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TEAM EFFECTIVENESS IN TECHNOLOGY-BASED ORGANIZATIONS. REFLEXIVE INVESTIGATION AMONG IT EXPERTS

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Purpose: The study aims to provide a deeper understanding of team effectiveness in technology-based organizations. Considering the technologically driven environment, the exploration focuses on team effectiveness and its essential aspects.
Design/methodology/approach: Team reflexivity is discussed as a theoretical context for team functioning in dynamic environments. Using a qualitative approach and thematic analysis, participants of the investigation provided definitions and engaged in discussions to refine key aspects of team effectiveness. An in-person investigation involved fifty-two information technology experts from diverse specializations, including cybersecurity, project management, UX design, software development, IT Architecture, DevOps, and Leadership.
Findings: The study's findings highlight primary aspects of team effectiveness (1) fulfillment of business requirements, (2) delivery of high-quality products, and (3) teamwork. Holistically, twelve aspects of team effectiveness emerged, including best practices for development, proper technology selection, user experience, managing technical debt, skills development, risk management, cybersecurity, and work environment.
Originality/value: The study contributes to the theory exploring team effectiveness and its aspects. It offers practical insights for managers, emphasizing the importance of aligning team goals with business needs, maintaining high-quality standards, and fostering teamwork. Future research directions include longitudinal studies to identify changes in team effectiveness over time and comparative analyses across industries. Findings underscore the necessity for a nuanced understanding of team effectiveness tailored to the challenges faced by technology-based organizations.
Keywords: Technology-based organizations, Team effectiveness, Team reflexivity.
Category of the paper: Research paper.

1. Introduction

Technology-based organizations are focused on adopting new technologies to improve operational efficiency and expand market opportunities (Cascio, Montealegre, 2016). They act in the technology-organization-environment (Li, 2020) using research and development (R&D) activities to maintain competitiveness and provide high-quality service most effectively.

Digital transformation has become a key factor in the evolution of technology-based organizations, involving adopting digital technologies to improve processes and create value (Reis, Amorim, Melão, Matos, 2018).

Findings provided by Gimpel, Hosseini, Huber, Probst, Röglinger, and Faisstet (2018) indicate that managers should adapt their business strategy to a new digital reality. This mainly results in the adaptation of processes and operations management. Therefore, as Urbach & Röglinger (2019) underline, digitalization causes processes of rethinking business in contemporary organizations. Because of dynamic changes, many technology-based organizations make decisions to conduct projects in agile teams, that can quickly adapt to needs or requirements and work effectively. Business managers and researchers underline a strong desire to understand how agile teams reach effectiveness (Steegh, Van De Voorde, Paauwe, 2025) and explore what helps agile teams be successful (Adzgauskaite, Tam, Martins, 2025). Therefore, this study aims to investigate two following research questions:

RQ 1: How do team members in technology-based organizations define team effectiveness?

RQ 2: What are the main aspects of team effectiveness that are essential for team members in technology-based organizations?

To answer these RQs, it is necessary to explain the technology-organization-environment, and specificity of working in teams, then identify definitions of team effectiveness, that can be understood differently.

The theoretical goal of this study is to revisit the findings on team effectiveness presented in former studies. The empirical goal of this study is to provide evidence from team members who work in teams in technology-based organizations referring to team effectiveness. Based on the participants` contribution it is expected to provide insights on how nowadays team members define team effectiveness and then what main technological, organizational, or environmental aspects of team effectiveness, are crucial for them.

Many years ago, Kozlowski and Ilgen (2006), desired to identify what we know, what we think we know, and what we need to know to improve the effectiveness of work groups and teams. Referring to their statement, *today we need to reflect on how we understand and define team effectiveness and its aspects, considering the dynamic technology-based world*. Then, we will be able to go deeper to improve effectiveness and facilitate the organizational environment. Therefore, the study contributes to the literature by re-examining the understanding of team effectiveness, which might be more complex and dynamic than its

former definitions. Additionally, using a qualitative approach, crucial aspects of team effectiveness are discovered.

2. Theoretical background

2.1. Teams in technology-based organizations

The digital age has changed the nature of work in ways that were unimaginable in the past (Barley, Bechky, Milliken, 2017). In technology-based organizations, teams often operate in virtual or hybrid environments, utilizing digital tools to facilitate communication and collaboration across geographical boundaries. Therefore, teams in technology-based organizations can be defined as groups of individuals with complementary skills collaborating to achieve common objectives, particularly in developing, implementing, and managing technological solutions (Garro-Abarca, Palos-Sanchez, Rus-Arias, 2020).

Effective leadership in these teams is often agile, characterized by flexibility, adaptability, and a focus on empowering team members to respond swiftly to changing technological demands (Larson, DeChurch, 2020). Additionally, they have a cross-functional composition comprising members from diverse functional backgrounds, enabling a holistic approach to problem-solving and innovation (Leite, Pinto, Kon, Meirelles, 2020) and given the rapid pace of technological advancement, team members are expected to engage in continuous learning to keep abreast of new tools, methodologies, and industry trends (López-Fernández, Díaz, García, Pérez, González-Prieto, 2021; Shvindina, Piven, 2024). Teams in technology-based organizations face challenges such as communication barriers (Garro-Abarca et al., 2020), technology-organization-environment context (Ng, Lit, Cheung, 2022), coordination tasks complexity, and lack of motivators that can influence effectiveness (Trzeciak, Banasik, 2022).

