knowledge and skills in the innovative process but also the very act of individuals to formulate ideas. Therefore also including new elements that can influence them, from traditions and communities of belonging to the sector, the organization, the leader, the social rules, and the sense-making processes to which they are subjected and which they share. Hence, the social dimension of the individual and the group is the starting point for the analysis and understanding of creativity and innovation. Consequently, those are definable as socially situated in space and time.

Through Amabile's Componential Model (1988), the author explores how these two spheres, individual and collective, are connected and influence each other in the innovation process, how the transition from creative idea to application of innovation

occurs, and how the whole process can establish a virtuous circle in the organization and in the team itself.

According to the model, the perception of the team's and the organization's motivation to innovate pushes individuals to complete their tasks (Amabile & Pratt, 2016). To do it best, individuals leverage their knowledge and expertise, perspectives, and cognitive styles. This process can result in the development of creative ideas, which can ideally improve various aspects of the individual's and team's work. At this point, the creative idea is subjected to collective analysis, first by their small team and then by the larger organization. To be analyzed and exploited to the fullest, creative ideas must find the support of the organization's innovation management, through the existence of a supportive work environment, the appropriate infrastructure system within the organization, the finances, and the possibility of drawing on skills of various kinds even outside the focus of the team. Only when people's creativity is supported and effectively explored by the organizational system, the innovative process can be undertaken. If successful, the innovation produced is capable of motivating the organization and groups (and therefore also individuals) to continue in that direction, establishing a virtuous circle.

2.2 Factors Contributing to Innovation

With the Dynamic Component Model, an enhanced version of the Component Model, Amabile and Pratt (2016) present some other factors that play a significant role in the process and directly impact motivation. Chief among them is the need for individuals to perceive a sense of progress, of moving the innovation process forward vigorously. In addition, it is pointed out the need for individuals to feel their ideas are contributing to building something meaningful. Two more personal components are also added: the affective dimension, which states the importance of paying attention to people's emotions during the creative process, and the influence external elements can have on individuals and groups. Those points recognize a double origin of the creative process, one internal to the individual and dependent on own motivations such as the pursuit of interests and satisfaction, and the other external, which especially derives from the interaction with the work environment. These four additional components – sense of moving forward, meaningfulness, attention to emotions, and external influence – play a key role in the motivation equation and the success of the individual creative process.

What just presented proved the working environment to be an influential component in the innovation process. To be creative, individuals need to have the chance to reflect and engage in problem-solving, feel supported by their leader, and be motivated by their team and organization.

2.2.1 Reflexivity

Team reflexivity can be defined as the ability to communicate, share information, reflect, evaluate, and come up with shared objectives, strategies, and processes in a group setting (El Baroudi et al., 2019; Leblanc et al., 2022; Shippers et al., 2015). It

can be seen as an informal transition process (Leblanc et al., 2022) or rumination (El Baroudi et al., 2019) about previous tasks to learn lessons from them. Reflection, or rumination, occurs when members discuss key events together seeking to come up with a collective interpretation (El Baroudi et al., 2019). In this phase, reflexivity serves as an element of self-improvement (Leblanc et al., 2022), through which team members can share their thoughts and opinions about their performances as individuals and as a team. It permits the detection of failures and errors, and to self-correct ongoing processes (Shippers et al., 2015). It also works as a way for team members to reflect on everyone’s expectations, and in what ways those were met or not (Leblanc et al., 2022). Team reflexivity represents a key factor for innovation since it allows people with different expertise to come together and share specific opinions about an issue, enlarging the team’s common knowledge by putting into communication fairly diverse, although still related, competencies. This can facilitate effective and creative utilization of the newly acquired knowledge, and improve the organization’s absorptive capacity of exploiting new information (Cohen & Levinthal, 1990). It also makes members more aware of changing environmental demands, which can be particularly important for tech teams that work in ever-changing environments (Leblanc et al., 2022; Shippers et al., 2015). Reflexivity lies at the base of critical dialogue, a form of interaction that involves individuals engaging in thoughtful and constructive conversations that go beyond the surface level and encourage critical thinking and analysis (Sloan, 2019).

Reflexivity is particularly relevant in learning-oriented teams in which trust is already quite high (Leblanc et al., 2022). However, engaging in this practice has proved to fuel team engagement, respect among team members and trust, thus promoting affective integration (Blanch et al., 2022).

In Amabile’s Componential Model (1988), reflexivity has a significant role and can be placed in the phase of transition from the creative to the innovative idea, which also coincides with the transition from the individual to the collective sphere. In this step, collective analysis has a major influence on outcome success. It involves individuals confronting others’ feedback, asking for advice, and implementing new knowledge, skills, and perspectives. Most of the time, the process requires undertaking a review of the idea and the work previously done, both from the individual proposing the creative idea and their team. Hence, the more people are at ease in expressing their opinion and sharing skills and knowledge, the more team members can enrich their perspectives, pursue rumination, and upgrade their creative and innovative capabilities.

Considering this, we propose team reflexivity to promote innovation.

Hypothesis 1: *Team reflexivity positively correlates with innovation.*

2.2.2 The Humble Leader

As previously explored, a positive work environment that pays attention to people’s emotions can motivate individuals and fuel innovation. To create the right atmosphere, the leader’s role in the team is crucial. Scholars proved that a humble leader can

particularly contribute in innovation-oriented settings (Kelemen et al., 2023; Leblanc et al., 2022).

Research studies regarding humility in managerial contexts are numerous, however humble leadership remains a quite ill-defined leadership style. The main cause for this seems to be the distinctive subjectivity of the term *humility*, which is highly dependent on cultures and thus hardly generalizable. This is why more than discussing humble leadership, researchers tend to focus on humility as an individual behavioral trait (Kelemen et al., 2023). What appears to have a rather strong and shared definition is what Owens et al. (2013) define as *expressed humility*. Expressed humility is an activated behavioral trait that is emerging more and more in team environments, and is particularly noticeable in leadership roles. Since it is dependent on the context, it is based on individual perception and common self-making. Thus, the people working with the leader are the ones labeling the individual as humble, based on their personal definition and perception of responding attributes.

The literature on the topic (Kelemen et al., 2023; Leblanc et al., 2022; Owens et al., 2013) shows that expressed humility is based on three necessary dimensions. The first of these is a manifested willingness to view oneself accurately. It means leaders have to show an effort in improving their self-awareness by admitting their limits, acknowledging their mistakes, and accepting and actively looking for feedback. The second cornerstone regards appreciating others' strengths and contributions, in a constant effort to *other-enhancing*, rather than self-enhancing. The third one regards teachability, which is a manifested willingness to constantly learn and improve.

Considering these capabilities, we propose leader's learning orientation and self-awareness can attract new knowledge and improve sharing processes in the group setting, fueling innovation.

Hypothesis 2: *Leader humility positively correlates with innovation.*

Ripple-down effect of leader humility

Leader humility can contribute to integrating team reflexivity since it promotes a willingness to always improve and be receptive to feedback (Leblanc et al., 2022; Owens et al., 2013; Shippers et al., 2015). Since leader behavior shows to have a ripple effect (Kelemen et al., 2023) on colleagues and followers, leader humility can push individuals part of the organization to adopt its standing points. Therefore, improving feedback receptiveness, taking better-informed decisions regarding tasks and expectations, and being receptive to positive peer models. Furthermore, by following the leader's example in asking for other people's ideas and perspectives, followers internalize that performance is not fixed, and limitations represent opportunities for acquiring knowledge from external stimuli.

Humble leaders also promote reflective behavior when highlighting members' qualities and contributions. By doing so, they signal that diverse opinions are welcomed, and frame members' unique knowledge as a resource that can be leveraged to find new and better ways of doing things (Blanch et al., 2022; Kelemen et al., 2023; Owens et al., 2013). At the same time, welcoming attitudes toward

mistakes and weaknesses and setting aside harsh judgments legitimize risk-taking, making space for testing bold creative ideas (Leblanc et al., 2022; Owens et al., 2013). These improvements have the power to foster the organization and team environment, pushing people to engage in learning behaviors and establishing a sense of trust, openness, and communal recognition. Moreover, it can have consequences on collaboration and interaction between members, casting aside competitiveness and over-comparison (Leblanc et al., 2022) and fueling team proactivity. Overall, humble leadership and reflexivity practices participate in making people come together and creating a sense of community, which could enhance people's motivation and engagement in the organization's mission (Owens et al., 2013), and lower stress levels (Salanova et al., 2002). Consequently, representing a powerful counteraction to turnover (Medcof & Rumpel, 2007; Thatcher et al., 2003).

Hence, building on its capacity to motivate people, make them feel heard and safe to express themselves, and influence their behaviors towards humility, we propose leader humility to enhance reflexivity in teams. This positive correlation between leader humility and reflexivity can ultimately contribute to innovation (see hypothesis 1).

Hypothesis 3: *Leader humility positively correlates with team reflexivity.*

2.2.3 Team Proactivity

In synergy with humble leadership, team proactivity can greatly contribute to improving reflexivity and innovative outcomes. Grant & Ashford (2008 cited in El Baroudi et al., 2019, p. 1) define proactivity as "anticipatory actions that employees take to impact themselves and/or their environment". Thus, following Crant & Bateman (2000 cited in Leblanc et al., 2022), proactivity can be defined as an inclination to take initiative to bring a meaningful change in their working life. In an attempt to further study proactivity in the working environment, researchers moved in the direction of exploring employee proactivity as an outcome of the interplay of individual factors, like personal motivations and aspirations, and contextual factors, such as the organizational settings, the work environment in which they engage, and the relationship they have with their peers and superiors (El Baroudi et al., 2019). The study showed that proactivity appears to follow a few stages. It begins on the personal level, in which individuals show proactivity by themselves, searching autonomously to improve their workflow and work process (Du et al., 2021). Individuals with this characteristic are proved to be particularly prone to have a learning-goal orientation, which indicates a willingness to master new skills rather than maximizing performance per se (El Baroudi et al., 2019).

Proactive individuals actively engage in *Voice behaviors* (El Baroudi et al., 2019), defined as the acts of seeking feedback and continuous communication with other team members, sharing ideas, observations, and doubts. Those activities promote knowledge-sharing and problem-solving processes (Du et al., 2021; El Baroudi et al., 2019), which contribute to enhancing the critical and common knowledge of the whole group. In this way, members know whom to ask for information based on

competencies and attitudes, and enlarge the group's knowledge (Cohen & Levinthal, 1990). On the team level, individuals can engage in team member proactivity when they feel they are an active part of the group, and that their work is dependent on others' tasks. Team member proactivity appears as individual constant efforts in trying to improve their team's condition rather than solely thinking for themselves since their work is directly dependent on the team's performance (El Baroudi et al., 2019). When the team member's proactivity is shared by all the people part of the team, it can be defined as team proactivity, in which the team as a whole adopts a proactive behavior (El Baroudi et al., 2019) and reflexivity procedures.

Proactive members and teams are particularly suitable for humble leaders and to engage in expressed humility processes since the sense of community and the habit of sharing ideas and pieces of information is already present and effective (Kelemen et al., 2023).

Considering team proactivity's function in expanding common and critical knowledge, we propose team proactivity to improve innovation capabilities in team settings.

Hypothesis 4: *Team proactivity positively correlates with innovation.*

Furthermore, we propose team proactivity positively influences the establishment of team reflexivity practices. Indeed, actively seeking feedback and continuous communication between team members initiate reflexivity processes, such as problem-solving and sense-making. This positive correlation between team proactivity and reflexivity can ultimately contribute to innovation (see hypothesis 1).

Hypothesis 5: *Team proactivity positively correlates with team reflexivity.*

Factors that enhance team member proactivity

Team member proactivity is a personal trait activated by contextual factors. Generally, teams characterized by flexibility and autonomy appear to be more prone to engaging in team proactivity. Flexibility and non-routine work push team members to improve the communication flow and create a common sense-making of the uncertainties they are facing. Furthermore, members are keener to take initiative and negotiate new modalities to complete tasks. This has a strong impact on the autonomy those employees have; they have more control and negotiation power over the tasks in terms of modalities and required time (El Baroudi et al., 2019). Therefore, in those teams, their engagement shows to be enhanced, which can directly affect team members' proactivity.

Heterogeneity in team composition is also particularly influential on the level of team proactivity. Diversity in terms of mindsets, knowledge, and background is essential in avoiding groupthink practices, which hinder the process of making a work environment open to new suggestions and novel ideas (El Baroudi et al., 2019). Heterogeneity can give new perspectives on the construction of common sense-making, thought processes, and work behavior, and encourage members to take the initiative to speak up. As a result, shared understanding of problems, cognitive integration (Blanch et al., 2022), and cohesion are proved to be enhanced. This has

important implications for the level of effect and satisfaction in members (Blanch et al., 2022; Kelemen et al., 2023). Overall, appreciation for individual proactive effort and performance is improved as well (Du et al., 2021; El Baroudi et al., 2019; Leblanc et al., 2022).

Finally, as previously stated, team member proactivity consists of team members constantly trying to maximize their skills or master new ones to improve performance (Du et al., 2021; El Baroudi et al., 2019). It occurs by actively seeking feedback and sharing ideas and observations with other team members. This learning-oriented behavior appears to have an affinity with the concept of teachability, which is one of the main characteristics of expressed humility in leaders (Owens et al., 2013). Building on the ripple-down effect that leader behavior has on team members (Kelemen et al., 2023), we propose that the level of team proactivity is directly affected by humility practices in leaders. At the same time, we also propose that members' positive attitude in being learning-oriented and open to feedback can motivate leaders to be even more involved in similar practices. In this perspective, the leader expressed humility represents the starting point for developing team humility, which affects the ability to be receptive or ask for feedback, and teachability. However, to trigger the process, team proactivity is a necessary condition for enabling the leader to engage in expressed humility. This is the reason we are interested in humility solely on leaders and in the members' perceptions of proactivity. To conclude, we can argue that these two personal behavioral traits, namely belonging to the leader and the members, activate and enhance each other. This can be supported by the behavioral interactionism theory, which lies on the principle that behaviors are both internally and externally controlled and that people "influence their own environment" (Bateman & Crant, 1993, p. 104). This relationship between team proactivity and leader humility is relevant in the context of innovation due to already previously stated hypotheses.

Hypothesis 6: *Team proactivity and leader humility are correlated with each other.*

2.2.4 Psychological Safety

Another aspect of a positive work environment can be the emerging state of psychological safety. Kahn (1990, p. 708) defines psychological safety as "feeling able to show and employ one's self without the fear of negative consequences to self-image, status, or career." In such situations, people feel safe as they can trust that they would not experience negative consequences for their personal engagement (Kahn, 1990). Edmondson (1999, p. 354) goes a step further and describes team psychological safety as "a shared belief that the team is safe for interpersonal risk-taking". This understanding of psychological safety is defined by Cauwelier (2019) to include 1) seeking, providing, or turning down help or advice, 2) raising concerns about issues, 3) advocating unpopular viewpoints, 4) admitting personal limitations, and 5) sharing personal and private feelings or experiences.

Cauwelier (2019) also argues that individuals often perceive the social context in a work environment as more threatening than motivating. Thus, it is crucial

to establish an environment with psychological safety so as to avoid problematic issues. For instance, team members tend to remain silent when they are worried that they will be mocked by colleagues due to their opinions or that their comments may be used against them in the future. As a result, it is more likely that issues persist unnoticed, misinterpretations endure, and output falls short of its potential. Individuals in such an environment feel it is better not to put themselves on the line.

