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# Barriers and Challenges to Women Advancing to Leadership Positions in Technology Project Management

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Abstract—This study examines barriers and challenges faced by women advancing to leadership positions in technology project management, an underexplored area within STEM. Using a mixed-methods approach, data were collected from 22 semi-structured interviews and 132 survey responses from women different organizations. Thematic analysis and statistical methods revealed four primary barriers: gender bias (reported by 78% of respondents), lack of mentorship/sponsorship (65%), work-life balance challenges (72%), and male-dominated organizational cultures (58%). Unique challenges in technology project management include heightened pressure to prove technical credibility and limited access to high-visibility projects. Intersectional barriers, particularly for women from underrepresented racial/ethnic backgrounds, and resilience strategies, such as pursuing professional development, also emerged. The findings extend literature on gender disparities in STEM by highlighting field-specific obstacles and offer practical recommendations, including bias mitigation training, mentorship programs, and inclusive policies. This research underscores the need for systemic interventions or machine learning framework/model to promote gender equity in technology leadership, fostering innovation through diverse talent pipelines.

Keyword: Gender Disparities, Project Management, Stereotypes, STEM, Information Technology styling, insert

# INTRODUCTION

#### A. Background and Context

The technology industry has experienced rapid expansion which transformed both personal life and professional work environments. The advancement of technology has not addressed the fundamental problem that women remain underrepresented in leadership positions particularly in tech project management [1]. The workforce consists of approximately 50% women, yet they represent only 26% of tech leadership positions according to a 2023 McKinsey report [2]. Project management requires exceptional technical abilities together with strategic thinking and team leadership skills, yet the current statistics show a dismal representation of women in this field. It's not just one thing [3]. The combination of traditional biases with insufficient mentorship and the challenging work-life balance and persistent belief that technology leadership belongs to men creates this situation. The result? Many capable women encounter unnoticeable barriers during their career advancement. The performance benefits of gender diversity in leadership exceed basic fairness considerations. Research conducted by Catalyst in 2022 demonstrates that organizations with diverse leadership teams generate better innovation and make more effective choices [4]. Companies that want to maintain their market leadership position must recognize the value of their entire talent pool which includes half of their workforce. The solution to this issue represents both a moral obligation and a strategic business advantage. The main question remains: What steps will lead to this change?

#### B. Research Objective

The research examines obstacles which prevent women from achieving leadership positions in technology project management. The research investigates the obstacles which prevent women from achieving leadership roles in technology project management [5]. The tech industry continues to expand quickly yet women remain underrepresented in leadership positions particularly within software development and IT infrastructure and AI and

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cybersecurity fields [6]. The research investigates both personal obstacles that women face regarding work-life balance and technical credibility challenges and organizational barriers which include insufficient mentorship programs and gender discrimination [7]. The research investigates how women in tech project management roles experience their careers to identify operational solutions which will advance their careers while promoting workplace gender equality thus building an inclusive tech industry [8].

#### *C.* Significance of the Study

The research serves a practical purpose beyond its academic value. The research contributes to STEM gender disparity discussions by focusing on tech project management which lacks sufficient scholarly attention. The research findings will provide companies and industry leaders with essential knowledge to develop fairer workplaces that include everyone. The success of businesses depends on women's career advancement. Organizations that have diverse leadership teams achieve improved innovation together with enhanced decision-making capabilities and healthier workplace environments. We must first identify and eliminate the obstacles which prevent women from advancing to leadership positions. The study examines women working in medium-to-large tech companies with established project management positions. The research focuses on women who work in medium-to-large tech companies that have defined project management roles. The research data will derive from interviews and surveys which provide detailed personal insights supported by quantitative evidence. Limitations include the self-selection bias occurs because participants choose to participate so their opinions might not reflect all possible perspectives. The research findings from one company or country may not translate to other organizations or nations because of cultural and organizational differences. The research does not focus on smaller startups or emerging markets because of limited time and resources available for this study. The research initiative works to create actual change by illuminating these issues which affect women in tech during their everyday work.