2.2. Defining team effectiveness

For decades researchers and managers have desired to enhance team effectiveness (Kozłowski, Illgen, 2006). However, different studies proposed a variety of factors for team effectiveness such as performances in work quality, changes, interpersonal interactions, values, and overall performance (Tran, Vu, 2021). For example, team effectiveness was defined as performance, satisfaction, and longevity of the team (Dennis, Fuller, Valacich, 2008), team performance, quality of team experience, and team viability (Aubé, Rousseau, 2005), the capacity a team has to accomplish the goals or objectives administered by an authorized organization or individual (Kozłowski, Ilgen, 2006) quality of problem-solving methods, and team members' solutions that increase work efficiency (Hambley, O'Neill, Kline, 2007) or the degree to which a team achieves its objectives, works well together and maintains or

enhances its ability to perform as a unit in the future (Mathieu, Maynard, Rapp, Gilson, 2008). Next, researchers proposed to define and measure team effectiveness based on on-time performance, product quality, and customer satisfaction (Maynard, Mathieu, Rapp, Gilson, 2012).

Researchers underline that team effectiveness evolves as more than the sum of individual efforts, but involves multiple paths of social influence (DeOrtentiis, Summers, Ammeter, Douglas, Ferris, 2013), therefore they define team effectiveness as the collective belief amongst team members in each other's skills and ability to achieve success, which is a social perception influenced by both individuals and the group as a whole. The perception of team effectiveness results in team members who are motivated and engaged in team activities, as they feel invested in the team's goals and perceive their work as meaningful (Muresan, Mititelu, Andres, Schraefel, 2024). Referring to the call to redefine team effectiveness taking into account contemporary circumstances, Junker, Bakker, and Derks, (2025) proposed sustained team effectiveness, defined based on two criteria. Firstly, teams must be able to meet their goals across multiple performance episodes, which is the performance criterion. Second, it should not go at the expense of team members' psychological and physical health, which is the well-being criterion.

It would be valuable to examine this model of sustained team effectiveness with empirical evidence, because as researchers emphasize, there are various aspects of team effectiveness (Tran, Vu, 2021) and an evaluation of specific aspects of team effectiveness is required, therefore a deeper exploration could help in finding insights into team effectiveness.

2.3. Team reflexivity in technology-based teamwork: conceptual background

Team reflexivity refers to the extent to which team members collectively reflect on and adapt their functioning to improve team processes and outcomes (Schippers, Edmondson, West, 2014). This concept draws on theories of team information-processing, which emphasize that team effectiveness depends on the capacity of members to engage in activities such as acquiring, sharing, elaborating, and revising information (Wilson, Goodman, Cronin, 2007). Teams despite having access to a broad pool of information, often rely disproportionately on shared knowledge, neglecting unique perspectives held by individual members (Edmondson, Harvey, 2018). Therefore, a key benefit of team reflexivity lies in mitigating failures and enhancing effectiveness.

Moreover, team members may hesitate to introduce novel ideas due to conformity pressures or low motivation to engage in discussions (Schippers, Rus, 2021). Reflexive teams prioritize open dialogue and critical evaluation of information, fostering an environment in which unshared knowledge is actively solicited and valued (Postmes, Spears, Cihangiret, 2001). Consequently, reflexivity broadens the team's focus, enhancing the diversity of information considered during decision-making.

Research shows that teams often fail to derive meaningful insights from new information due to a tendency to cling to initial preferences (Edmondson, Harvey, 2017) so building psychological safety in the team is crucial to building open discussion and space for reflections (Edmondson, Lei, 2014). Without adequate reflection, diverse perspectives may remain unintegrated, leading to incomplete task representations and diminished team effectiveness (Homan, Van Knippenberg, Van Kleef, De Dreu, 2007). Reflexivity addresses this issue by highlighting discrepancies in task understanding and encouraging members to reconcile different viewpoints. Reflexive teams are better at integrating unique knowledge, ultimately leading to more comprehensive and innovative solutions (Van Ginkel, Tindale, Van Knippenberg, 2009).

Teams in technology-based organizations exist in dynamic and innovative environments, where assumptions quickly become obsolete, and failure to update strategies, reflect and redefine requirements can strongly undermine effectiveness (Schippers, Rus, 2021). Teams often develop habitual routines that persist even when circumstances change, a phenomenon known as inertial behaviour (Gersick, Hackman, 1990). Reflexivity helps teams break free from these patterns by fostering a mindset of continuous improvement. Moreover, holding teams accountable for their decision-making processes, rather than merely their outcomes, encourages ongoing reflection and reassessment (Schippers et al., 2014) consequently, team reflexivity can enhance the team's ability to learn from experience and adjust accordingly to provide better effectiveness. Therefore, considering dynamic changes, complexity, the necessity of continuous learning, and the requirement to adapt to changing circumstances, it is worth exploring how currently team effectiveness is defined and understood in teams that work in technology-based organizations.