Psychological safety can be seen as an emerging state of teamwork that can have a positive effect on the outcome of a group. It can enhance the learning behavior in a team (Edmondson, 1999), allowing members to increase their perception of being able to express themselves within the working environment, also defined as *sense of voice* (Blanch et al., 2022). It relates to the extent to which individuals feel empowered, heard, and valued in sharing their opinions, ideas, doubts, or suggestions. This can result in an enhancement of team performance as problems and ways for improvement are identified quickly (Cauwelier, 2019), and people are more likely to be engaged in their work (Blanch et al., 2022).

Javed et al. (2017) have shown that psychological safety can have a mediating role between certain leadership styles and team innovation. In their work, inclusive leadership moderates the relationship between proactive personality and psychological safety, showing the positive impact of psychological safety on team outcomes. Hence, the researchers proved that some characteristics of the team, including the behavior of all individuals, are the basis for creating psychological safety. Moreover, Frazier et al. (2017) outlines that psychological safety is correlated with positive leader relations, which highlights the leader's influence on shaping a psychologically safe environment. Besides that, the authors argue that proactive personalities are more likely to perceive a situation as psychologically safe, which ultimately allows individuals to speak up. Furthermore, Qian et al. (2022) proved how leader humility can enhance psychological safety in teams, which highlights the positive effect of certain leader behaviors on establishing psychological safety.

Considering the psychological safety potential in enhancing sharing processes and learning behavior, and the impact leadership roles can have in the picture, we propose leader humility and team proactivity to be correlated with psychological safety.

Hypothesis 7: *Psychological safety positively correlates with leader humility and team proactivity.*

Furthermore, as presented by Du et al. (2021), psychological safety has been shown to have positive effects on team creativity. We argue that a more positive environment characterized by psychological safety could improve the team's critical and common knowledge, and affect innovation outcomes.

Hypothesis 8: *Psychological safety positively correlates with innovation.*

2.3 The Integrative Model

In an attempt to integrate hypothesis 1 to 6, we propose a model which combines team proactivity, humility in leaders, and team reflexivity, and explain how these components can spur innovation. The model was inspired by the work of Leblanc et al. (2022), with the main difference being the relationship of co-influence between leader humility and team proactivity, as presented in hypothesis 6.

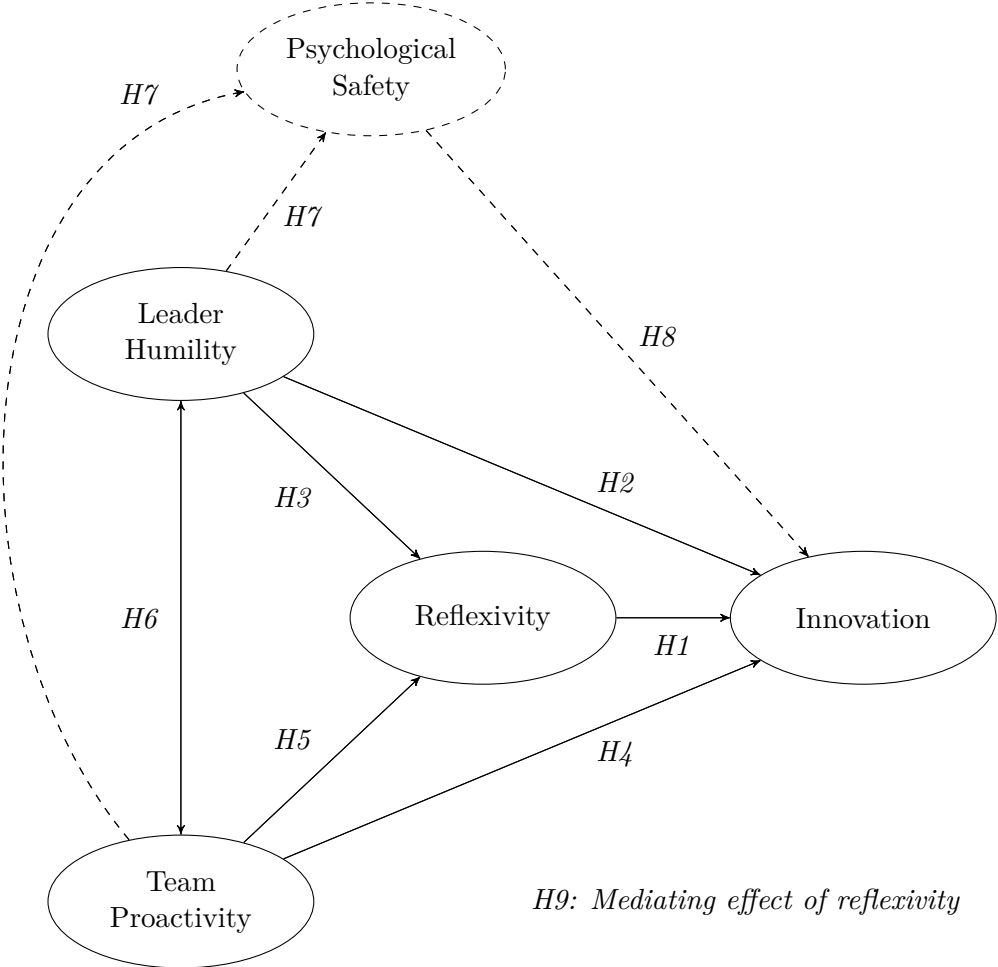


FIGURE 2.1: Proposed theoretical model

As mentioned in hypothesis 3 and 5, leader humility and team proactivity are proposed to contribute to establishing team reflexivity, which is proposed to have a significant effect on innovation outcomes (hypothesis 1).

Based on this formulation, we expect leader humility and team proactivity to have an indirect effect on innovation. On the contrary, we expect leader humility and team reflexivity to have a significant effect on team reflexivity. Hence, proving the existence of a reflexivity mediating role between leader humility and team proactivity on one hand, and innovation on the other.

Hypothesis 9: *Team reflexivity mediates leader humility and team proactivity positive relations with innovation.*

2.4 Summary

With this chapter, we tried to give a compound overview of the literature relating to innovation, team reflexivity, leader humility, team proactivity, and psychological safety. What just presented does not include a specific perspective on technology context, but rather a more general illustration of how these factors generally act and interact with each other. Hence, by researching the existence of these variables in tech teams, we aim to provide interesting insights and prove the theories in the technology context, which is characterized by peculiar aspects linked to the environment and people's common background.

Chapter 3

Methodology

3.1 Research Design

The aim of this study was to investigate how leader expressed humility and team proactivity are related to reflexivity, which might ultimately foster innovation. In addition to these elements, psychological safety was analyzed. For this reason, the study used a quantitative approach with different measures for each variable. These were used to describe the variables' statistical characteristics and to seek support for our hypotheses. Therefore, the type of study can be defined as correlational since it aims to investigate whether and how strongly the different variables are related. To avoid influencing the results, we measured the variables through a survey-based approach.

The study population consists of tech teams in Europe since we noticed a gap in the research on leader humility in this context (Kelemen et al., 2023; Leblanc et al., 2022). The sampling method chosen is the non-probability one since the recruitment of the teams took place through our direct approach and persuasion to participate in our study. As a result, we acknowledge the presence of some research bias since we had to select which organizations/teams to contact for our study. Moreover, we recognize that the success rate of convincing strongly depends on how we were able to approach the organizations/teams (e.g. through our network, or at public events). The data collection procedure will be further explained in section 3.2.

Each team willing to participate in our study received two links to our web-based questionnaires by e-mail. One link provided the questions for the team leader and the other the ones for the team members. Each of the links asked the respective people to answer the measures for certain study variables. The operationalization for these variables was done through Likert scale-based items, which relied on already existing and well-proven scales. More details about the used items can be found in section 3.3.

The analysis of the received data was performed in two steps. In the first step, the responses of every single team were analyzed to ensure reliability and validity.

Even though the participants of the study were individuals of teams (i.e. leader and members), the responses were aggregated on a team level for the final analysis by matching the responses of the team leader and the team members (Leblanc et al., 2022). An explanation of this process is provided in section 3.4. After the aggregation, the data analysis continued in a second step, which included the actual analysis of the relationship between the study variables. This second step incorporated different statistical tools to be able to draw conclusions for the hypothesis supporting our theoretical model. This analysis included the descriptive statistics of the study variables, a correlation matrix of the study variables, and different statistical models from SPSS PROCESS and SmartPLS. More details and the results of this analysis are presented in chapter 4. Elaborations about the reliability and validity of the research design can be found in section 3.6.

3.2 Data Collection Procedure

The target group of our study was tech teams, which we defined as teams that mainly consist of engineers and software developers. To get access to these teams, we were mostly relying on our network, people met at public events, and official representatives of organizations. In total, we contacted 220+ teams all over Europe. The teams were located in start-ups, multi-national organizations, established SMEs, and research institutes related to tech topics. Most of these teams were related to the ICT sector, electrical engineering, and computer science. A certain amount of the participants were related to engineering teams in the automotive or aerospace industry. The geographical hotspots of participating teams were Sweden, Germany, Italy, and Belgium. The first contact in most of the teams was either the team leader or a team member. In some cases, we also approached department heads or other employees in higher management positions. Those redirected us to teams dealing with tech-related methods (e.g. product development, programming) in their daily work life. Our contacts received a high-level description of our study, which included the general goal of our surveys, the data collection method, and a disclaimer that the teams could get a debriefing about the general findings and practical implications of our study in return for their successful participation. The disclaimer was supposed to be an incentive for the teams to participate, as they would get the opportunity to get insights on how to improve their organization practices (Podsakoff et al., 2003). Due to this choice, it could be argued that the response rate and the accuracy of the responses might have been improved.

Ultimately, 66 teams expressed their willingness to participate in our study. An overview of the teams in the final data set can be found in section 4.1. Some of the contacted teams either declined our query or did not respond within the two months of our data collection period. For these teams, the main reasons for declining our query were:

1. strict policies of the organizations for collaborations with external parties;
2. not enough time in the near future; and/or

3. fear of overloading the team with surveys as they already have internal team-related questionnaires.

We acknowledge that the challenges around getting enough teams for our survey have certain practical implications. These will be further discussed in subsection 4.7.2.

3.3 Variable Measures in Survey

As section 3.2 already explained, the study was conducted in several European countries with varying official languages. For this reason, the language of the survey questions was English. All the questions except the control variables were based on a Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree). A detailed overview of all the questions asked in the survey can be found in the appendix section A.5 to A.9. The items regarding team reflexivity and team innovation were asked the team leader (TL). The ones about leader humility, team proactive personality, and team psychological safety were asked the team members (TM). Both groups, namely team leaders and team members, received some demographic questions, which included items like gender, professional working experience, and team tenure.

3.3.1 Leader Humility (TM)

In order to determine a value for the leader humility variable, the team members were asked several questions about their perception of their team leader's behavior. Nielsen and Marrone (2018) recommend utilizing such an assessment by the team members to mitigate the self-enhancement and modesty effect that might occur when using self-reported measures. According to Kelemen et al. (2023), most Likert scale-based studies related to humble leadership rely on these questions by Owens et al. (2013) in order to measure leader's expressed humility. As a result, we rely on this scale to measure it in our survey.

The nine items of this scale target the three dimensions of humility introduced in subsection 2.2.2. The first dimension is the manifested willingness to view oneself accurately. Question examples for this dimension are "The team leader actively seeks feedback, even if it is critical", and "The team leader shows appreciation for the unique contributions of others". The latter aims towards the second dimension of humility, which is the appreciation of others' strengths and contributions. Lastly, questions like "The team leader is open to advice from others" assess the dimension around the teachability of the leader. An overview of the items for this measure can be found in section A.5.

Sekaran and Bougie (2016) consider Cronbach's Alpha value below 0.60 as poor and above 0.80 as good. A value around 0.70 is considered acceptable (Sekaran & Bougie, 2016). The Cronbach's Alpha was 0.893 for this scale and our final data set. This is a sign that the utilized scale has high reliability.

3.3.2 Team Proactivity (TM)

Similar studies in the field (Leblanc et al., 2022; Parker et al., 2006) utilized four of the highest loading items from Bateman and Crant (1993) to measure the proactivity in a team. Similar to the approach of Leblanc et al. (2022), the working body of the teams (i.e. team members) were asked about their proactive behavior. This approach ensures that the team members and the team leaders can finish the questionnaires in a reasonable time which ensures a higher response rate as they do not have to answer all survey questions. The four questions related to this scale were asked to the team members and included items like "I am excellent at identifying opportunities" and "If I believe in an idea, no obstacle will prevent me from making it happen". An overview of the items for this measure can be found in section A.6.

This scale had a Cronbach's Alpha of 0.692 for our final dataset. Even though it is below the level of a good value (0.80), it is still acceptable as it is in the range of 0.70 (Sekaran & Bougie, 2016). Kline (2013) sees it similar as he argues that Cronbach's Alpha can be as low as 0.60 for psychological constructs.

3.3.3 Psychological Safety (TM)

In order to investigate psychological safety, we used a seven-item scale. A set of questions formulated by Edmondson (1999) was asked to the individual team members. This is important as psychological safety in a team is based on the individual perception of the team members about the social context in a work environment (Cauwelier, 2019). According to Newman et al. (2017) the scale utilized in this study is one of the most used scales for measuring psychological safety on a team level. Example items of the questions are "Members of this team are able to bring up problems and tough issues" and "Working with members of this team, my unique skills and talents are valued and utilized". An overview of the items for this measure can be found in section A.8.

The Cronbach's Alpha of this scale for our final data set was 0.802, which indicates that it has high reliability.

3.3.4 Reflexivity (TL and TM)

The questions used to assess team reflexivity were previously used by several other scholars (de Jong & Elfring, 2014; Leblanc et al., 2022) and derive from Carter and West, 1998. It is a five-item scale that assesses to what extent members reflect upon their task and adapt based on the situation at hand. Sample items are "In this team we often review the feasibility of our objectives" and "In this team we often discuss the methods used to get the job done". These questions were asked to the team leader and the team member in order to assess how the perception of the team leader and the perception of the team members on this topic coincide. An overview of the items for this measure can be found in section A.7.

This scale had a Cronbach's Alpha of 0.836 for our data set, which means that it can be considered a reliable scale.

3.3.5 Innovation (TL)

To assess the team innovation of the participating teams, four questions were asked the team leader. The items used in the survey were originally developed by Anderson and West (1998), but an adapted version by De Dreu (2006) was used in this study. Sample items are "Team members often implement new ideas to improve the quality of our products and services" and "This is an innovative team". An overview of the items for this measure can be found in section A.9.

The Cronbach's Alpha of this scale for our final dataset was 0.852 which indicates that there is a high degree of reliability.

3.3.6 Control Variables (TL and TM)

Several control variables were included to better understand the responses and to perform additional statistical analysis. Scholars have shown that team size (i.e. number of individuals in the team) can have a significant influence on the outcomes of a team (e.g. innovation capabilities of a team) (Hülshager et al., 2009). For this reason, the team leader was asked to indicate the number of individuals in their team. Besides this, other questions were directed to gather information about how long the respondents have been working in their professions and as part of their current team.

Moreover, a single-item measure ("Members of this team depend on each other to accomplish their work.") was used to determine the interdependence of the team. It was required as it is a common assumption that team interdependence can influence team dynamics in several ways (Kozlowski & Bell, 2003).

Finally, as tech teams can have a variety of purposes, the team leader was asked to choose a classification for their teams. The options were 1) research and development team, 2) infrastructure team, 3) user and customer support team, 4) quality assurance team, and 5) their own description for the team, if the previous ones were not applicable.