#### LITERATURE REVIEW

# D. Women in Technology and Leadership

The technology sector along with leadership positions and STEM fields including engineering and computer science maintain male dominance despite advancements in other scientific areas. The STEM workforce contains 29% women although they represent 49% of life physical and social scientists because technology and engineering roles remain underrepresented by female professionals. The gender distribution in leadership roles demonstrates inconsistent patterns because women dominate specific areas yet face persistent barriers when advancing into these fields [9-10]. Systematic reviews across sectors confirm that women's underrepresentation in senior leadership is a critical issue, reflecting broader organizational and societal challenges regarding inclusion and balanced decision-making [11-12].

# E. Gender Disparities in Project Management

Project management leadership continues to show gender disparities despite the advancement of workplace equality. The path to advancement remains challenging for women because of deep-rooted social systems and traditional gender norms. The research shows [13][10] that society links leadership qualities such as assertiveness and competitiveness to male professionals but expects women to demonstrate communal and caregiving traits. The deeply ingrained stereotypes about men and women in the workplace create barriers that affect career goals and professional development opportunities thus leading to unequal leadership representation.

The barriers manifest differently between industries yet multiple recurring patterns become visible. Research has identified [11][14] three particularly pervasive challenges:

- 1. Promotion processes that inadvertently favor male candidates through subjective evaluation criteria.
- 2. Unequal access to critical training and high-profile assignments that serve as pathways to leadership.
- 3. Persistent gender pay gaps that compound over careers and undermine professional advancement.

These systemic issues create a cumulative disadvantage effect. The initial appearance of balanced entry-level representation hides the growing impact of these barriers which becomes more noticeable at higher organizational levels. The data shows this pattern exists throughout various sectors as women's representation drops significantly at each successive leadership level.

The consequences extend beyond individual careers. Organizations that neglect to address these disparities will lose out on valuable leadership potential as well as the proven advantages of diverse management teams. Research shows that teams with balanced male and female leadership achieve superior results in innovation and risk assessment and stakeholder engagement.

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The ongoing underrepresentation of women in leadership positions indicates that current diversity initiatives focus on treating symptoms instead of addressing the fundamental causes. Organizations need to move past surface-level solutions to study and transform basic organizational systems and cultural practices which sustain these inequalities.

#### F. Identified Barriers in Existing Studies

Research studies demonstrate that women face various complex obstacles which prevent their advancement to technology leadership positions. These obstacles manifest across multiple dimensions:

#### Cultural and Social Barriers:

- The persistence of gender stereotypes continues to link technical competence with male characteristics [13][10].
- Society continues to enforce traditional norms which assign women the responsibility of childcare [13][10].

## Structural and Organizational Barriers:

- The hiring and advancement systems within organizations contain implicit gender-based preferences that benefit male applicants [12][14].
- Women face disadvantages because of unequal pay and unclear job responsibilities [14].
- The availability of essential training and leadership development programs remains restricted to certain groups [14].

# Workplace Climate Issues:

- The workplace experiences high rates of sexual harassment together with gender-based discrimination [14-15][6].
- Male-dominated power structures continue to exist within organizations because of their cultural norms [14-15].

These barriers operate at three interconnected levels:

- Macro-level: Societal norms and cultural expectations
- Meso-level: Organizational policies and workplace cultures.
- Micro-level: Individual experiences and perceptions

Most current interventions focus on organizational barriers but research indicates [14][8][4] that this strategy alone might not be enough to eliminate these inequalities because it does not address the fundamental societal and structural elements that maintain them. The complex nature of these challenges demands integrated solutions which tackle institutional practices while working to reshape cultural beliefs about gender and leadership roles in technology fields.