3. Methodology

This study undertakes explorative research based on a qualitative method. The group investigation aimed to discover the current understanding of team effectiveness and team effectiveness aspects in teams that work in technology-based organizations. The group of participants consisted of fifty-two IT Experts` who agreed to participate voluntarily in the session.

At the study's design stage, the sample was comprehensively considered referring to commendations proposed by Bekele and Ago (2022), as the sample size and characteristics can significantly affect results. To provide a relevant sample composition for this investigation, only people who work in teams in technology-based organizations were invited. Secondly, the quality of the data is significant, so all participants took part in the investigation (1) voluntarily; (2) in person; (3) and in advance they were aware of the objective of the session.

Thirdly, the wideness or narrowness of the scope of the study affects the size of the sample. In the case of this study, the scope refers to one specified concept: team effectiveness with its aspects.

Referring to particular numbers for sample size, Bernard (2013) suggested that 10-20 key research participants are enough to uncover and understand the major issues in any study of lived experience (after Bekele, Ago, 2022). At least 6 participants for phenomenological studies and approximately 30-50 participants for ethnographies and grounded theory studies were proposed by Bernard (2013). Former, Creswell (2007) recommended between 5 and 25 interviews for a phenomenological study and 20-30 for a grounded theory study. The biggest sample size suggested for the qualitative research was estimated at 30-60 participants (Guest, Bunce, Johnsonet, 2006). To provide as relevant a sample as possible, this suggestion was implemented in this study.

In this study, participants were IT Experts who worked in teams and were responsible for the following specializations: Cybersecurity, Product Management, Project Management, UX design, Software Development, IT Architecture, AI Solutions, DevOps, and IT Leadership. The group of participants consists of nine women and forty-three men. The anonymity of participation was assured to them.

The session took place in November 2024. It was conducted physically, discussions were recorded and transcribed. Additionally, written notes from every participant were collected. Based on them team effectiveness and aspects of team effectiveness were discussed. Group investigation with IT experts provided insights that were examined via text mining and content analysis. More precisely, to conduct an investigation the reflexive thematic analysis was used as the method of identifying, analyzing, and reporting patterns or themes (Braun, Clarke, 2019, 2022),

The protocol of the investigation was the following: (1) presenting the topic of the session which is team effectiveness; (2) ensuring that participation is anonymous and voluntary and that anyone can end the session at any time; (3) agreeing on the objectives of the session which are formulating a team effectiveness definition and identification of team effectiveness aspects crucial for IT Experts who work in teams in technology-based organizations; (4) asking participants to write how they understand team effectiveness – they provided their definitions using keywords working individually in silence; (5) participants were asked to write on a piece of paper keywords that they used; (6) when everyone was ready the discussion was opened starting with keywords they used; (7) when the particular keyword was said aloud other participants were asked to collect papers with the same keyword to see how many included this keyword in the definition and based on this part of the discussion aspects of team effectiveness were identified; (8) participants were asked to read definitions that were prepared at the beginning of the session and every definition was discussed with additional questions to be precise about how definitions are understood including the semantic dimension of the language; (9) during the session in the discussion, categories of team effectiveness aspects and the

definition of team effectiveness were formulated. It is worth to take into account the semantic aspects of the process. Intentionally definitions were not described at the beginning of the action. As some keywords might have several meanings for different people (e.g. cybersecurity or teamwork), the core part of the discussion was the process of reaching the shared definitions.

It is worth underlining that although team reflexivity is discussed in the theoretical background, the present study did not operationalize team reflexivity as an analytic construct. Reflexive thematic analysis (Braun, Clarke, 2019, 2022) was used as a methodological approach to identify themes in how participants defined team effectiveness and which aspects they associated with it.

4. Results

During the investigation, participants mentioned various team effectiveness aspects, that emerged from used keywords. They are presented in Table 1 in the order of how often the aspects appeared in the materials provided by the participants. The twelve aspects identified in this study represent constitutive elements of how IT experts conceptualize team effectiveness in technology-based organizations. Given the exploratory qualitative design, these aspects are not presented as causal antecedents or outcomes, but rather as interconnected components that practitioners associate with effective team functioning.

Table 1.
Team effectiveness aspects emerged from the investigation

Number	Aspects of team effectiveness in technology-based organizations
1	Fulfillment of business requirements
2	High-quality product (including DoD* and DoR**)
3	Teamwork
4	Best practices for development
5	Proper selection of technology
6	Including User Experience (UX) & User Interface (UI)
7	Managing technical debt
8	Skills development
9	Risk management
10	Documentation
11	Cybersecurity
12	Work environment

DoD*: Definition of Done, DoR**: Definition of Ready

Source: own elaboration.

1. Fulfillment of Business Requirements was identified as essential for IT Experts. A successful team consistently delivers solutions that meet the needs and objectives of stakeholders. This involves clear communication with business representatives, comprehensive requirements gathering, and the ability to translate these requirements into technical deliverables. By maintaining a focus on business value, the team can

prioritize work that directly impacts organizational goals, ensuring that efforts align with strategic initiatives and customer expectations.