3.4 Data Aggregation from Individual to Team Level

At first, the responses of the individual study participant were stored in an Excel table for a first analysis. This analysis included a check of whether the response rate was sufficient (i.e. the leader and more than 30% of the members of one team answered the questionnaire). The answers about participants' main tasks and the team classification were utilized to determine if the teams fit our definition of a tech team. After these checks, the aggregation of the team responses was performed.

This was done by creating an item for the results of each team, aggregating the responses of the leaders with those of the members similar to Leblanc et al. (2022). The team leader's responses were used to discern the value of the team's innovation. Values for team proactivity, psychological safety, and leader humility were determined by averaging the responses of different team members. Finally, the value for team reflexivity was determined by averaging the responses of all individuals in a team (e.g., team leaders and team members). As the measure of leader humility

was targeted to one person (i.e. members rate leader), the standard deviation of the accumulated responses for this measure was checked. If the standard deviation for a certain team was greater than 1.0, then the measure of leader humility for this team was removed from the data set. The other measures (e.g. team proactivity) remained in the data set.

3.5 Statistical Analysis on Team Level

This study relied on the analysis with three statistical analysis tools beyond a simple analysis of the descriptive statics. This allows the reader to better understand the final data set of this study. Firstly, a Pearson correlation matrix is utilized to determine simple correlations among the study variables (Mayers, 2013; Sekaran & Bougie, 2016). This allows us to see the relationships of the study variables on a higher level.

In a second step, the statistical analysis tool SPSS was used to investigate the relationships between the study variables in more detail (Mayers, 2013; Sekaran & Bougie, 2016). More specifically, the main part of the SPSS analysis utilizes a similar approach to Leblanc et al. (2022), in which the macro PROCESS of the SPSS tool was used. This tool allowed us to perform a mediation analysis of the study variables.

As this study heavily builds on existing theories (Leblanc et al., 2022) and tries to provide an understanding of additional variables and relationships, the SmartPLS tool was an adequate way to perform exploration beyond mediation analysis with SPSS PROCESS (Hair et al., 2011; Puteh & Azman Ong, 2017). The tool utilizes a partial least squares-structural equation modeling (PLS-SEM), which has the benefit of also working with relatively small sample sizes and it allows to model many relationships between the variables of a model (Hair et al., 2011). On the contrary, the PLS-SEM method is criticized as it does not provide a global measure of the goodness of a model and it is considered less reliable for strict hypothesis testing compared to SPSS (Hair et al., 2011; Puteh & Azman Ong, 2017). Nevertheless, PLS-SEM can be seen as a complementary method in our study and it provides additional insights as it allows to build more complex structural models.

3.6 Validity, Reliability, and Generalizability

The validity and reliability of this study were ensured by adopting theories from peer-reviewed articles from well-known authors who investigated related aspects of this topic (Amabile & Pratt, 2016; Edmondson, 1999; Leblanc et al., 2022; Owens et al., 2013). Besides this, the measures of the study were already introduced and validated in other studies (Bateman & Crant, 1993; Carter & West, 1998; De Dreu, 2006; Edmondson, 1999; Owens et al., 2013), which ensured that they measure the underlying concept. The statistical analysis for the measures on our specific data set confirmed the reliability as all of them had a sufficient value for Cronbach's Alpha. Besides this, a multi-collinearity analysis showed that the variance inflation factor

(VIF) was below 1.5 for all the measures. Also, the Condition Index was below 2.0 for all the measures. For this, no concerns regarding multi-collinearity were raised.

In order to overcome common method biases, we decided to ask the measures for some of the study variables to the team members (e.g. leader humility), and some others to the team leader (e.g. innovation). Such an approach is commonly proposed in social science studies as a remedy to improve the method bias (Podsakoff et al., 2012). The self-enhancement and modesty effect was reduced by using the team members to assess the leader's expressed humility (Nielsen & Marrone, 2018). Indeed, asking the leader directly about their behavior could reduce the reliability and validity of such a study.

Another aspect to ensure a high degree of reliability and validity was to analyze the outliers and double-check the responses with the participants. This was done by sending a validation survey to the outlier teams after several weeks. Similar methods are discussed by Podsakoff et al. (2012) to reduce the effect of method biases by introducing a temporal separation between the measures.

To have a high degree of generalizability, we choose not to limit the target group of our study too much. For this reason, we tried to find participants all over Europe (e.g. Sweden, Germany, Italy) and in different tech sectors (e.g. software development teams, engineering teams in the aerospace and automotive sector). This ensured that the results of our study were not too specific as the participating teams have a variety of backgrounds. Another aspect to ensure generalizability is to perform the statistical analysis with well-chosen parameters (e.g. 95% confidence interval, proven analysis tools like SPSS PROCESS).

Chapter 4

Analysis and Discussion

This chapter provides the analysis and discussion of the gathered data for this study. The final data set is presented in section 4.1 and analyzed in the light of different descriptive statistics. Afterward, a correlation matrix is discussed in section 4.2. Several graphs visualize the relationship between data points in the final data set, which can be used to see the trend between different variables (see section 4.3). Then, an analysis based on different statistical models, namely SPSS and SmartPLS, is proposed to validate the theoretical model (see section 4.4 and section 4.5). In conclusion, the different parts of the analysis are brought together in section 4.6 and further discussed in section 4.7.

4.1 Profile and Descriptive Statistics of Final Data Set

Section 3.2 already explained how the participating teams were approached and that 66 teams were willing to participate in the survey for this study. Of these 66 teams, 36 have crossed the 30% response rate threshold for the team members. Three of these teams were excluded from the study since they did not meet the criteria of being tech teams in Europe (e.g. the leader stated that they were a procurement team, or they were located outside of Europe). Hence, all the data used is based on the remaining 33 teams. Figure 4.1 shows the geographical distribution of the teams with a sufficient response rate. By analyzing the origin of the teams, it becomes clear that most teams are from Sweden, Germany, and Belgium. Besides this, several others are from Italy and France. Ireland, the Netherlands, and Turkey account for one team each.

Table 4.1 shows a breakdown of the final data set at the individual and team levels. There are 156 team members and 33 team leaders in the final data set of this study. On the individual level, it becomes evident that only a small percentage of the team members are female (10%), which is slightly higher in leader positions (15%). This observation goes in line with the share of female students in tech-related subjects at European universities. For example, at KTH Stockholm, one of the biggest technical universities in Scandinavia, only 35% of all students are women (KTH Stockholm, 2021). More specifically, the share of female students in subjects

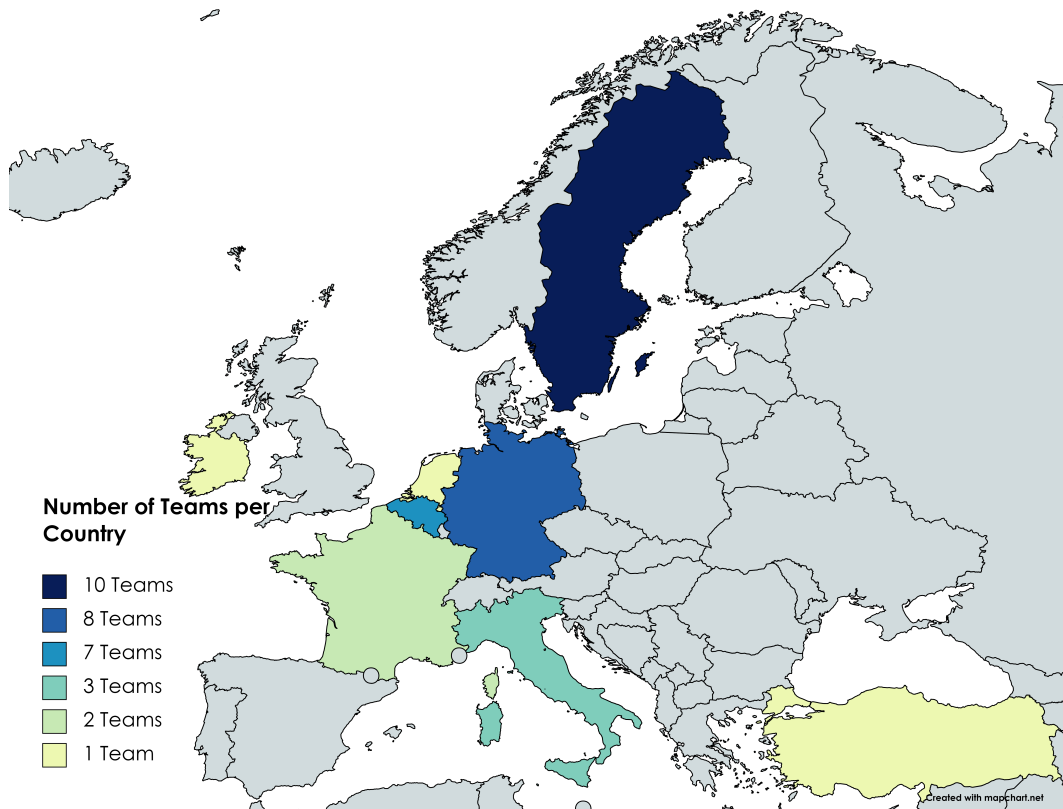


FIGURE 4.1: Overview about origin of teams with sufficient response rate

like electrical engineering or computer science is 13 and 21%, respectively (KTH Stockholm, 2021). As there is a positive trend in recent years that more women are subscribing to technical studies, the working body in organizations still has to grow. As a result, there is a low percentage of female workers in the organizations outside university, as observed in this study. Therefore, there is limited diversity concerning gender in the population and sample of this study.

The breakdown at the team level in Table 4.1 shows that most of the 33 teams in the final data set of this study have either a rather low response rate (30 to 70%) or reached a very high response rate (90 to 100%). Figure B.1 visualizes the distribution of the response rates of the teams in the final data set. Figure B.2 visualizes the distribution of the team sizes of the teams in the final data set. There is one group (team size of 4 to 7 people) with the most teams. The number of teams reduces when moving towards the lower and higher end of the distribution of the team sizes. Most of the teams were classified as R&D teams by the team leader (91%). Besides this, two teams were classified as customer support teams and one team as a quality assurance team. This classification was confirmed manually by analyzing the answers of the team leaders and team members with regard to the main tasks of their jobs.

4.1. Profile and Descriptive Statistics of Final Data Set

Individual Level		Number of Team Members	Number of Team Leader
Gender	Male	139 (89.10%)	28 (84.85%)
	Female	16 (10.26%)	5 (15.15%)
	No Answer	1 (0.64%)	0 (0%)
	Others	0 (0%)	0 (0%)
Total		156	33

Team Level		Number of Teams
Response Rate	30-50%	10 (30.30%)
	50-70%	11 (33.33%)
	70-90%	2 (6.06%)
	90-100%	10 (30.30%)
Team Size (Leader + Members)	1-3	4 (12.12%)
	4-7	10 (30.30%)
	8-11	8 (24.24%)
	12-15	7 (21.21%)
	16-19	3 (9.09%)
	20-23	1 (3.03%)
Team Classification	R&D	30 (90.90%)
	Customer Support	2 (6.06%)
	Quality Assurance	1 (3.03%)
	Others	0 (0%)
Total		33

TABLE 4.1: Breakdown of participants on a team and individual level

Table 4.2 shows the descriptive statistics of the study variables based on the 33 teams which crossed the 30% threshold for the response rate. Team size and response rate are metadata and have similar values in other studies with a similar methodology (Leblanc et al., 2022). The other variables are either based on the answers of the team leader (TL), the team members (TM), or both (TL & TM). Note that leader humility and psychological safety have the lowest range of values (min to max) and have the highest minimum value of all study variables. As a result, the means of leader humility and psychological safety are the highest and the closest to the maximal value of the utilized Likert scale (i.e. 5).

Table B.1 shows the means of the eight variables from Table 4.2, which are further split based on the teams' geographical origin. In order to maintain anonymity, the teams from Italy, France, Ireland, the Netherlands, and Turkey are summarized in one category ("Others"). Even though there are minor regional differences between the means, no further conclusion will be drawn based on this analysis as the number of

teams within one group of Table B.1 range between 7 and 10. It is worth mentioning that adding or removing another team from one of the groups would result in a notable change in the means since there is not a large number of teams in each group.

	Min	Max	Mean	SD
1. Team Size (metadata)	2	22	9.21	6.03
2. Response Rate (metadata)	0.31	1.00	0.67	0.25
3. Team Interdependence (TL & TM)	2.00	5.00	3.90	0.69
4. Leader Humility (TM)	3.20	5.00	4.33	0.37
5. Team Proactivity (TM)	2.25	4.31	3.61	0.47
6. Psychological Safety (TM)	2.89	4.71	4.31	0.41
7. Reflexivity (TL & TL)	2.20	4.64	3.75	0.53
8. Innovation (TL)	2.50	5.00	4.05	0.69

TABLE 4.2: Descriptive statistics of study variables

4.2 Analysis of Correlation Matrix of Study Variables

The required calculations for the correlations were performed with SPSS. The shown values represent the Pearson Correlation Coefficient. As the main measures of this study are based on Likert Scale, a Pearson Correlation Matrix is an adequate way to analyze the relationships between the variables (Sekaran & Bougie, 2016).

The correlation between the different variables of the study is presented in Table 4.3. It shows a strong, negative significance between the team size and the response rate (variables 1 and 2). This can be traced back to the fact that most teams with 100% response rates are also quite small. On the contrary, bigger teams rarely got a response rate close to 100%.

Variable	1	2	3	4	5	6	7
1. Team Size	--						
2. Response Rate	-.61**	--					
3. Team Interdependence	.07	.10	--				
4. Leader Humility	-.22	.06	.27	--			
5. Team Proactivity	-.03	-.03	.26	.47**	--		
6. Psychological Safety	.01	-.03	.23	.16	-.13	--	
7. Reflexivity	-.13	.10	.30	.48**	.36*	.30	--
8. Innovation	.33	-.17	.35*	.26	.35*	.37*	.46**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

TABLE 4.3: Correlation among study variables

Hypothesis 1 postulated that innovation is positively correlated with reflexivity. This is supported by the high degree of significance and the positive coefficient of the relationship between variables 8 and 7 in the correlation matrix. A similar correlation between innovation and reflexivity was also documented by Leblanc et al. (2022).

Hypothesis 3 postulated that leader expressed humility is positively correlated to reflexivity. This is supported by the high degree of significance and the positive coefficient for the relationship between variables 7 and 4. A similar correlation between leader humility and reflexivity was also reported by Leblanc et al. (2022).

Variable 8 and 5 are positively correlated on a level of $p=0.046$ which means that the teams with more proactive team members are also more innovative. This supports hypothesis 4.

The positive correlation postulated by hypothesis 5 is supported by the correlation matrix as there is a significant correlation between variables 7 and 5. The p-value for this correlation is equal to 0.046. This means that the teams with more proactive team members are also more reflexive.

The positive correlation between variables 5 and 4 is the fourth correlation with a p-value lower than 0.001. This supports hypothesis 6. This means that the teams with a higher degree of leader expressed humility also consist of more proactive team members.

Hypothesis 8 is supported by the positive correlation between variables 8 and 6. The p-value for this correlation is equal to 0.034. This means that the more innovative teams of this study also have a higher degree of psychological safety.

The positive correlation between leader humility and innovation (hypothesis 2) is not directly supported by the correlation matrix. Similarly, there is no evidence for the correlation between psychological safety and any of the other variables than innovation (hypothesis 7). Besides this, the mediating effect of reflexivity postulated by hypothesis 9 requires further analysis.