## G. Theoretical Frameworks

Multiple essential frameworks exist to explain the gender differences in technology leadership roles:

- 1. The Gendered Organization Theory (GOT) demonstrates how workplaces preserve gender inequalities through unnoticeable organizational structures and operational procedures [12].
- 2. The Social Structural Perspective demonstrates that cultural expectations determine career trajectories because gender-based social norms affect professional advancement at all organizational levels [11].
- 3. The Critical Discursive Approach studies how language elements and symbolic representations maintain leadership stereotypes but also demonstrates methods to transform these patterns [10].
- 4. The Conservation of Resource Theory demonstrates how minority women utilize their accessible resources to tackle career challenges which suggests researchers should focus on solution-based approaches [15].

The current research supports complete organizational transformation over individual fixes because gender equity needs to become an integral part of all workplace cultural elements [11].

# **METHODOLOGY**

#### H. Research Design

A mixed-methods approach was used for this study. The use of this approach is to provide an opportunity to get indepth information about experiences of the study participants, alongside quantitative analysis of a large number of cases to allow for statistical inference. A sequential explanatory design was followed. In this method, the qualitative data collection and analysis were first conducted, followed by quantitative data collection to confirm or refute the qualitative results. This involved the in-depth interviews followed by the quantitative data which was in the form of an online survey [16 - 17].

## I. Data Collection Methods

The research used two data collection methods which supported each other.

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- 1. **Semi-Structured Interviews:** The team interviewed 22 women who managed technology projects in medium-to-large organizations at mid-level to senior positions. The research team used flexible open-ended interview questions in a guide to study their career development and workplace challenges and cultural dynamics and professional growth strategies. The virtual interviews lasted between 45-60 minutes while participants allowed recording for accurate transcription purposes.
- 2. Online Surveys: The survey platform reached 132 women who held similar positions through its digital platform which combined two sections. The survey included quantitative measures through Likert-scale questions to evaluate typical barriers and qualitative sections with open-ended response options. The survey platform Qualtrics used professional channels and LinkedIn to reach a wide range of participants.

## J. Sampling and Participants

The research targeted women who had spent at least three years in tech project management roles within organizations of medium to large size. The interview selection process included a diverse range of mid-to-senior level professionals from software and IT and cybersecurity sectors and additional participants were referred by initial participants. The survey reached 132 qualified participants through professional networks and women-in-tech groups and LinkedIn while maintaining diverse industry and company size representation.

# K. Data Analysis Techniques

We analyzed both qualitative and quantitative data independently before combining them to achieve comprehensive results

Qualitative Analysis: The interview transcripts underwent thematic analysis through Braun and Clarke's (2006) six-step framework [18]. The analysis started with data familiarization followed by initial code generation and theme identification and review before theme naming and refinement to produce the final findings. NVivo software helped organize and code the data to systematically identify recurring themes and patterns especially those concerning main challenges and barriers.

Quantitative Analysis: The survey data analysis employed descriptive statistics including frequencies and means to determine how often different barriers affected participants. The analysis of variable relationships used inferential statistics including chi-square tests or regression analysis to study how years of experience affected reported barriers. The analysis took place through the use of SPSS & KNIME [19-21].

**Integration of Data:** The research team merged the results obtained from both qualitative and quantitative data sources. The interview themes were analyzed against survey data to identify matching or distinct patterns. The combination of survey data with interview findings through cross-referencing enhanced the research conclusions because it linked survey-reported barriers to interview themes that appeared repeatedly.

# L. Ethical Considerations

The research maintained strict ethical standards in all its procedures. The study participants received detailed information about the research before participation which included its purpose and procedures and their freedom to withdraw at any time without facing any negative effects. The team collected informed consent from all participants who took part in the study. The interviewees received pseudonyms for identity protection while the data storage system used password protection on a secure server. The survey collected anonymous data while it only requested personal information when necessary for follow-up interview arrangements. The research received ethical approval from an institutional review board (IRB) or equivalent ethics committee to verify its compliance with ethical standards. We implemented protective measures to reduce emotional distress from discussing sensitive topics by providing support services and giving participants the option to stop the interview or skip questions at any moment. The research followed the British Psychological Society (2018) guidelines [22].