2. High-quality product was revealed at the second position in conducted investigation. for maintaining user satisfaction and long-term product success. Participants underlined that teams can achieve this by adhering to well-defined standards such as the Definition of Done (DoD) and Definition of Ready (DoR), which ensure that tasks are fully complete and meet all acceptance criteria before moving forward. High-quality products are characterized by robustness, reliability, and maintainability, which are achieved through rigorous testing, regular code reviews, and continuous integration practices.
3. Teamwork fosters a collaborative and supportive work environment, which is fundamental to achieving team goals. Effective teams communicate openly, share responsibilities, and leverage diverse skill sets to solve complex problems. By fostering trust and mutual respect, members can collaborate efficiently, resolve conflicts constructively, and continuously improve both individual and team performance. High levels of teamwork contribute to better decision-making, higher morale, and more innovative solutions. During the discussion participants underlined also awareness of talents in team and reasonable sharing task and duties among team members.
4. Best Practices for Development - In this aspect participants emphasized practices like regular refactoring, thorough testing (unit, integration, and end-to-end), and conducting systematic code reviews. Best practices help prevent technical debt, improve maintainability, and enhance the overall efficiency of the development process. Teams that consistently apply these practices can reduce errors, accelerate delivery, and adapt more easily to changing requirements. Participants provided examples of rules and tools that support the best practices, e.g. DRY (do not repeat yourself, do not do the same job twice) or KISS (principle advises keeping designs simple and avoiding unnecessary complexity, making them user-friendly).
5. Proper Selection of Technology cannot be surprising while experts who work in teams in technology-based organizations participated in the investigation. Selecting the appropriate technology stack is crucial for long-term project success. The choice should align with business requirements, team expertise, scalability needs, and the anticipated lifespan of the product. Proper selection involves evaluating available tools and frameworks, considering both current and future needs, and balancing innovation with stability. Participants underlined that by choosing the right technology, teams can minimize risks, optimize performance, and ensure easier maintenance.
6. Including User Experience (UX) & User Interface (UI). Based on the investigation effective teams prioritize UX and UI as integral components of product development. A well-designed user interface enhances usability, while a positive user experience ensures that the product meets user expectations in terms of functionality, accessibility,

and aesthetics. Teams achieve this by involving UX/UI experts throughout the development process, conducting usability testing, and incorporating user feedback to iteratively improve the product.

7. Managing Technical Debt involves identifying, documenting, and addressing areas of the codebase that require improvement. Unchecked technical debt can lead to increased maintenance costs, slower development, and reduced product quality over time. Participants stressed that effective teams balance the delivery of new features with refactoring efforts and code clean-up to keep technical debt manageable. Regular code reviews, automated testing, and adherence to coding standards help mitigate technical debt.
8. Skills Development was also indicated by participants in this session. C continuous skills development is vital for maintaining a competitive edge in technology-driven environments. Teams that invest in upskilling their members can better adapt to evolving technologies, methodologies, and market demands. Participants have discussed also how it can be achieved and they provide examples such as formal training, mentorship programs, knowledge sharing, and participation in industry events.
9. Risk Management was especially stressed by cybersecurity experts during the session. Effective risk management helps teams anticipate and mitigate potential issues before they become critical. This involves identifying technical, operational, and business risks early, assessing their impact, and developing mitigation strategies. Regular risk assessments, proactive planning, and communication with stakeholders are essential for minimizing project disruptions and ensuring successful outcomes.
10. Documentation can be a bit surprising aspect of team effectiveness. It was a hot discussion about to what extent documentation is essential for team effectiveness. However, especially participants with leading positions and those who have already changed organisation or team underlined this aspect of team effectiveness. Documentation includes requirements, design decisions, API references, user guides, and operational procedures. Therefore, well-maintained documentation ensures knowledge transfer, facilitates onboarding of new team members, and supports ongoing maintenance. Teams should prioritize clear, concise, and accessible documentation as a part of their workflow.
11. Cybersecurity is a critical concern in technology-based organizations. Teams must implement robust security measures throughout the development lifecycle, including secure coding practices, regular vulnerability assessments, and adherence to industry standards and regulations. By proactively addressing security, teams can protect sensitive data, prevent breaches, and ensure compliance with legal requirements, safeguarding both users and the organization. During the discussion, participants underlined that this aspect will be even more essential in the future.

12. Work Environment can significantly contribute to team effectiveness. In this point of the discussion, participants included both the physical and psychological aspects, such as a well-equipped workspace, a culture of respect and inclusion, and support for work-life balance. They agreed that a healthy work environment promotes creativity, reduces stress, and enhances effectiveness.

Above, are presented aspects of team effectiveness discussed by participants of the investigation, using their statements and reflections. The final part of the session was focused on the formulation the definition of team effectiveness clear, understand and accepted by participants. Considering all discussed aspects and frequency of keywords essential to describe team effectiveness the final, formulated definition was the following:

Team effectiveness in technology-based organizations is the ability to deliver high-quality products that meet business requirements through teamwork. Effective teams understand business needs, maintain rigorous quality standards, and foster collaboration.

Additionally, effective teams adopt best development practices, select appropriate technologies, prioritize user experience, manage technical debt, and continually develop skills, taking care of risk management, clear documentation, robust cybersecurity, and a positive work environment.