Note that even though only the correlation between team interdependence and innovation is significant on a 5% level, team interdependence has high non-significant correlating coefficients to leader humility, team proactivity, psychological safety, and reflexivity. This could indicate that team interdependence plays an important role in the context of this study. The positive correlation between team interdependence and innovation was also reported by Leblanc et al. (2022).

4.3 Visualization of Correlations of Study Variables

The graphs in this chapter show the scatter plot of different variables in order to illustrate their relationship. For each graph, a linear trend line is shown. These graphs illustrate and support the correlations introduced in the previous section.

Figure 4.2 indicates that the teams with a higher degree of leader expressed humility also have a higher value for team proactivity. This supports our hypothesis 6. Two teams with the lowest leader expressed humility have a meaningful difference in team size (3 and 14 people in the team) and both of them are classified as R&D teams.

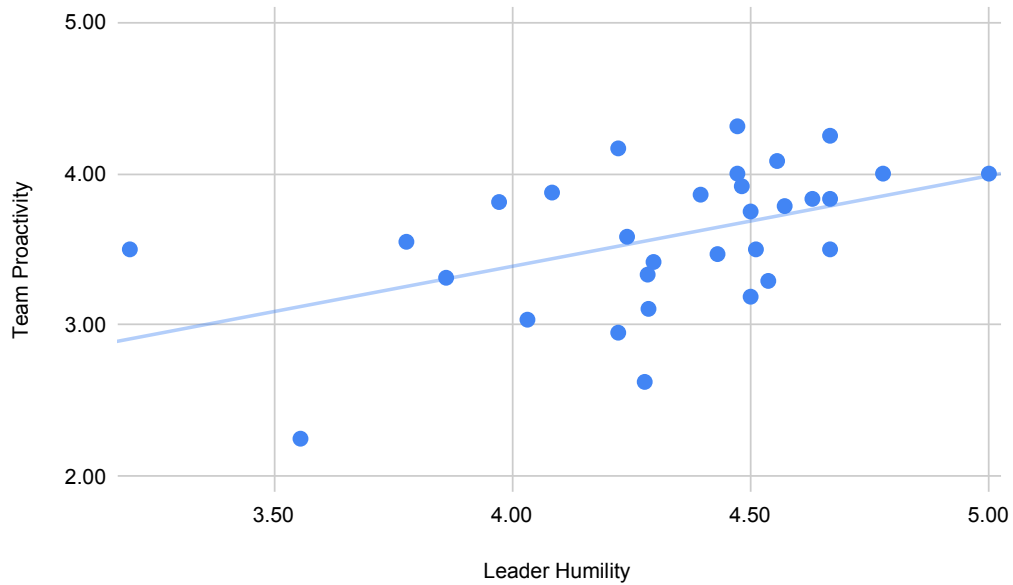


FIGURE 4.2: Positive relationship between team proactivity and perceived leader humility

Figure 4.3 shows that teams in which the leader shows more humility also have more reflexivity. This supports our hypothesis 3. The six teams with the highest scores for reflexivity have all a team size of ≤ 8 people. Similarly, Figure 4.2 shows that teams with a higher degree of proactivity also have more reflexivity. This supports our hypothesis 5.

Figure 4.4 shows that teams with higher reflexivity are more innovative. This supports our hypothesis 1. The discrete-looking values for innovation in this graph are due to the fact that the innovation measure of this study related to four items which were only answered by one person. As a result, there is a much more limited amount of potential values for the measure of innovation.

4.4 Validation of Theoretical Framework with SPSS PROCESS

As already explained in section 3.5, SPSS PROCESS is a common tool for evaluating some aspects of hypotheses. Therefore, SPSS PROCESS analysis is used in this study to evaluate the central aspect of our theoretical model, namely the relationships between leader humility, team proactivity, reflexivity and innovation.

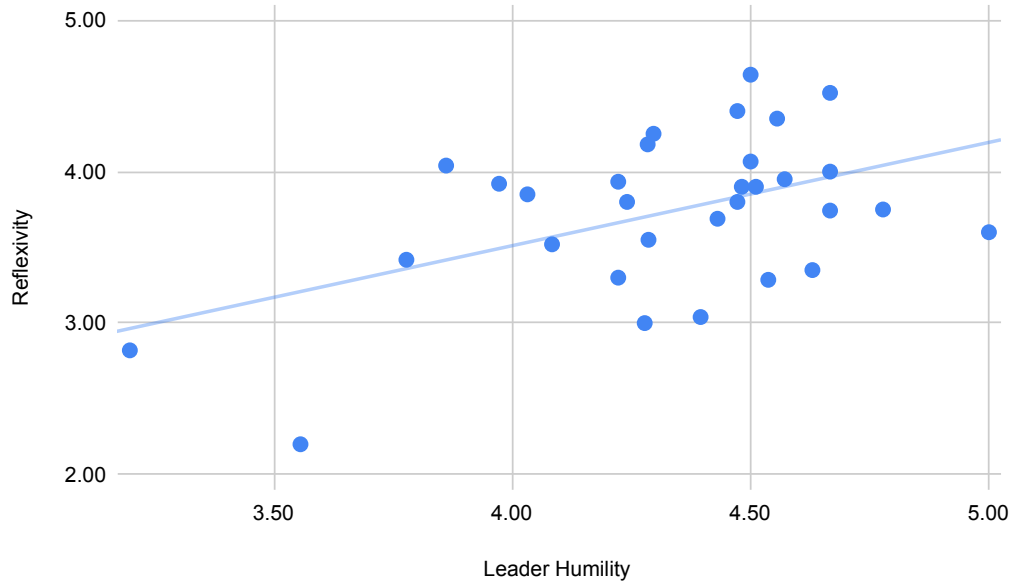


FIGURE 4.3: Positive relationship between perceived reflexivity and leader humility

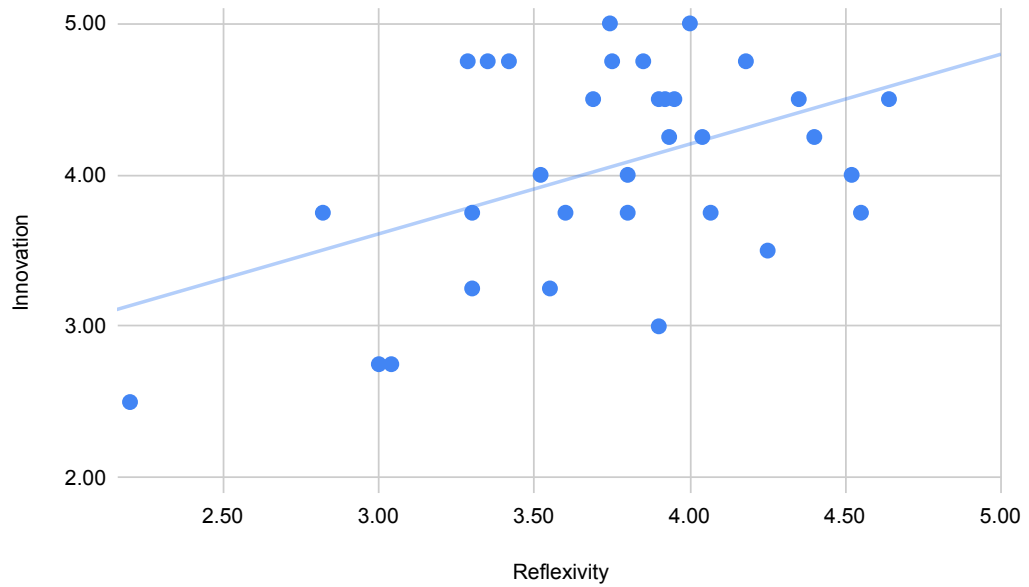


FIGURE 4.4: Positive relationship between innovation and reflexivity

4.4.1 Relationship Leader Humility and Team Proactivity

Figure 4.5 shows a part of the proposed theoretical model which was validated against the data obtained by this study. The results of this model were obtained with linear regression. The relationship between leader humility and team proactivity is directly correlated with a standardized coefficient of $b=0.47$ and a standard error of 0.16. The p-value for this relationship is 0.008. The model summary shows that $F=8.158$, $p < 0.05$ and $R^2 = 0.22$. This means that this model accounts for 22% of the variance in the relationship between leader humility and team proactivity. This support our hypothesis 6.

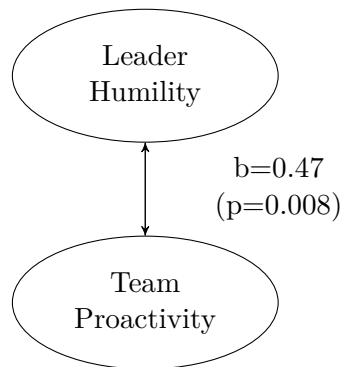


FIGURE 4.5: Validated theoretical model (0)

4.4.2 Relationship Leader Humility, Reflexivity, and Innovation

Figure 4.6 shows a part of the proposed theoretical model which was validated against the gathered data. The results for this model were obtained by using Model 4 of PROCESS (Hayes, 2017) on 5000 samples and a 95% confidence interval. This method is also used by other studies in the field in order to assess a mediating model (Leblanc et al., 2022). The results show that leader humility is directly correlated with reflexivity with a coefficient of $b=0.39$ and a standard error of 0.17. The p-value for this relationship is 0.0273, which means that it is a significant correlation. This model accounts for 31% of the variance in the relationship between leader humility and reflexivity since R^2 is equal to 0.31. According to Cohen (1988), this means that the effect size is large as the coefficient of determination (R^2) is greater than 0.26. These arguments support our hypothesis 3.

Also, innovation is directly correlated with reflexivity with a coefficient of $b=0.45$ and a standard error of 0.19. The p-value for this relationship is 0.0261, which means it is a significant correlation on a 5% level. This model accounts for 39% of the variance between reflexivity and innovation since R^2 is equal to 0.39. As a result, the coefficient of determination is above the level of a large effect size (Cohen, 1988). These arguments support our hypothesis 1.

The direct effect of leader humility on innovation has a coefficient of $b=0.11$ and a p-value of 0.5319. Therefore, this direct effect is not significant. The indirect effect

	Team Reflexivity			Innovation		
	b	SE	95% CI	b	SE	95% CI
Control Variables						
Team Size	-.03	.16	[-.35, .30]	.38*	.15	 [.07, .70]
Task Interdependence	.30	.17	[-.05, .65]	.09	.18	[-.27, .46]
Main Predictors						
Leader Humility	.39*	.17	 [.05, .73]	.11	.18	[-.26, .48]
Team Reflexivity				.45*	.19	 [.06, .83]
F		4.13*			4.23**	
R		.56			.63	
R^2		.31			.39	

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 4.4: Results of SPSS PROCESS regression model for the relationship between leader humility, reflexivity and innovation.

has a coefficient of $b=0.20$ and a bootstrap confidence interval of $[-.05, .41]$. By further checking this mediation analysis' indirect effect with a Sobel test, the p-value results being 0.0970. Even though this indirect effect is not significant on a 5% level, these results indicate that there might be a full mediating effect of reflexivity between leader humility and innovation. We see our hypothesis 9 supported due to the small sample size of this study and the large effect size.

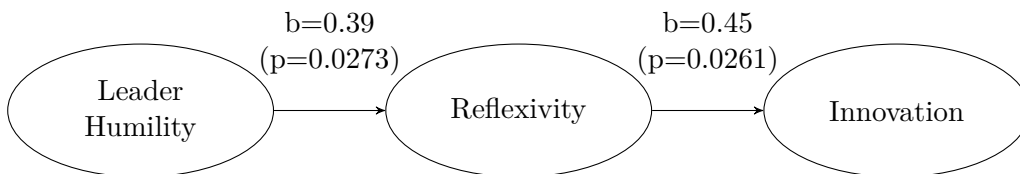


FIGURE 4.6: Validated theoretical model (1)

4.4.3 Relationship Team Proactivity, Reflexivity, and Innovation

Figure 4.7 shows a part of the proposed theoretical model which was validated against the gathered data. The results for this model were obtained by using Model 4 of PROCESS (Hayes, 2017) on 5000 samples and a 95% confidence interval. It shows that team proactivity is directly correlated with reflexivity with a coefficient of $b=0.30$ and a standard error of 0.17. The p-value for this relationship is 0.0951. This model has a value of R^2 equal to 0.19, which means that it accounts for 19% of the relationship between team proactivity and team reflexivity. Even though this relationship is not significant on a 5% level, hypothesis 5 can be supported by this

result. An argument for this is that the coefficient of determination can be classified between a medium and large effect size (Cohen, 1988).

Innovation is directly correlated with reflexivity with a coefficient of $b=0.40$ and a standard error of 0.16. The p-value for this relationship is 0.0204, which means that there is a significant correlation. This model accounts for 42% of the variance in the relationship between reflexivity and innovation since R^2 is equal to 0.42. The coefficient of determination can be classified as large due to the value of R^2 (Cohen, 1988). These arguments support our hypothesis 1.

The direct effect of team proactivity has a coefficient of $b=0.18$ and a p-value of 0.2665. Therefore, this direct effect is not significant. The indirect effect has a coefficient of $b=0.12$ and a bootstrap confidence interval of $[-.1536, .2629]$. Further investigation with a Sobel test of the mediation analysis reveals that the p-value of this indirect effect is equal to 0.1577. Even though this is not significant on a 5% level, we see hypothesis 9 supported due to the small sample size of this study.

	Team Reflexivity			Innovation		
	b	SE	95% CI	b	SE	95% CI
Control Variables						
Team Size	-.13	.17	[-.48, .21]	.37*	.15	 [.07, .67]
Task Interdependece	.23	.17	[-.13, .58]	.16	.15	[-.16, .47]
Main Predictors						
Team Proactivity	.30	.17	[-.06, .65]	.18	.16	[-.14, .50]
Team Reflexivity				.40*	.16	 [.07, .72]
F		2.31			5.00*	
R		.44			.65	
R^2		.19			.42	

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

TABLE 4.5: Results of SPSS PROCESS regression model for the relationship between team proactivity, reflexivity and innovation.

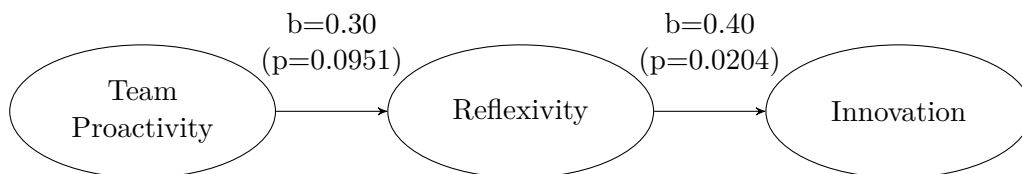


FIGURE 4.7: Validated theoretical model (2)

4.4.4 Conclusions Based on Analysis with SPSS PROCESS

Even though some of the relationships investigated in this section are not significant on a 5% level, we consider the central part of our theoretical model as supported. This central part of the theoretical model includes the positive correlation between leader humility and team proactivity, as well as the mediating effect of reflexivity from leader humility and team proactivity to innovation. Arguments supporting our view are the small sample size of this study and the large coefficient of determination in the different models.