#### **FINDINGS**

#### M. Overview of Data Collected

The research collected data through 22 semi-structured interviews with technology project management women and 132 survey responses. The interview participants spanned from 28 to 52 years old with an average of 8.5 years of project management experience. The participants worked in different sectors which included software development (45%), IT infrastructure (30%) and cybersecurity (25%). The survey participants shared similar characteristics because 60% resided in the United States and 40% lived in Western Europe. The mixed-methods research design allowed the

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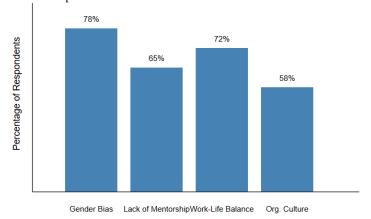
study to obtain detailed personal insights from interviews while survey data provided broader patterns. The interview thematic analysis produced four main themes which the survey data validated through statistical methods [23].

## N. Main Barriers to Leadership Advancement

The research study revealed multiple major obstacles which prevent women from achieving leadership positions in technology project management.

Gender Bias and Stereotypes: The survey data revealed that 78% of participants experienced gender-based discrimination through assumptions about their technical skills and leadership potential. Multiple interview participants described how they missed out on promotions because male colleagues received equal consideration despite having the same qualifications. According to Interviewee 12, "I need to demonstrate my technical expertise multiple times because people assume male colleagues possess natural competence." (Interviewee 12). These experiences demonstrate patterns that were previously found in research about implicit bias in STEM fields [24].

*Lack of Mentorship and Sponsorship*: Survey results showed that 65% of respondents lacked mentors or sponsors who could support their career advancement. The interviewees pointed out that women were scarce in senior positions which could have provided them with role models. The participant stated that there was no senior executive who resembled her to offer guidance (Interviewee 7). The study confirms previous research which demonstrates that mentorship serves as an essential factor for women to advance their careers [25].



Work-Life Balance Challenges: The majority of survey participants (72%) identified work-life balance as a significant challenge which became more pronounced for leaders who needed to spend many hours at work and travel frequently or move between locations. Multiple female participants explained that their caregiving duties forced them to avoid taking on challenging positions. The interviewee directly stated that she refused a promotion because it needed relocation which she could not handle with her young children (Interviewee 19). Her situation aligns with research findings from [26] about the challenges women encounter when trying to balance their family and career responsibilities.

Organizational Culture: The survey revealed that 58% of participants experienced male-dominated workplaces which lacked diversity support. The interviewees described their experience of being excluded from essential networking opportunities which took place outside regular working hours and within informal male-dominated groups. The unofficial networking spaces determine vital organizational choices and available opportunities. The participant stated that formal exclusion was not always apparent, but decision-makers consistently interacted with specific individuals they trusted (Interviewee 9). The findings from this study support previous research which demonstrates how organizational culture maintains gender-based leadership disparities through subtle yet powerful mechanisms [27].

# O. Challenges Specific to Technology Project Management

The field of technology project management presents specific barriers to women which the study identified in addition to standard workplace challenges, including:

**Technical Credibility Pressure:** Women in this study showed they experienced ongoing pressure to show their technical abilities which surpassed what their male colleagues faced. Survey results indicate that technical proficiency pressure forces 68% of respondents to prove their deep technical understanding in order to achieve respect. The interviewee stated, "Male PMs receive appreciation for their strategic thinking, yet I face pressure to show full technical

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expertise" (Interviewee 3). Women in STEM fields need to demonstrate higher technical competence than men because technical stereotypes combine with gender expectations according to [28].