5. Discussion

5.1. Findings

The findings presented based on the investigation revealed several critical aspects of team effectiveness in technology-based organizations, highlighting the multifaceted nature of effective teamwork. The definition consists of three dimensions such us (1) fulfillment of business requirements, (2) high-quality products, and (3) teamwork. It can be quite surprising that participants did not mention aspects that are included in widely used definitions, such us delivering the product till the deadline (Sarin, O`Connor, 2009), and providing the product within the established budget (Graham, Daniel, Doore, 2016), or viability as the team's capacity to sustain its functioning over time (Mathieu et al., 2008). Instead, participants propose fulfilling business requirements, which is a more comprehensive statement. It can suggest the necessity of wider flexibility, openness, listening, understanding and ability to adapt to dynamic business expectations.

The findings of this study resonate with recent advances in team effectiveness literature, particularly in the context of technology-based environments. The emphasis on aligning team output with business requirements and fostering high-quality deliverables is consistent with studies highlighting the critical role of goal clarity and outcome alignment in team success

(Kozlowski, Ilgen, 2006; Tran, Vu, 2021; Edmondson, Lei, 2014). Aligning team objectives with organizational strategy has become increasingly crucial in modern, rapidly digitizing industries. This alignment ensures that resources are effectively allocated and organizational goals are met efficiently.

The critical role of teamwork, a recurrent theme in prior research, is extensively validated in this study. Larson and DeChurch (2020) identified agile and cross-functional teams as essential in navigating technological complexities, a notion further corroborated by recent empirical studies (Steegh et al., 2025; Muresan et al., 2024). Reflexive practices, which Schippers et al. (2014) identified as pivotal in fostering innovation, were also underscored in our findings, reflecting the ongoing need for teams to regularly evaluate and improve their collaborative processes.

Additionally, the integration of best practices in development, proper technology selection, and a strong focus on user experience mirrors current trends in digital transformation. López-Fernández et al. (2021) pointed out that teams adept at integrating user-centered design and technical best practices tend to outperform their counterparts. Moreover, the growing recognition of managing technical debt as a strategic activity aligns with insights from Trzeciak and Banasik (2022), who emphasized its importance in long-term product sustainability.

Risk management emerged as another key theme in this study, particularly in the context of cybersecurity. Ng et al., (2022) highlighted that proactive risk management practices, including regular threat assessments and the implementation of robust security protocols, are essential in safeguarding critical digital assets. Additionally, the newest research suggests that currently, businesses must have a cybersecurity policy and supporting tools, and cybersecurity management including cybersecurity audit plays a crucial role in enhancing the self-efficacy of the workforce (Chaudhuri, Behera, Balaet, 2025). A supportive work environment was also mentioned by participants as a crucial aspect of team effectiveness. This finding aligns with Edmondson & Lei (2014), who demonstrated that psychological safety within teams fosters open communication and innovation, which cannot be overstated.

5.2. Theoretical Implications

This study contributes to the theoretical understanding of team effectiveness by providing a definition and aspects, particularly within technology-based organizations. First, the study enriches the conceptualization of team effectiveness by integrating business requirements, high-quality product delivery, and teamwork as core dimensions. This redefinition challenges traditional models that emphasize deadlines, budget adherence, and long-term viability (Mathieu et al., 2008; Sarin, O'Connor, 2009). By prioritizing the fulfillment of dynamic business needs, the study underscores the evolving nature of team goals in fast-paced technological environments.

Second, the study supports the understanding of sustained team effectiveness by aligning it with the notion of adaptive capability. As Junker et al. (2025) argue, the sustainability of team effectiveness depends on the ability to meet performance goals while maintaining the well-being of team members. The emphasis on reflexivity, continuous learning, and best practices in development illustrates how teams can remain effective in the face of changing technological landscapes. This reinforces the relevance of reflexive practices (Schippers et al., 2014) and positions team reflexivity as a critical mechanism for fostering adaptability and innovation.

Third, by identifying specific technological, organizational, and environmental aspects of team effectiveness—such as proper technology selection, technical debt management, and cybersecurity—the study broadens the scope of factors traditionally considered in team effectiveness research. The explicit inclusion of these elements suggests that the effectiveness of teams in technology-driven contexts cannot be fully understood without accounting for the complex interplay of these aspects, echoing insights from the Technology-Organization-Environment (TOE) framework (Ng et al., 2022; Tornatzky, Fleischer, 1990).

Lastly, this research highlights the role of psychological and physical work environments in fostering team effectiveness. This finding aligns with Edmondson and Lei's (2014) work on psychological safety and suggests that creating a supportive work environment is not merely a peripheral concern but a central factor influencing team performance and innovation.

Summarizing, the study contributes to theory by proposing a view on team effectiveness tailored to the specificities of technology-based organizations. It calls for future theoretical models to integrate adaptability, reflexivity, and context-specific factors, thereby offering a nuanced understanding of how contemporary teams can thrive in complex, rapidly evolving environments. Additionally, researchers underline that team effectiveness can be improved by supporting the development of social processes such as potency and learning (Puente-Palacios, Barouh, 2021), while one of the best ways to do it, can be team learning focused on a deep understanding of essential definitions.