4.5 Validation of Theoretical Framework with SmartPLS

The previous section mainly focused on validating the correlation between leader humility and team proactivity, and evaluating the mediating effect of reflexivity. Conversely, this section will further explore the impact of other variables (e.g., team size, team interdependence, psychological safety) on the core of our theoretical model. Already during the initial analysis, no concerns were raised regarding the validity of aggregating the measurement items at the team level (e.g. Cronbach's Alpha assessment, multi-collinearity analysis). For this reason, the values of the different measures for the participating teams are accumulated at the team level into one value per variable, and imported as such into SmartPLS.

The analysis with SmartPLS includes several different models which increase the complexity of the modeling gradually. The modeling starts with a simple mediation model with three variables (i.e. leader humility, reflexivity, and innovation) similar to the central part of the theoretical framework provided by (Leblanc et al., 2022). Afterward, additional variables are introduced incrementally. The relationships from the Pearson Correlation Matrix with an absolute value bigger than 0.15 are also introduced for each variable (see section 4.2). Hence, the following models are utilized in the analysis with SmartPLS:

- **Model 1:** This simple model reconstructs the relationships from the mediation analysis of subsection 4.4.2. This means that the direct effect of leader expressed humility on reflexivity and innovation is considered. Besides this, the relationship between reflexivity and innovation is modeled.
- **Model 2:** Here, team proactivity is added to Model 1 by drawing a connection from team proactivity to reflexivity and innovation. Since SmartPLS does not allow bi-directional relationships between two variables, the relationship between leader humility and team proactivity is modeled uni-directional starting from leader humility.
- **Model 3:** The Pearson Correlation Matrix indicated that team size has rather high coefficients with leader humility and innovation. For this reason, Model 2 is extended by adding a connection from team size to these two variables.

- **Model 4:** Next, psychological safety is added by extending Model 3. Considered connections start from psychological safety and go to reflexivity and innovation as well as from leader humility to psychological safety.
- **Model 5:** Lastly, team interdependence is added with connections to leader humility, team proactivity, reflexivity, psychological safety, and innovation.

4.5.1 Model 1

Figure 4.8 visualizes the structure of Model 1 in SmartPLS. The first value on the paths between the variables is the path coefficients determined by the PLS-SEM algorithm. The values in brackets are the p-values found by the bootstrapping method with 5000 samples. The values in the circles of the variables are the R^2 values of the variables which indicate how well this model predicts the specific variables.

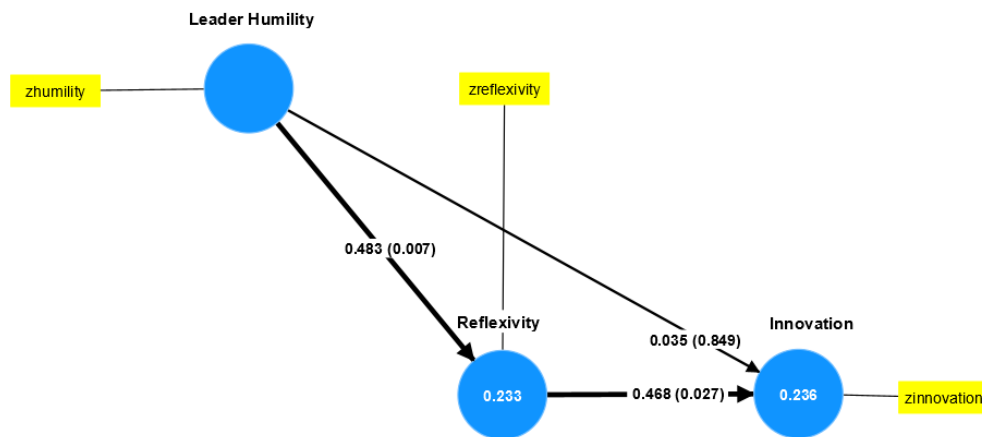


FIGURE 4.8: Path coefficients and model fit of variables for SmartPLS Model 1

Similar to the mediation analysis with SPSS PROCESS, the results of the PLS-SEM algorithm reveal that there is no direct effect of leader humility on innovation as the path coefficient is only 0.035 and the p-value is equal to 0.849. On the other hand, the indirect effect of leader humility through reflexivity to innovation has a coefficient of 0.226, which means that the total effect of leader expressed humility on innovation is 0.261. This indirect effect of leader humility on innovation has a p-value of 0.134, which is still an acceptable level considering the small sample size of this study. This model shows that leader humility accounts for 23% of the variance of reflexivity ($R^2_{reflexivity} = 0.233$) and leader humility together with reflexivity accounts for 24% of the variance of innovation ($R^2_{innovation} = 0.236$). Table 4.6 shows a summary of the total effect of different variables which highlights the positive effect of leader humility on reflexivity and innovation as well as the positive effect of reflexivity on innovation.

Paths	Path Coefficient	p-value
Leader Humility → Innovation	0.261	0.134
Leader Humility → Reflexivity	0.483	0.007
Reflexivity → Innovation	0.468	0.027

TABLE 4.6: Total effects in Model 1

4.5.2 Model 2

After introducing team proactivity to the model of SmartPLS, the paths starting from leader humility are still on the same level for coefficients and the p-values. Besides this, the model reveals that the relationship between leader humility and team proactivity is strong as the path coefficient is equal to 0.469 and the p-value is equal to 0.001. $R^2_{team\ proactivity}$ is equal to 0.220, which means that leader humility accounts for 22% of the variance of team proactivity as this relationship is the only connection pointing towards team proactivity. Figure 4.9 visualizes the output of this model and Table 4.7 summarizes the total effect of the different variables on each other.

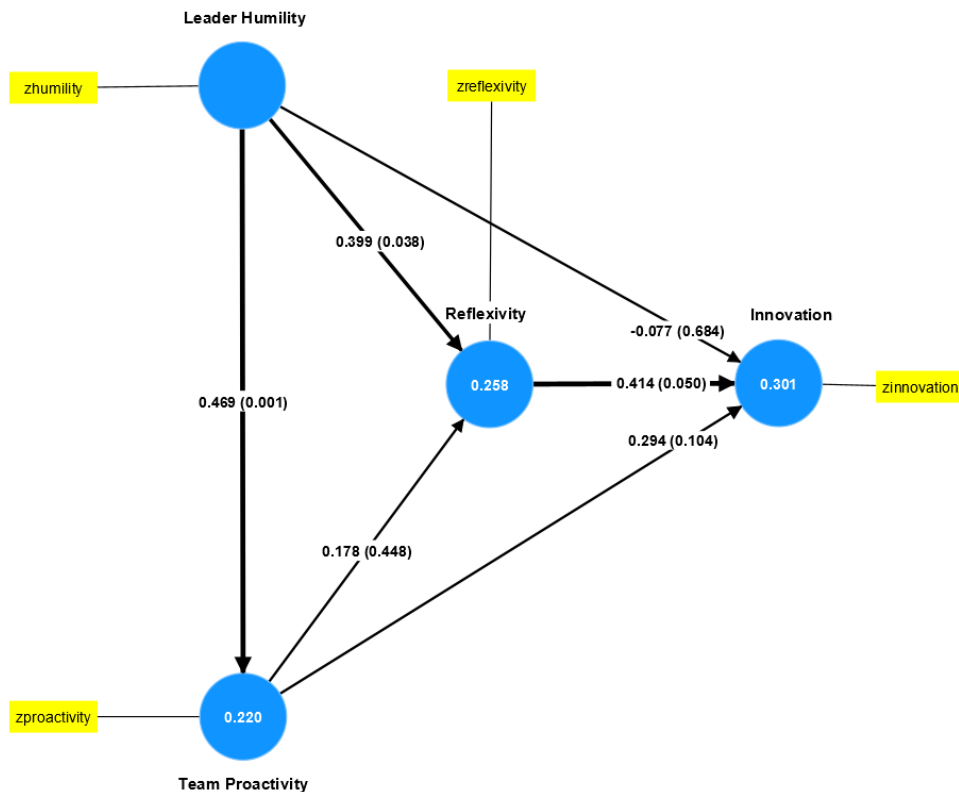


FIGURE 4.9: Path coefficients and model fit of variables for SmartPLS Model 2

Even though the direct effect of team proactivity on reflexivity is not on a significant level ($p = 0.448$), the total effect of team proactivity on innovation has a coefficient of 0.368 with a p-value of 0.091. The results of this analysis are similar to the ones in the mediation analysis in subsection 4.4.3 with the difference that the direct effect of team proactivity on innovation has a lower p-value (0.104 compared to 0.2665). On the other hand, the direct effect of team proactivity on reflexivity has a p-value of 0.0951 in the SPSS mediation analysis compared to a p-value of 0.448 in this analysis. The R^2 values of reflexivity and innovation improved by 0.025 and 0.065 respectively compared to Model 1. As a result, this model accounts for 26% of the variance of reflexivity and for 30% of the variance of innovation.

Paths	Coefficient	p-value
Leader Humility → Innovation	0.261	0.134
Leader Humility → Reflexivity	0.483	0.007
Leader Humility → Team Proactivity	0.469	0.001
Reflexivity → Innovation	0.414	0.050
Team Proactivity → Innovation	0.368	0.091
Team Proactivity → Reflexivity	0.178	0.448

TABLE 4.7: Total effects in Model 2

4.5.3 Model 3

This model includes team size as another variable in the analysis with SmartPLS as visualized in Figure C.1. The relevant additional paths are from team size to leader humility and from team size to innovation. Note that four structural paths point towards innovation, which means that the guideline of PLS-SEM regarding the minimum sample size is violated (Hair et al., 2022). As a result, the measures for path significance (p-values) are less reliable for Models 3 to 5.

By introducing team size to the modeling of SmartPLS, the value of $R^2_{innovation}$ increases notably from 0.301 in Model 2 to 0.435 in Model 3. This means that Model 3 accounts for 44% of the variance of innovation. The direct path from team size to innovation has a coefficient of 0.377 and a p-value of 0.020. It indicates that larger teams are also rated as more innovative by the team leaders.

The p-values of the total effects decrease after introducing team size. For this reason, many of the total effects shown in Table 4.8 are significant even on a 5% level. Even though the effect of team size on leader humility, reflexivity, and team proactivity is not close to a significant level, it is worth mentioning that these three relationships have a negative coefficient. This could indicate that the larger teams have less proactive team members, and the team leader shows less humility. Also, these bigger teams could have less reflexivity. Note that $R^2_{leader\ humility}$ is equal to 0.049, which means that team size only accounts for 5% of the variance in leader humility.

Paths	Path Coefficient	p-value
Leader Humility → Innovation	0.344	0.015
Leader Humility → Reflexivity	0.483	0.007
Leader Humility → Team Proactivity	0.469	0.001
Reflexivity → Innovation	0.421	0.028
Team Proactivity → Innovation	0.325	0.075
Team Proactivity → Reflexivity	0.178	0.448
Team Size → Innovation	0.300	0.065
Team Size → Leader Humility	-0.221	0.281
Team Size → Reflexivity	-0.107	0.293
Team Size → Team Proactivity	-0.104	0.282

TABLE 4.8: Total effects in Model 3

4.5.4 Model 4

In this model, psychological safety is added to SmartPLS with a connection from leader humility to psychological safety and from psychological safety to reflexivity and innovation.

The direct effect of leader humility on psychological safety has a coefficient of 0.161 and a p-value of 0.339. Also, the goodness of the model for psychological safety ($R^2_{\text{psychological safety}}$) is only equal to 0.026, which indicates that leader humility only accounts for less than 3% of the variance of psychological safety. This could mean that leader humility does not have any significant influence on psychological safety in a team.

Even though the direct effects of psychological safety on reflexivity and innovation are above the 5% significance level (0.208 and 0.152, respectively), the goodness of the model fit for reflexivity and innovation improved by 0.044 and 0.055, respectively. This indicates that the overall model improves by introducing psychological safety. The total effect of psychological safety on innovation has a coefficient of 0.328 and a p-value of 0.103, which hints that teams with more psychological safety might be also more innovative according to the team leader. Table 4.9 shows an overview of all total effects in this model.

4.5.5 Model 5

The Pearson Correlation Matrix indicates that team interdependence might have an effect on several study variables (see section 4.2). As a result, Model 5 introduces task interdependence as a new variable in SmartPLS. Also, relevant connections are drawn from this variable to leader humility, team proactivity, reflexivity, psychological safety, and innovation. Figure C.3 visualizes the structure of Model 5.

The direct effects of team interdependence on other variables are all not close to a 5% level. Nevertheless, the direct connection from task interdependence to team proactivity has a path coefficient of 0.262 and a p-value of 0.161. The good-

Paths	Path Coefficient	p-value
Leader Humility → Innovation	0.339	0.021
Leader Humility → Psychological Safety	0.161	0.339
Leader Humility → Reflexivity	0.483	0.007
Leader Humility → Team Proactivity	0.469	0.001
Psychological Safety → Innovation	0.328	0.103
Psychological Safety → Reflexivity	0.218	0.208
Reflexivity → Innovation	0.351	0.051
Team Proactivity → Innovation	0.392	0.017
Team Proactivity → Reflexivity	0.221	0.322
Team Size → Innovation	0.281	0.072
Team Size → Leader Humility	-0.221	0.281
Team Size → Psychological Safety	-0.036	0.577
Team Size → Reflexivity	-0.107	0.293
Team Size → Team Proactivity	-0.104	0.282

TABLE 4.9: Total effects in Model 4

ness of fit for some variables improved to a certain degree after introducing team interdependence as a variable in the model. As a result, this measure in Model 4 shows that $\Delta R^2_{team\ proactivity} = 0.063$, $\Delta R^2_{leader\ humility} = 0.076$, $\Delta R^2_{reflexivity} = 0.062$ and $\Delta R^2_{psychological\ safety} = 0.023$. In contrast to these rather big changes in the goodness of the model variables, $\Delta R^2_{innovation}$ is equal to 0.000, which indicates that introducing team interdependence did not improve the model fit for innovation compared to Model 4.

An analysis of Table 4.10 reveals that considering team interdependence as an additional variable impaired the p-values of other paths in the model. This indicates that team interdependence has an influence on the study variables, which is not necessarily completely captured with Model 5. However, this effect of team interdependence on this model has to be seen critically as the sample size violates the recommendation for the minimum amount of samples in models 3 to 5 (Hair et al., 2022).

4.5.6 Conclusions Based on Analysis with SmartPLS

This analysis showed that the goodness of the study variables can be improved by 1) adding relevant connections between the main predictors of the model (i.e. leader humility, team proactivity, reflexivity, and innovation) and by 2) considering additional variables such as team size, team interdependence, and psychological safety. The total effects in Model 5 highlight the positive effect of leader humility on team proactivity, reflexivity and innovation, as well as the positive effect of team proactivity on innovation (see Table 4.10). Besides this, the positive effect of reflexivity, psychological safety, team interdependence and team size on innovation can be shown in the total effects table.