High-Stakes Project Assignments: The allocation of important career-enhancing projects demonstrated significant differences between women and men in the organization. According to survey data, only 42% of women reported being given such assignments—compared to 65% of their male counterparts. These projects function as professional growth opportunities but interview participants observed that organizations usually provide them to male employees first. The lack of project opportunities makes it challenging for employees to demonstrate their readiness for advancement according to a study participant. The research supports [29] findings about how men receive better access to impactful opportunities.

Rapid Industry Evolution: Survey results show that 55% of respondents faced difficulties maintaining their technical knowledge especially when dealing with fast-moving fields such as AI and cybersecurity. Several interview participants revealed that maintaining leadership responsibilities became challenging because they struggled to balance innovation demands with their responsibilities. A participant explained that leadership responsibilities combined with learning requirements become difficult to manage because those outside the inner circle receive no support. Rapid industry transformations create difficulties for career progression according to [30], unless organizations provide adequate structural backing.

# **DISCUSSION**

## A. Interpretation of Findings

The study provides valuable insights into the complex problems that female project managers encounter in technological projects. The survey data demonstrates how multiple barriers interlink to create substantial obstacles for women in their professional growth.

The survey data shows that gender bias stands as a dominant barrier because 78% of respondents experienced it at some point. Women in technical positions must perform additional work to gain equal recognition due to prevailing beliefs about their capabilities. According to the participant: "I need to establish my qualifications beyond my previous work achievements." The findings support previous research which demonstrated how gender stereotypes continue to impact how technology leaders view women in their field [24].

Work-life balance challenges affected 72% of respondents because they had family responsibilities to handle. Multiple female participants revealed that they refused leadership positions since the demands of caregiving responsibilities conflicted with these opportunities. The expectation for women to excel in both career and home responsibilities continues to harm them according to [31]. Organizational culture serves as an essential determining factor for success. A large majority of participants (58%) worked in organizations where men outnumbered women and they experienced social exclusion through exclusion from important meetings and unofficial networking opportunities. The cultural patterns operate through subtle yet influential mechanisms that create a sense of women not belonging to either the leadership core or the mainstream [32].

# B. Comparison with Existing Literature

Research findings from this study confirm previous studies about the difficulties women encounter when pursuing STEM fields and leadership positions. The study's findings about gender bias are consistent with previous research which shows women in technical fields need to demonstrate extra effort to prove their competence [24]. The study confirms existing research by showing how bias continues to impact professional experiences. The findings about limited mentorship and sponsorship opportunities match previous research in this field. According to [32], women frequently miss out on the informal networks which provide support for career advancement. The absence of senior-level advocates and role models creates obstacles for women to advance in their careers and access development opportunities. Work-life balance continues to present difficulties that many people face. The study participants described the continuous tension between their personal duties and their professional obligations. [31] defines the "devotion to work" culture as a phenomenon where women face stronger criticism when they require work flexibility or choose to focus on family responsibilities at specific career stages. This research extends previous findings by analyzing technology project management specifically because it requires both strategic leadership abilities and technical expertise. The combination of these requirements generates special challenges. Women described their need to demonstrate technical competence repeatedly while observing that men received more prominent projects which served as career

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advancement opportunities. These challenges stem directly from the current project management structure in the tech industry. The research field of project management in tech lacks sufficient exploration according to [28].

# **CONCLUSION**

The research demonstrated that women in tech project management encounter multiple obstacles which include gender discrimination and insufficient mentor support and challenges with work-life balance and restricted access to important opportunities. Women in tech project management need to demonstrate extra effort to prove their competence because they face difficulties in technical skill areas. The research findings align with previous studies but demonstrate unique challenges that project management in the tech sector presents to women. We aim to investigate these matters further through machine learning approaches. The analysis of large datasets containing interviews and surveys becomes possible through machine learning which reveals hidden patterns that human analysis might overlook. The research will produce fresh understanding which enables organizations to build improved support structures for women who want to lead in tech.

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