5.3. Practical Implications

From a practical standpoint, this study offers several actionable insights for managers and team leaders in technology-based organizations. First, ensuring alignment with business requirements should be a primary focus. Clear communication channels between business stakeholders and technical teams can enhance mutual understanding and ensure that delivered solutions meet expectations. Second, maintaining high-quality standards through practices such as adherence to Definition of Done (DoD) and Definition of Ready (DoR) can significantly improve product reliability and user satisfaction. Managers should invest in robust quality assurance processes, including comprehensive testing and regular code reviews. Third, fostering a collaborative team culture is essential. Teams that promote trust, respect, and open communication are more likely to achieve higher levels of innovation and productivity.

Agile leadership practices that empower team members and encourage participation can further enhance collaboration. Additionally, the study highlights the importance of ongoing skills development. Organizations should establish formal training programs, mentorship opportunities, and avenues for knowledge sharing to ensure that team members stay current with technological trends. Risk management emerged as another critical aspect. Managers should implement proactive risk identification and mitigation strategies, particularly in areas such as cybersecurity, where potential threats can have significant consequences.

Lastly, the study underscores the value of a supportive work environment. Providing a well-equipped workspace, promoting work-life balance, and fostering a culture of respect and inclusion can enhance team morale and reduce turnover.

5.4. Limitations

While this study was conducted with attention to methodological rigor, sample composition, and size to provide valuable insights, the research is not without limitations. First, the investigation was conducted in person, with the participation of IT experts from different domains, however, the physical form of the session caused that participants were not a very diverse group in terms of region of origin or cultural background. Moreover, technological organizations are characterized by a high degree of masculinization, resulting in an uneven gender distribution, with a disproportionate ratio of men to women. Future studies could benefit from a more geographically diverse sample to enhance generalizability. Additionally, the particular composition of the group for this session could affect results. Participants shared their reflections strongly based on their specializations, so the group consisted of other specialists or in different proportions, e.g. less Product Managers and more IT architects might change the findings.

Second, the study relied on self-reported statements, which may be subject to biases such as social desirability bias. Participants could share their reflections with diversified levels of openness and honesty. Some of them were a bit shy. Moreover, the investigation was conducted in the form of group session conducted by facilitators and their presents might affected the discussion.

Third, the qualitative nature of the research means that the findings are context-specific and may not be universally applicable. This study was embedded in technology-based organizations and precisely the IT sector. Implementation of findings in another sector might require an investigation relevant to the sector. Additionally, considering the nature of qualitative studies, the quantitative studies could complement these findings by providing statistical validation of the identified aspects.

5.5. Directions for Future Research

Building on the findings of this study, future research could explore several avenues. First, longitudinal studies could examine how team effectiveness evolves over time in response to changes in organizational strategy, technology, and market dynamics. Such studies could provide deeper insights into the sustainability of team effectiveness.

Second, comparative studies across different industries could reveal whether the identified aspects of team effectiveness are unique to technology-based organizations or have broader applicability. This would help refine the proposed model and enhance its generalizability.

Third, further research could investigate the interplay between different aspects of team effectiveness. For example, examining how skills development influences technical debt management or how risk management practices impact product quality could yield valuable insights.

Moreover, an important finding is not only what participants emphasized, but also what was largely absent from their conceptualizations of team effectiveness. Classic criteria frequently discussed in the literature, such as adherence to deadlines, budget performance, or long-term team viability (Mathieu et al., 2008; Sarin, O'Connor, 2009) were not spontaneously mentioned by participants. One plausible explanation is the contextual specificity of technology-based and agile work environments, where effectiveness is often framed less in terms of fixed project constraints and more in terms of continuous value delivery, product quality, and adaptive collaboration. Additionally, as the participants were primarily technical experts rather than managerial decision-makers, budgetary or schedule considerations may have been perceived as organizational constraints external to the team's immediate sphere of influence. Finally, the open-ended structure of the session prompt may have encouraged a focus on shared meaning and operational practices rather than formal performance metrics. Therefore, future research could examine how different organizational roles or alternative framing of effectiveness prompts might elicit more traditional outcome criteria.

Lastly, exploring the role of emerging technologies, such as artificial intelligence and machine learning, in shaping team effectiveness could be a fruitful area of inquiry. As these technologies become more prevalent, exploring their impact on team dynamics, decision-making, and performance will be crucial. Therefore, further studies in these directions should be conducted to provide a deeper and comprehensive understanding.

Conclusion

Reality is complex, ambiguous, and multifaceted, which means that the approach to defining key concepts may vary significantly across different teams and organizations. Consequently, the way certain terms or ideas are understood and framed can differ depending on the unique context, culture, and operational environment of each organization. This is precisely why we should cultivate reflexivity and engage in critical questioning of existing concepts, ensuring that their interpretation and definition remain aligned with an ever-evolving reality. The proposed definition aligns with multidimensional views of team effectiveness emphasizing goal accomplishment and collaborative functioning (Kozlowski, Ilgen, 2006; Mathieu et al., 2008). At the same time, it highlights the particular importance of business requirement fulfillment and product quality in contemporary technology-based teams. By embracing a reflective mindset, we can continuously adapt our understanding to better address the complexities and dynamics of the contemporary environment. Therefore, this study explored the understanding of team effectiveness in technology-based organizations by identifying key aspects that contribute to it.