Paths	Path Coefficient	p-value
Leader Humility → Innovation	0.280	0.085
Leader Humility → Psychological Safety	0.120	0.524
Leader Humility → Reflexivity	0.404	0.017
Leader Humility → Team Proactivity	0.398	0.001
Psychological Safety → Innovation	0.313	0.128
Psychological Safety → Reflexivity	0.171	0.367
Reflexivity → Innovation	0.352	0.061
Team Interdependence → Innovation	0.298	0.168
Team Interdependence → Leader Humility	0.276	0.231
Team Interdependence → Psychological Safety	0.189	0.274
Team Interdependence → Reflexivity	0.406	0.095
Team Interdependence → Team Proactivity	0.372	0.121
Team Proactivity → Innovation	0.365	0.041
Team Proactivity → Reflexivity	0.140	0.527
Team Size → Innovation	0.292	0.063
Team Size → Leader Humility	-0.231	0.238
Team Size → Psychological Safety	-0.028	0.661
Team Size → Reflexivity	-0.093	0.308
Team Size → Team Proactivity	-0.092	0.254

TABLE 4.10: Total effects in Model 5

Figure C.4 illustrates how the model fit for the different variables in the analysis with SmartPLS develops throughout the incremental model development. After Model 2, which includes our basic theoretical framework, the most interesting differences in the model fit (R^2) of the different models are:

- A notable increase in $R_{innovation}^2$ after introducing team size as a variable (Model 3)
- Minor increases in $R_{reflexivity}^2$ after introducing psychological safety (Model 4) and team interdependence (Model 5)

4.6 Summary of Findings

In this section, we summarize the results obtained through the Pearson Correlation Matrix (see section 4.2, the analysis with SPSS (see section 4.4), and the analysis with SmartPLS (see section 4.5) by stating which of our hypotheses can be supported based on the results we obtained. An overview of which hypotheses are supported by which analysis and the overall conclusion can be found in Table 4.11. Additional discussion about the support of the different hypotheses is provided in section 4.7.

	Pearson Correlation Matrix	SPSS PROCESS	SmartPLS	Overall Support
Hypothesis 1	✓	✓	✓	✓
Hypothesis 2	✗	✗	✓	✓
Hypothesis 3	✓	✓	✓	✓
Hypothesis 4	✓	✓	✓	✓
Hypothesis 5	✓	✓	✗	✓
Hypothesis 6	✓	✓	✓	✓
Hypothesis 7	✗	?	✗	✗
Hypothesis 8	✓	?	✓	✓
Hypothesis 9	?	✓	✓	✓

TABLE 4.11: Summary of results for the proposed hypothesis

Hypothesis 1: Team reflexivity positively correlates with innovation - supported

This relationship is significant and positively correlated in both the Pearson Correlation Matrix and the mediation analysis with SPSS PROCESS. The corresponding part of the mediation analysis has a value of R^2 of 0.39 and 0.42 for subsection 4.4.2 and 4.4.3, respectively. This means that these models of the mediation analysis account for 39% and 42%, respectively, of the variance of the relationship between reflexivity and innovation. According to Cohen (1988), the underlying models can be classified to have a large effect size due to the high R^2 values. The analysis with SmartPLS shows that reflexivity has a notable total effect on innovation. As a result, this hypothesis is supported.

Hypothesis 2: Leader humility positively correlates with innovation - supported

This relationship has no significant correlation in the correlation matrix. The direct effect of reflexivity on innovation was not significant on a 5% level in the mediation analysis with SPSS PROCESS. However, the analysis with SmartPLS reveals that the total effect of leader humility on innovation is notable as it has a coefficient of 0.280 and a p-value of 0.085. For this reason, we identify this hypothesis as supported due to this total effect.

Hypothesis 3: Leader humility positively correlates with team reflexivity - supported

Leader expressed humility has a strong, positive correlation ($p < 0.01$) with team reflexivity in the correlation matrix. The part of the mediation analysis which investigated this correlation has an R^2 of 0.31 (see subsection 4.4.2). This means that this model of the mediation analysis accounts for 31% of the variance in this relationship. SmartPLS also highlights that the total effect of leader humility on reflexivity is high and significant on a 5% level. As a result, this hypothesis is supported.

Hypothesis 4: Team proactivity positively correlates with innovation - supported

The indirect and direct effect of the mediation analysis in subsection 4.4.2 does not

show a significant correlation on a 5% level. Nevertheless, we believe that there is an indirect effect of proactivity on innovation as the indirect effect in the mediation analysis has a p-value of 0.1577 and a coefficient of 0.12. Additionally, the results of SmartPLS reveal that the total effect of proactivity on innovation is significant on a 5% level. Also, the relationship between team proactivity and innovation was significantly and positively correlated according to the correlation matrix. As a result, we consider this hypothesis as supported.

Hypothesis 5: *Team proactivity positively correlates with team reflexivity* - **supported**

The first part of the mediation analysis in subsection 4.4.3 did not show a positive correlation on a 5% level. The p-value for this relationship is equal to 0.0951, which could indicate that there might be an effect with a bigger sample size. However, this hypothesis is supported since the correlation matrix shows that this relationship is positive on a significant level and the coefficient of determination (R^2) for this part of the mediation analysis was on a medium-large level.

Hypothesis 6: *Team proactivity and leader humility are correlated with each other* - **supported**

Both the Pearson Correlation Matrix and the linear regression analysis in subsection 4.4.1 showed that these two variables are significantly positively correlated to a high degree ($p < 0.05$). Also, the analysis with SmartPLS shows that the total effect of leader humility on team proactivity is high and significant ($p = 0.001$). Therefore, this hypothesis is supported.

Hypothesis 7: *Psychological safety positively correlates with leader humility and team proactivity* - **not supported**

Neither the Pearson Correlation Matrix nor additional analysis with SPSS showed any significant correlation between psychological safety and leader humility or team proactivity. Also, the analysis with SmartPLS did not allow to draw any meaningful conclusions. As a result, this hypothesis is not supported.

Hypothesis 8: *Psychological safety positively correlates with innovation* - **supported**

As postulated with this hypothesis, psychological safety is positively correlated to innovation on a significant level according to the Pearson Correlation Matrix. Additionally, the analysis with SmartPLS revealed that psychological safety can have a notable influence on the model. Therefore, this hypothesis is supported.

Hypothesis 9: *Team reflexivity mediates leader humility and team proactivity relations with innovation* - **supported**

Even though the mediation analysis did not show a mediating effect on a 5% level, we still see this hypothesis as supported due to the rather low p-values in the analysis and the small sample size of the study. Besides this, the analysis with SmartPLS also supported the idea of mediation of reflexivity from leader humility and team proactivity to innovation. For this reason, we consider this hypothesis as supported.

Figure 4.10 shows how the final theoretical model looks after the data analysis is conducted. Besides these elaborations about the proposed hypothesis, it is worth noticing that team size and task interdependence also showed a certain influence on some of the study variables as explained in the previous sections.

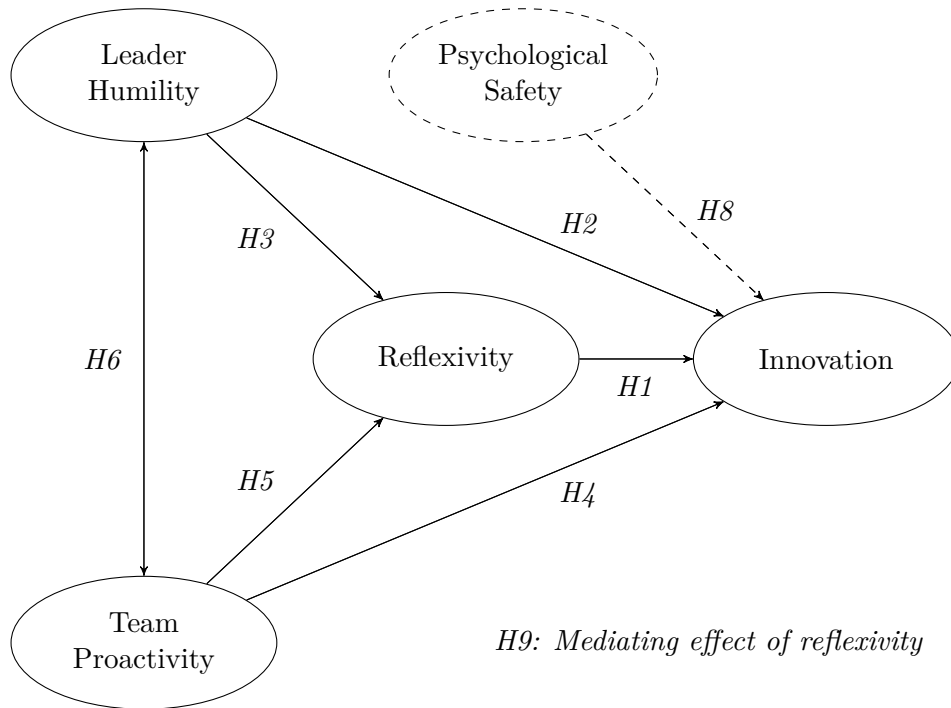


FIGURE 4.10: Final theoretical model with an illustration how the hypotheses support this model

4.7 Discussion

After providing an initial interpretation of the study results in the previous sections, subsection 4.7.1 presents a discussion of the proposed theoretical model, delving into how it answers the research questions identified in the introduction of this thesis. Besides this, different elements of the theoretical background (i.e. mediating effect of reflexivity, role of psychological safety) will be picked up and discussed in light of the results of this study. Finally, subsection 4.7.2 provides an overview of the most significant limitations from a retro perspective.

4.7.1 Justifications of the Theoretical Model

The aim of this study was to investigate the role of the leader's and team's behavior in establishing innovation in tech teams. The proposed theoretical model was to be proven by the analysis of a survey-based study. This survey included 33 teams from different European countries and different tech sectors. The analysis of the obtained

data revealed that most of the correlations between the study variables postulated in our theoretical framework can be proven. There is also evidence that there might be a mediating effect of reflexivity, which would affect the relationship between leader humility and team proactivity, as well as innovation.

Answers to the Research Questions

The first of our research sub-questions was *"What is the relationship between reflexivity and innovation in team settings?"*. Following a wide research body on the argument, reflexivity is presented as an important component in teams to share opinions and engage in common sense-making, which can have important outcomes in fueling creativity and thus innovation (Amabile, 1988; Leblanc et al., 2022; Shippers et al., 2015). The study's data analysis showed there is a positive and significant correlation between team reflexivity and innovation. For this reason, hypothesis 1 was supported. Even though this relationship was one of the strongest ones in our results, our findings only imply that the teams with more reflexivity are also more innovative, without proving the full causation of innovation. The results of our study support the ideas of other scholars in the field, but additional research is required to prove a causal relationship between reflexivity and innovation.

Besides, since team reflexivity is a socially produced state, its levels can be improved through the team's specific behaviors, as some researches prove (Leblanc et al., 2022; Owens et al., 2013; Shippers et al., 2015). Inspired by Leblanc et al. (2022) model, we focused on two particular behaviors, from the leader and the members respectively. This idea was captured with our second research sub-questions: *"What is the role of leader humility and team proactivity in improving reflexivity?"*. Scholars previously indicated how these two behaviors enhance critical dialogue and learning goal orientation in teams, which lie at the base of reflexivity processes (El Baroudi et al., 2019; Leblanc et al., 2022; Owens et al., 2013). This permitted us to suppose a direct correlation between the two behavioral traits and reflexivity. Hence, the study investigated the correlation between leader expressed humility and team proactive behavior, and reflexivity. Since a positive relationship was confirmed, both hypotheses 3 and 5 were supported.

The last of our research sub-questions was: *"Are leader humility and team proactivity correlated with each other?"*. The two factors are both activated behavioral traits, which means they are people's personal characteristics that come to the surface when the environmental context is favorable (Bateman & Crant, 1993). Building on this and the fact that the environment is socially determined and hence correlated to people's behavior, we supposed leader humility and team proactivity to leverage and enhance each other. Due to time constraints, the modalities by which this occurs could not be investigated. Hence, we focused on the correlation between the two factors solely. The study results showed that tech teams with a higher level of leader humility have a higher level of team proactivity, and vice versa. This positively answered the last research sub-question and supported hypothesis 6.

These sub-questions contributed to answering our main research question, which was *"What is the role of leader and team behaviors in establishing innovation in*

technology teams?". The results of this study showed how specific behaviors of the leader and the team members (i.e. leader humility and team proactivity) are correlated to reflexivity processes in teams. This positive relationship can ultimately help increase the innovation level in tech teams, by leveraging communication and creativity in individuals.

The Mediating Effect of Reflexivity

One of the central aspects of our theoretical model is team reflexivity's mediating effect between leader expressed humility and team proactivity on one side, and innovation on the other. The data analysis showed that this mediating effect might exist, but further investigations are required. The reason is that the direct and indirect effects of the mediation analysis (see 4.4.2 and 4.4.3) are not significant on a 5% level. This stands in contrast to other studies, such as Leblanc et al. (2022), which proved reflexivity mediating effect in the context of hospital teams closely related to medicine discovery and academic research. Moreover, the literature indicates that there might be a mediating effect of reflexivity between team proactivity and innovation (Du et al., 2021; El Baroudi et al., 2019). For these reasons, we still believe in the existence of a mediating effect between the team behaviors (i.e. leader expressed humility and team proactivity) as the relevant coefficients in the mediation analysis were on the verge of being significant ($p = 0.0970$ and $p = 0.1577$). Besides this, the analysis with SmartPLS showed that leader humility and team proactivity have a notable total effect on innovation, which could be partially explained by a mediating effect of reflexivity.

One of the reasons why these aspects of the mediation analysis with SPSS PROCESS were not significant on a 5% level could be that the sample size was too small. Other studies with a similar methodology had a sample size nearly double the number of the teams compared to this study (Leblanc et al., 2022). Another reason could be that our sample consists of teams from different sectors (e.g. automotive and aerospace). There might be slightly different working habits which could affect the measurement of our study variables (Johns, 2006). Additionally, the sample comprised teams from different European countries. This could cause differences in behavior and differences in the perception of behavior and processes as the work context can play a significant role (Johns, 2006). Lastly, the study variables might be influenced by other variables that were not captured. These could have majorly influenced the relevant relationships between the variables and affected the mediation analysis (Kelemen et al., 2023). Besides this, our study did not investigate to what degree the participating teams utilize hybrid or remote work. Employees who are active in these work models are less exposed to their colleagues' behavior because they spend less time directly with each other. It means that they might be less influenced by the leader's actions, which increases the level of self-leadership of the employees (Galanti et al., 2021).

The Role of Psychological Safety

Regarding the psychological safety variable, the only significant relationship we identified was with innovation, which is supported by several scholars in different contexts (Du et al., 2021; Frazier et al., 2017; Liu et al., 2021; Newman et al., 2017; Zhu et al., 2022). The correlation suggests that teams with a higher degree of psychological safety are also more innovative.

Differently from what we expected at the beginning of our study, our results did not show a correlation between psychological safety with leader humility and team proactivity. This stands in contrast to what the initial theoretical framework proposed (see hypothesis 7) and what the work of some authors suggested (Frazier et al., 2017; Qian et al., 2022). One reason for this missing correlation within this study could be that most teams had a high level of psychological safety as the mean of psychological safety is the second highest among the five main variables of the study (see Table 4.2). An explanation for this could be that most of the teams in this study have a low level of diversity (e.g. mainly males, similar cultural and professional backgrounds) (Gerlach & Gockel, 2022). As a result, there are fewer teams with a low level of psychological safety in the final data set, which makes it more difficult to detect a correlation with other study variables. Including more teams in this research might have solved this problem and might have given clearer results for the relationship of psychological safety with other variables. Apart from these elaborations, the result could also mean that psychological safety is simply not correlated to the investigated behaviors in the context of this study.

Besides the previously discussed relationships, we believe psychological safety may have some important correlations with the presence of team reflexivity, even though this did not arise in the analysis. As stated in the theory chapter, psychological safety is regarded as an emerging state in a team setting that encourages people to take part in feedback loops, engage in voice behaviors, admit personal limitations, and share personal and private feelings or experiences (Amabile et al., 2004; Cauwelier, 2019; Edmondson, 1999). Also, researchers prove that it can enhance learning behaviors and team performance by helping identify and resolve problems quickly (Cauwelier, 2019; Edmondson, 1999). What just stated has a lot to do with reflexivity processes, which consist of the engagement of people with different expertise to share opinions, enlarge the team's common knowledge and build common sense-making (El Baroudi et al., 2019; Shippers et al., 2015). We hope future studies could contribute to a better understanding of the overlapping characteristics of the two topics, and how this relation can influence innovation.

4.7.2 Limitations of This Study

We recognize some limitations in the data analysis and discussion we just presented.

1. To assess team innovation in the participating groups, we asked the related questions only to the team leader. This choice reflected our willingness to avoid common method bias by obtaining measures from different sources and not asking every question to the same groups of people (i.e. members and team

leaders). However, we recognize that the results may be highly influenced by leaders' personal perspectives, goals, and definitions of innovation. Hence, it can be argued that the gathered data is subjective and does not depict an objective assessment of innovation in the selected teams.

2. In most of the cases, we did not receive answers from all the members of the teams. We acknowledge the possibility that the missing responses might have affected the results of some variables, regarding team proactivity for example. Thus, it could be empirically argued that missing responses from certain members could represent a lack of proactivity and communication behavior.
3. The research was carried out in a limited time. Because of this, we have not been able to contact a higher number of groups, and enlarging the research geographical spectrum to other countries in Europe. Hence, we recognize that having more teams involved in the study could have increased the level of significance of some variables. Nevertheless, we see the sample size of 33 teams as sufficient for our study as the central limit theorem is met (Mayers, 2013). It means that a study with more than 30 teams should be able to represent normally distributed variables.
4. Related to the previous point, because of time limit reasons, the teams involved in the research come from different tech sectors. We acknowledge that depending on their tasks and the characteristics of their job, people's working habits might differ. Hence, the results of some variables might be affected as well.
5. There is more than one leader in some of the teams as they are organized in different ways. For example, some organizations implement a matrix hierarchy in order to organize the work of their engineering teams. This can lead the team members to report to more than one leader (i.e. the functional leader of the unit and the project leader). The power balance between the two leaders can vary depending on the specific context of these teams, which leads to the impossibility to decide who the team leader is in these contexts. For this reason, in teams with a matrix structure, we decided who to consider a team leader by consulting our contact person. Another situation with no clear leader was when teams use the SCRUM method. Here, a product owner and a SCRUM master are working together with the rest of the development team. In this case, we identified the product owners as leaders since the participants felt they are more in a leading position compared to the SCRUM master. The two situations with matrix structures and SCRUM teams illustrate that there is not one clear leader in some tech teams and that this could be considered an ambiguity factor of our study.

Chapter 5

Conclusion

In today's society, tech teams are everywhere. They enable organizations to leverage technology effectively, stay competitive, and navigate the complexity of the digital era. In this rapidly changing and highly competitive environment, it is crucial to stay on the crest of the hottest new wave to secure a stable future for the organization (Damanpour & Evan, 1984). For this reason, innovation plays an important part in tech teams. In particular, the literature indicates reflexivity has a significant role because it eases people's communication and critical dialogue (Blanch et al., 2022; El Baroudi et al., 2019). As reflexivity depends on group interactions, insights into the individual behaviors in team settings from both the leader's and team members' sides are considered to be highly relevant. Consequently, the research purpose of this study was to answer the question "*What is the role of leader and team behaviors in establishing innovation in technology teams?*". Since there is a vast space of relevant team-internal variables and external circumstances in literature, the study investigated leader expressed humility, team proactivity, team reflexivity, psychological safety, and innovation variables, and related those to each other in a theoretical model. The resulting postulated relationships were investigated through a quantitative study that included 33 tech teams from all over Europe. The statistical analysis was conducted with SPSS PROCESS and SmartPLS.

The results indicate that leaders expressed humility and team proactivity are positively correlated with each other. These two variables are also positively correlated with reflexivity, which means that the teams with a higher score for leader humility and/or team proactivity are also more reflexive. Furthermore, it resulted that the teams with a higher degree of reflexivity are also more innovative. However, the mediating effect of reflexivity by the leader expressed humility and team proactivity towards innovation was not demonstrated at the 5% significance level, although this was expected due to previous results of other studies (Leblanc et al., 2022). Some reasons for this insignificant effect could be the availability of a small sample size, a too-large variety in the context of the teams, or other variables not captured by this study. Nevertheless, we can consider our theoretical model validated since the statistical analysis highlights the importance of reflexivity in the context of innovation, aside from the mediation effect.

Overall, this study contributes to creating a better understanding of how reflexivity can stimulate innovation in tech teams. It helps to close a research gap since it focuses on a new geographical region (i.e. Europe) and investigates a different sector (i.e. technology sector) compared to existing work. It also enriches the picture by proposing a new theoretical model that includes psychological safety as a new variable.

5.1 Managerial Implications

From the results of our study, we can draw some implications for both the organizational management and the team leaders when trying to improve the innovative output of their teams.

The organization's human resources department has a core role during the recruitment process and throughout the employees' working experience. The positive effect of team proactivity can be taken into consideration during the employees' hiring stage. It can be convenient for the organization to assess proactive behaviors through professional assessment tools to improve the proportion of proactive employees in their organic (Du et al., 2021). However, recruiting should not be limited to only proactive individuals. Hence, a solution could be to spread proactive members in the teams as soon as the organization is restructured. In this way, the teams can benefit from the presence of proactivity in individual members, which could potentially trigger an improvement in team proactivity as well. By considering the teams' tasks and responsibilities, allocating proactive members throughout the organization could also be convenient to build or improve the required performance of the selected groups (El Baroudi et al., 2019). Also, when considering teams' composition, the degree of heterogeneity, flexibility, and autonomy must be taken into account. El Baroudi et al. (2019) proved that the most proactive teams are located in smaller groups, more flexible and autonomous, and heterogeneous in terms of knowledge, demographics, and backgrounds. Reproducing these types of teams could represent a viable and potentially beneficial decision for organizational management.

At the same time, leaders' recruiting and promotion can have a significant role as well (Wang et al., 2021). In fact, selecting leaders who have an empowering style and humble behavior could improve low proactive members to participate more in reflexivity processes by speaking up and sharing their knowledge (Du et al., 2021). However, as Leblanc et al. (2022) point out, leaders should consider the organizational context before engaging in expressed humility behaviors. This attitude could be perceived as hinky and fake if applied in an unsuitable context.

Another aspect that the human resources department should take into consideration is the involvement of both members and leaders in training sessions. Workshops and seminars could help leaders develop certain attributes, such as admitting their limits, accepting and actively looking for feedback, appreciating others' strengths and contributions, and improving personal interaction and empathy (Amabile et al., 2004; El Baroudi et al., 2019; Wang et al., 2021). Those sessions could help acknowledge the impact they have on their followers, take the initiative to adopt positive behaviors,

and avoid negative ones, such as micromanaging and giving tasks without considering the degree of difficulty and responsibility (Amabile et al., 2004). Training for team members could involve sessions to improve reflexivity, which aim to encourage people to share opinions, participate in discussions and untangle problems, or improve employees' work-related knowledge (Leblanc et al., 2022; Wang et al., 2021). Team building activities could also be beneficial to establish a stronger relationship among team members, which could have a positive effect on members' motivation and proactivity (El Baroudi et al., 2019). Besides these positive effects of training, we believe investing in fostering psychological safety will improve the working everyone's working environment and it will ultimately improve the innovativeness of teams (Newman et al., 2017; Zhu et al., 2022)

In conclusion, in light of the results of the study and the literature review, we agree on the following Amabile et al. (2004) statement: "Leaders who wish to support high-level performance must pay careful attention to the details of their own everyday—and seemingly mundane—behavior toward subordinates" (p. 30). We believe reflexivity processes, psychological safety, and team proactivity processes cannot arise in team settings immediately. They rather require constant effort from both organization management and leaders to understand the special needs of each group, and the right modalities to engage those people, which may vary based on the context.

5.2 Directions for Future Researches

The present study aims to contribute to understanding the role of certain behaviors in leaders and members that can affect reflexivity and innovation in team settings. A possibility for future resources would be to extend the study to a larger data set, to increase the level of statistical significance. Besides this, considering different variables in a future study will help to close the research gap about creating a better understanding of reflexivity and innovation in teams. One specific recommendation could be to investigate the relationship between psychological safety and reflexivity, and what implications it may have. Even though we could not testify to its presence in this study, we still believe the two topics overlap to a certain degree.

Furthermore, it would be beneficial to further investigate the context impact of the studied organizations on the study variables. Different cultures may influence how teams work. The next studies could focus on the analysis of tech teams in specific states, to avoid the cultural uncertainty we faced. Indeed, a tacit agreement on certain aspects depending on cultures can be expected (i.e. definition of humility). Taking this dimension into account could have relevant implications for some variables. Moreover, this study did not consider the perspective of hybrid and remote work, which is becoming a more important working habit since the COVID-19 pandemic (Galanti et al., 2021). Investigating the concepts presented in this study in specific work formats (i.e. in-person vs. hybrid vs. fully remote) could offer interesting insights.

Appendices

Appendix A

Overview Survey Content

A.1 Introduction Survey

Hello!

We are Sebastian Karl and Cecilia Bobba, students of the Master in Management at Lund University and currently, we are working on our Master's thesis. Our specific topic is related to teamwork and leadership in tech teams. **The objective of this survey is to collect data to investigate how personal and group behavior affect certain processes in a team.**

The first section of this survey contains general administrative questions. The following three pages contain the questions on the research topic. We ask you to respond based on your personal opinion. The gathered data will remain confidential and handled for research purposes only.

It will take you around 5 minutes to fill out the entire survey.

If you need more information, you can contact us at ce5537bo-s@student.lu.se or se2447ka-s@student.lu.se

Thanks for your help!

A.2 Initial Questions Team Leader Survey

What is your gender?

- Male
- Female
- Other
- I would prefer to not answer this question

What is your nationality? (more than one, if applicable)

How would you describe your profession? (e.g. software developer, electrical engineer, ...)

What would you define as your main tasks?

How long have you been working (since you finished your studies)?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

For how long have you been working in your profession?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

For how many years have you been a leader of any team? (this team and also others)

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

How long have you been working in this team?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years

A.2. Initial Questions Team Leader Survey

More than 10 years

How long you have been the leader of this team?

Less than 1 year

1 to 3 years

3 to 5 years

5 to 10 years

More than 10 years

How would you describe this team?

Research and development team

Infrastructure team

User and customer support team

Quality assurance team

Other

How many team members does this team have (including the leader)?

A.3 Initial Questions Team Member Survey

What is your gender?

- Male
- Female
- Other
- I would prefer to not answer this question

What is your nationality? (more than one, if applicable)

How would you describe your profession? (e.g. software developer, electrical engineer, ...)

What would you define as your main tasks?

How long have you been working (since you finished your studies)?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

For how long have you been working in your profession?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

How long have you been working in this team?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

How long you have been working with your current team leader?

- Less than 1 year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- More than 10 years

A.4 Task Interdependence Measure

Please indicate how much you agree with the following statement.

The members of this team depend on each other to accomplish their work.

Strongly Disagree Neutral Strongly Agree

A.5 Leader Humility Measure

For the next questions, consider how your team leader interacts with the team members.

The team leader actively seeks feedback, even if it is critical.

Strongly Disagree Neutral Strongly Agree

The team leader admits it when they don't know how to do something.

Strongly Disagree Neutral Strongly Agree

The team leader acknowledges when others have more knowledge and skills than him- or herself.

Strongly Disagree Neutral Strongly Agree

The team leader takes notice of others' strengths.

Strongly Disagree Neutral Strongly Agree

The team leader often compliments others on their strengths.

Strongly Disagree Neutral Strongly Agree

Strongly Disagree Neutral Strongly Agree

The team leader shows appreciation for the unique contributions of others.

The team leader is willing to learn from others.

Strongly Disagree Neutral Strongly Agree

The team leader is open to ideas of others.

Strongly Disagree Neutral Strongly Agree

The team leader is open to advice from others.

Strongly Disagree Neutral Strongly Agree

A.6 Team Proactivity Measure

Consider how you work in your team.

No matter what the odds, if I believe in something I will make it happen.

Strongly Disagree Neutral Strongly Agree

I love being a champion for my ideas, even against others' opposition.

Strongly Disagree Neutral Strongly Agree

I excel at identifying opportunities.

Strongly Disagree Neutral Strongly Agree

If I believe in an idea, no obstacle will prevent me from making it happen.

Strongly Disagree Neutral Strongly Agree

A.7 Team Reflexivity Measure

Consider how your team works.

In this team we often review the feasibility of our objectives.

Strongly Disagree Neutral Strongly Agree

In this team we often discuss the methods used to get the job done.

Strongly Disagree Neutral Strongly Agree

In this team we regularly discuss whether we are working effectively together.

Strongly Disagree Neutral Strongly Agree

In this team we modify our objectives in light of changing circumstances.

Strongly Disagree Neutral Strongly Agree

In our team we often review our approach to getting the job done.

Strongly Disagree Neutral Strongly Agree

A.8 Psychological Safety Measure

Consider your team's working environment.

If you make a mistake on this team, it is not really held against you.

Strongly Disagree Neutral Strongly Agree

Members of this team are able to bring up problems and though issues.

Strongly Disagree Neutral Strongly Agree

People on this team never reject others for being different.

Strongly Disagree Neutral Strongly Agree

It is safe to take a risk on this team.

Strongly Disagree Neutral Strongly Agree

It is easy to ask other members of this team for help.

Strongly Disagree Neutral Strongly Agree

No one on the team would deliberately act in a way that undermines my efforts.

Strongly Disagree Neutral Strongly Agree

Working with members of this team, my unique skills and talents are valued and utilized.

Strongly Disagree Neutral Strongly Agree

A.9 Innovation Measure

Consider how your team works.

Team members often implement new ideas to improve the quality of our products and services.

Strongly Disagree Neutral Strongly Agree

This team gives little consideration to new and alternative methods and procedures for doing their work.

Strongly Disagree Neutral Strongly Agree

Team members often produce new services, methods, or procedures.

Strongly Disagree Neutral Strongly Agree

This is an innovative team.