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References

1. Adzgauskaite, M., Tam, C., Martins, R. (2025). What helps Agile remote teams to be successful in developing software? Empirical evidence. *Information and Software Technology, 177*, 107593. https://doi.org/10.1016/j.infsof.2024.107593
2. Aubé, C., Rousseau, V. (2005). Team goal commitment and team effectiveness: The role of task interdependence and supportive behaviors. *Group Dynamics: Theory, Research, and Practice, 9(3),* 189-204. https://doi.org/10.1037/1089-2699.9.3.189
3. Barley, S.R., Bechky, B.A., Milliken, F.J. (2017). The changing nature of work: Careers, identities, and work lives in the 21st century. *Academy of Management Discoveries*, *3(2),* 111-115. https://doi.org/10.5465/amd.2017.0034

4. Bekele, W.B., Ago, F.Y. (2022). Sample Size for Interview in Qualitative Research in Social Sciences: A Guide to Novice Researchers. *Research in Educational Policy and Management, 4(1),* 42-50. https://doi.org/10.46303/repam.2022.3
5. Bernard, H.R. (2013). *Social Research Methods: Qualitative and Quantitative Approaches* (2nd ed). Los Angeles, CA: SAGE Publications.
6. Braun, V., Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health, 11(4),* 589-597. https://doi.org/10.1080/2159676X.2019.1628806
7. Braun, V., Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative Psychology, 9(1),* 3-26. https://doi.org/10.1037/qup0000196
8. Cascio, W.F., Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3(1),* 349-375. https://doi.org/10.1146/annurev-orgpsych-041015-062352
9. Chaudhuri, A., Behera, R.K., Bala, P.K. 2025. Factors impacting cybersecurity transformation: An Industry 5.0 perspective. *Computers & Security*, *150*, 104267. https://doi.org/10.1016/j.cose.2024.104267
10. Creswell, J. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (2nd ed.). California, United States of America: SAGE Publications, Inc.
11. Dennis, A.R., Fuller, R.M., Valacich, J.S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS Quarterly, 32(3),* 575-600. https://doi.org/10.2307/25148857
12. DeOrtentiis, S.P., Summers, K.J., Ammeter, P.A., Douglas, C., Ferris, R.G. (2013). Cohesion and satisfaction as mediators of the team trust – team effectiveness relationship: An Interdependence theory perspective. *Career Development International*, *18*, 521-543. http://dx.doi.org/10.1108/CDI-03-2013-0035, Emerald Group Publishing Limited.
13. Edmondson, A.C., Harvey, J.F. (2018). Cross-boundary teaming for innovation: Integrating research on teams and knowledge in organizations. *Human Resource Management Review, 28(4),* 347-360. https://doi.org/10.1016/j.hrmr.2017.03.002
14. Edmondson, A.C., Harvey, J.-F. (2017). *Extreme teaming: Lessons in complex, cross-sector leadership.* Emerald Group Publishing.
15. Edmondson, A.C., Lei, Z. (2014). Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior, 1*, 23-43. https://doi.org/10.1146/annurev-orgpsych-031413-091305
16. Garro-Abarca, V.M., Palos-Sanchez, P.R., Rus-Arias, E. (2020). Working in virtual teams: A systematic literature review and a bibliometric analysis. *IEEE Access*, *8*, 168923-168940. https://doi.org/10.1109/access.2020.3023546

17. Gersick, C.J.G., Hackman, J.R. (1990). Habitual routines in task-performing groups. *Organizational Behavior and Human Decision Processes, 47(1),* 65-97. https://doi.org/10.1016/0749-5978(90)90047-D
18. Gimpel, H., Hosseini, S., Huber, R., Probst, L., Röglinger, M., Faisst, U. (2018). Introduction to digitalization cases: How organizations rethink their business for the digital age. *Digitalization Cases: How Organizations Rethink Their Business for the Digital Age,* 1-12. https://doi.org/10.1007/978-3-319-95273-4_1
19. Graham, C.M., Daniel, H., Doore, B. (2016). Millennial teamwork and technical proficiency's impact on virtual team effectiveness: implications for business educators and leaders. *International Journal of E-Collaboration, 12(3),* 34-50. doi:10.4018/IJeC.2016070103
20. Guest, G., Bunce, A., Johnson, J. (2006). *How Many Interviews Are Enough? An Experiment with Data Saturation and Variability*. SAGE Journals, 59-82.
21. Hambley, L.A., O'Neill, T.A., Kline, T.J.B. (2007). Virtual team leadership: the effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes, 103(1),* 1-20. doi:10.1016/j.obhdp.2006.09.004
22. Homan, A.C., Van Knippenberg, D., Van Kleef, G.A., De Dreu, C.K. 2007. Bridging faultlines by valuing diversity: Diversity beliefs, information elaboration, and performance in diverse work groups. *Journal of Applied Psychology*, *92(5),* 1189-1199. https://doi.org/10.1037/0021-9010.92.5.1189
23. Junker, T.L., Bakker, A.B., Derks, D. (2025). Toward a theory of team resource mobilization: A systematic review and model of sustained agile team effectiveness. *Human Resource Management Review, 35(1),* 101043. https://doi.org/10.1016/j.hrmr.2024.101043
24. Kozlowski, S.W.J., Ilgen, D.R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Psychological Science in the Public Interest, 7(3),* 77-124. https://doi.org/10.1111/j.1529-1006.2006.00030.x
25. Larson, L., DeChurch, L.A. (2020). Leading teams in the digital age: Four perspectives on technology and what they mean for leading teams. *The Leadership Quarterly, 31(1),* 101377. https://doi.org/10.1016/j.leaqua.2019.101377
26. Leite, L., Pinto, G., Kon, F., Meirelles, P. (2020). The organization of software teams in the quest for continuous delivery: A grounded theory approach. *Information and Software Technology, 123*, 106294. https://doi.org/10.48550/2008.08652
27. Li, J.C.-F. (2020). Roles of individual perception in technology adoption at organization level: Behavioral model versus TOE framework. *Journal of System and Management* Sciences, *10(3),* 99.97-118. https://doi.org/10.33168/jsms.2020.0308
28. López-fernández, D., Dı´az, J., Garcı´a, J., Pérez, J.E., González-Prieto, Á. (2021). DevOps Team Structures: Characterization and Implications. *IEEE Transactions on Software Engineering, 48*, 3716-3736. doi:10.1109/TSE.2021.3102982