Strongly Disagree Neutral Strongly Agree

Appendix B

Overview of Final Dataset

B.1 Means of Study Variables Split Based on Geographical Regions

Region	1. Team Size	2. Response Rate	3. Team Interdependence	4. Leader Humility	5. Team Proactivity	6. Psychological Safety	7. Reflexivity	8. Innovation
Sweden	9.60	0.56	3.63	4.23	3.45	4.30	3.55	3.83
Germany	9.38	0.61	4.17	4.55	3.86	4.58	3.99	4.25
Belgium	9.57	0.74	3.73	4.29	3.38	4.05	3.59	3.89
Others	8.25	0.78	4.10	4.28	3.75	4.30	3.89	4.28
Overall	9.21	0.67	3.90	4.33	3.61	4.31	3.75	4.05

TABLE B.1: Overview about the means of the study variables split based on geographical regions

B.2 Distribution of Team Size and Response Rate

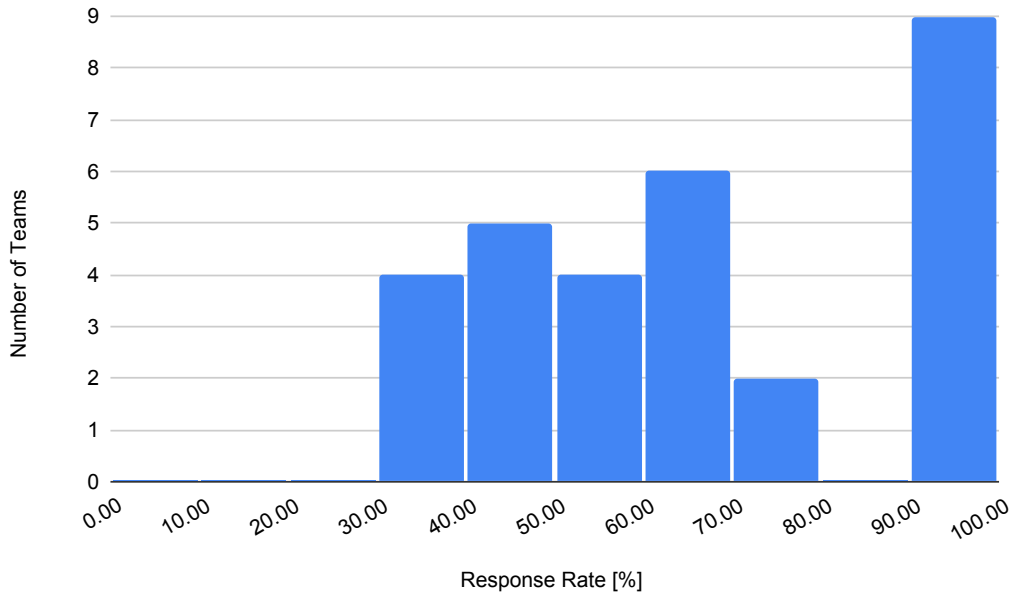


FIGURE B.1: Distribution of response rate of teams in final data set

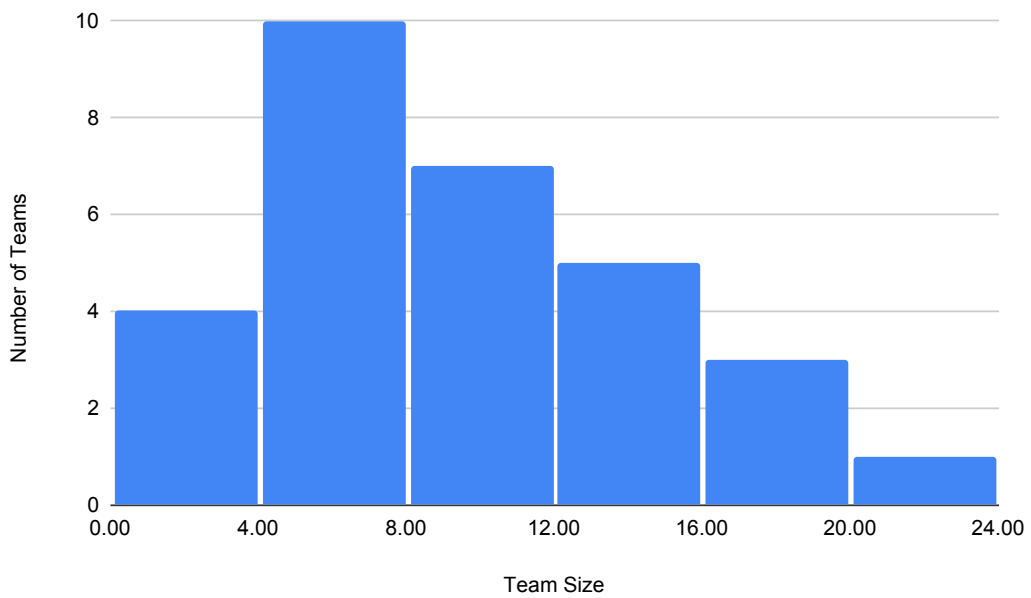


FIGURE B.2: Distribution of team size of teams in final data set

B.3 Scatter Plots of Study Variables

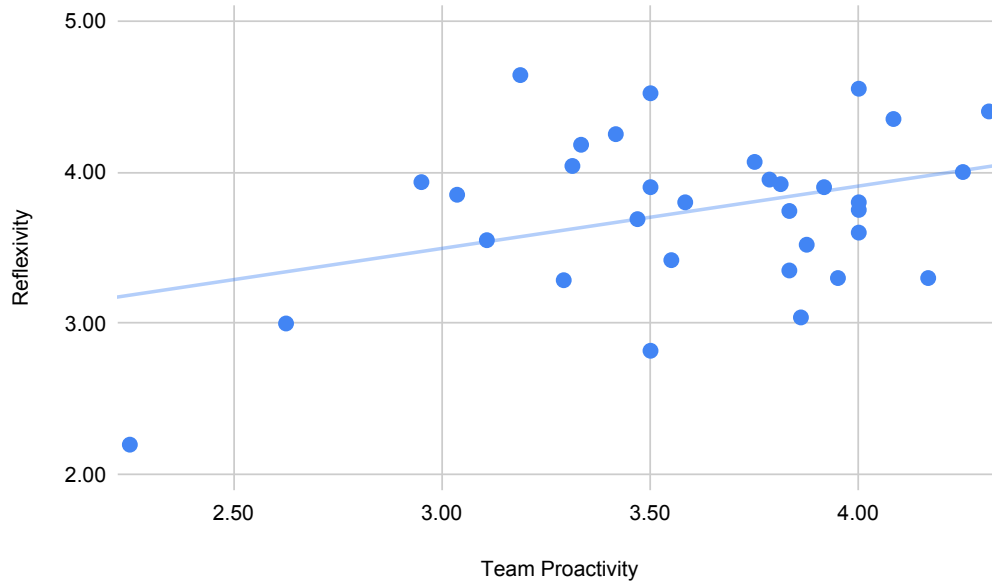


FIGURE B.3: Positive relationship between team proactivity and reflexivity

Appendix C

Results of Data Analysis with SmartPLS

C.1 Model 3

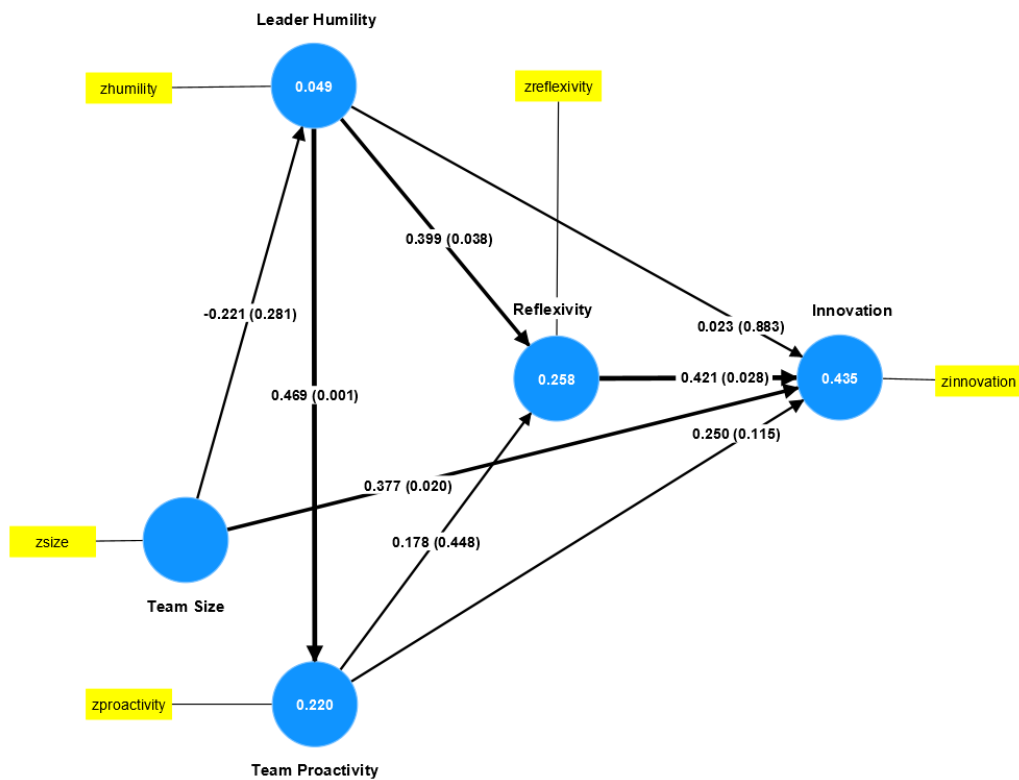


FIGURE C.1: Path coefficients and model fit of variables for SmartPLS model 3

C.2 Model 4

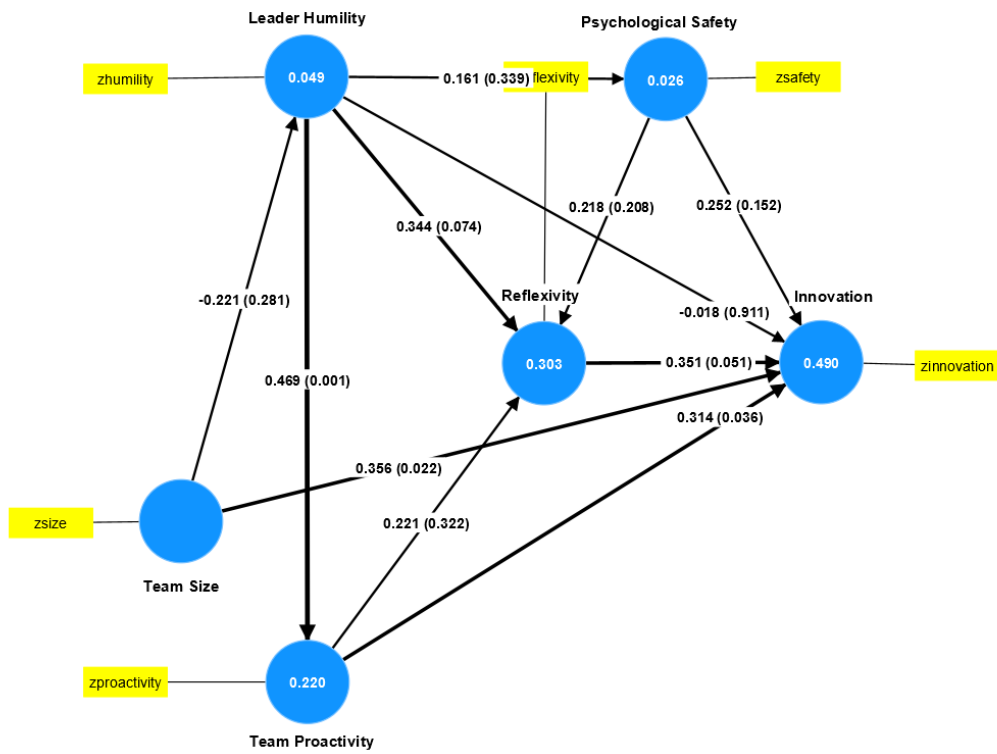


FIGURE C.2: Path coefficients and model fit of variables for SmartPLS model 4

C.3 Model 5

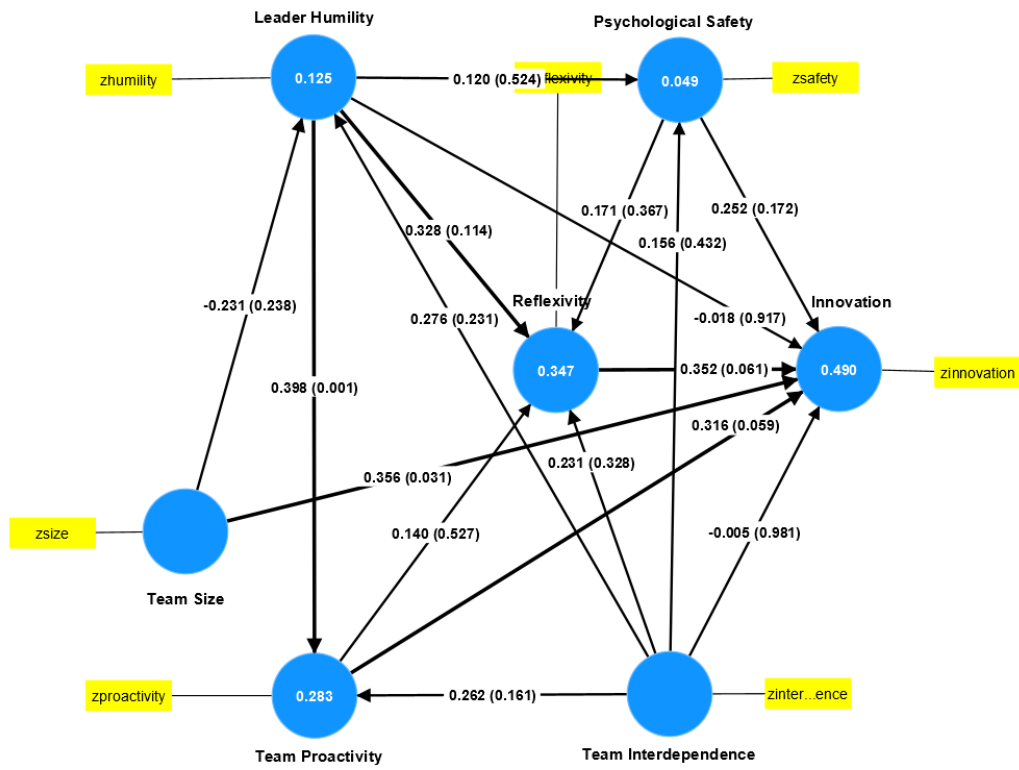


FIGURE C.3: Path coefficients and model fit of variables for SmartPLS model 5

C.4 Development of Model Fit

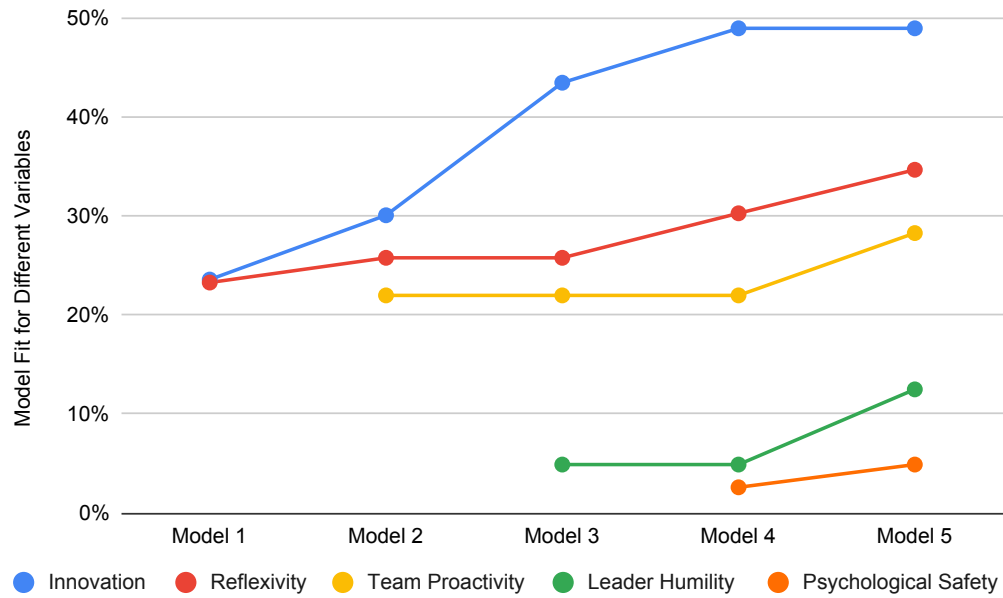


FIGURE C.4: Development of the model fit for the different variables in the SmartPLS analysis

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