29. Mathieu, J.E., Maynard, M.T., Rapp, T., Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management, 34(3),* 410-476. https://doi.org/10.1177/0149206308316061
30. Maynard, M.T., Mathieu, J.E., Rapp, T.L., Gilson, L.L. (2012). Something(s) old and something(s) new: Modeling drivers of global virtual team effectiveness. *Journal of Organizational Behavior, 33(3),* 342-365. https://doi.org/10.1002/job.1772
31. Muresan, G.C., Mititelu, S., Andres, J., Schraefel, M.C. (2024). Should I introduce myself?: Asynchronous semi-guided professional introductions for enhanced perceived team effectiveness in new virtual dyadic teams. *International Journal of Human–Computer Studies, 188*, 103279. https://doi.org/10.1016/j.ijhcs.2024.103279
32. Ng, P.M.L., Lit, K.K., Cheung, C.T.Y. (2022). Remote work as a new normal? The technology-organization-environment (TOE) context. *Technology in Society, 70*, 102022. https://doi.org/10.1016/j.techsoc.2022.102022
33. Postmes, T., Spears, R., Cihangir, S. (2001). Quality of decision making and group norms. *Journal of Personality and Social Psychology, 80(6),* 918-930. https://doi.org/10.1037/0022-3514.80.6.918
34. Puente-Palacios, K.E., Barouh, R.T.d.J. (2021). Relationship between team learning and team effectiveness. *Journal of Workplace Learning, Vol. 33, No. 7*, pp. 534-546. https://doi.org/10.1108/JWL-11-2020-0180
35. Reis, J., Amorim, M., Melão, N., Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. *Advances in Intelligent Systems and Computing, 745*, 411-421. https://doi.org/10.1007/978-3-319-77703-0_41
36. Sarin, S., O'Connor, G.C. (2009). First among equals: The effect of team leader characteristics on the internal dynamics of cross- functional product development teams. *Journal of Product Innovation Management, 26(2),* 188-205. https://doi.org/10.1111/j.1540-5885.2009.00344.x
37. Schippers, M.C., Rus, D.C. (2021). Team reflexivity and innovation: The moderating role of team context. *Journal of Business Research, 127*, 548-559. https://doi.org/10.1016/j.jbusres.2021.01.065
38. Schippers, M.C., Edmondson, A.C., West, M.A. (2014). Team reflexivity as an antidote to team information-processing failures. *Small Group Research, 45(6),* 731-769. https://doi.org/10.1177/1046496414553473
39. Shvindina, H., Piven, D. (2024). The Evolution of Project-Based Organizations: A Bibliometric Analysis and Literature Review. *Journal of Technology Management & Innovation, 19*(2), 112-132. https://doi.org/10.4067/S0718-27242024000200112
40. Steegh, R., Van De Voorde, K., Paauwe, J. (2025). Understanding how agile teams reach effectiveness: A systematic literature review to take stock and look forward. *Human Resource Management Review, 35(1),* 101056. https://doi.org/10.1016/j.hrmr.2024.101056

41. Tran, T.B.H., Vu, A.D. (2021). Transformational leadership versus shared leadership for team effectiveness. *Asian Academy of Management Journal, 26(2),* 143-171. https://doi.org/10.21315/aamj2021.26.2.7
42. Trzeciak, M., Banasik, P. (2022). Motivators influencing the efficiency and commitment of employees of agile teams. *Journal of Open Innovation: Technology, Market, and Complexity, 8(4),* 176. https://doi.org/10.3390/joitmc8040176
43. Urbach, N., Röglinger, M. (2019). *Digitalization Cases - How Organizations Rethink Their Business for the Digital Age.* Cham: Springer International Publishing, https://link.springer.com/book/10.1007/978-3-319-95273-4
44. Van Ginkel, W.P., Tindale, R.S., Van Knippenberg, D. (2009). Team reflexivity, development of shared task representations, and performance improvement. *Organizational Behavior and Human Decision Processes, 109(1),* 61-71. https://doi.org/10.1016/j.obhdp.2009.12.002
45. Wilson, J.M., Goodman, P.S., Cronin, M.A. (2007. Group learning. *Academy of Management Review, 32(4),* 1041-1059. https://doi.org/10.5465/amr.2007.26585724