Perceived Managerial Programming Competence and Job Satisfaction Among IT Professionals in Germany: A Quantitative Cross-Sectional Study

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A thesis submitted to The University of Gloucestershire in accordance with the requirements of the degree of Doctor of Business Administration in the School of Business

July 2026

Word Count: 64,488

Abstract

The German information technology (IT) sector faces a structural skills shortage. Although the immediate manager is consistently identified as the principal predictor of developer satisfaction, the specific attributes conferring supervisory credibility in technical environments remain conceptually imprecise. Addressing this gap, this thesis investigates the empirical relationship between the perceived programming skill of IT supervisors and the job satisfaction of formally employed IT professionals in Germany.

Adopting a post-positivist epistemology and a hypothetico-deductive design, the research employed a quantitative, cross-sectional bilingual online survey. Data were collected from 335 IT professionals via an instrument combining the validated KAFA job satisfaction scale (Haarhaus, 2016) with a bespoke measure of perceived managerial programming skill. The study integrated Self-Determination Theory (Deci & Ryan, 1985), Leader-Member Exchange theory (Graen & Uhl-Bien, 1995), and Social Identity Theory (Tajfel & Turner, 1979) to theorise that domain-specific technical competence establishes a foundational prerequisite for trust and psychological need satisfaction. Data were analysed in SPSS using Pearson correlation alongside hierarchical and moderated multiple regression.

Perceived managerial programming skill strongly correlated with job satisfaction (r = .528, p < .001) and uniquely predicted substantial variance (ΔR^2 = .276), surpassing demographic covariates and formal academic credentials. This relationship operates as a stable baseline, unmoderated by the subordinate's career seniority, educational background, or company size. However, continuous moderation analyses provided partial, convergent support for a role-based amplification: the relationship appears to intensify along a programming-intensity gradient, consistent with an identity-validation mechanism for core software developers. Exploratory analyses revealed a bimodal "hollow middle" distribution in skill-sufficiency ratings, indicating a binary cognitive threshold in competence evaluation.

This research contributes to knowledge by empirically validating the practitioner-driven "Szczepanski Proposition" (Szczepanski, 2017). Theoretically, it refines organisational behaviour frameworks by repositioning domain-specific technical competence as a prerequisite for autonomy-supportive leadership. Practically, the findings challenge credential-centric promotion pathways, offering evidence-based recommendations for organisational design, supervisory training, and generative AI governance within the German *Engpassberufe* context.

Author's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed Date 22 July 2026

(Victor Vojtech Terber)

DOI: 10.46289/KEQF2548

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Dedication

To Anne: my love, my life, my wife.

Acknowledgements

Thirty-five years ago, in Freiburg, I began a doctoral thesis in medicine and did not finish it. That I have now completed one is owed, in no small part, to the people named below.

My thanks go first to my supervisor, Dr Douglas Yourston, for eight years of patient guidance through a candidature that took rather longer, and endured rather more interruption, than either of us anticipated. He has never once said so directly, in keeping with a reserve I have come to value, but I suspect he is as relieved as I am that it is done.

I am grateful to my examiners, Dr Rima Bizri of the Canadian University Dubai and Dr Azley Abd Razak of the University of Gloucestershire, for the rigour and fairness of my viva voce examination and for the feedback that materially improved the final thesis.

This research has its roots in my father, Josef Terber († 2022), who retrained as a programmer after our family's emigration from Czechoslovakia and whose working life first showed me, long before I had the vocabulary for it, the divide this thesis investigates. I hope he would recognise something of himself in it. My mother, Vera Terber, has waited a very long time for this moment. It is a pleasure to finally give it to her.

I would also like to thank Prof Dominique Demougin (RPTU Kaiserslautern) and Prof Karsten Weber of OTH Regensburg, each of whom vouched for my application with a written reference. Karsten, an old friend since our schooldays in Grenzach-Wyhlen, will recognise how long a road it has been from there to here.

The idea for this doctorate first occurred to me during my MBA at Durham University and EBS Universität für Wirtschaft und Recht, and I remain grateful to that programme and to the peers who made it as intellectually enjoyable as it was formative.

I owe thanks to my employer, Mallia Aesthetics GmbH - where Anne is a Managing Director - which has given me the opportunity to begin testing several of this thesis's conclusions in practice rather than merely publish them.

Claudia Allen, Jennifer Kelley, and Michael Hey gave generously of their time as pilot reviewers of the survey instrument, and I thank them for permission to name them here; I remain equally grateful to the other pilot contributors.

Beyond them, I owe a debt to the many colleagues, clients, and managers I have worked alongside over three decades in European IT, who supplied, mostly without knowing it, the observations this thesis set out to test.

My thanks go finally to the 335 professionals who completed the survey itself, and to the Postgraduate Research team at the University of Gloucestershire for their efficient and good-humoured administration of the process throughout.

And, above all, to Anne, to whom this thesis is dedicated.

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1 Introduction

1.1 Strategic Context: Talent Retention in the German IT Sector

Germany's digital economy is central to national economic stability. Despite geopolitical uncertainty and recession, the Information and Communications Technology (ICT) sector continues to expand. The digital industry association Bitkom forecast turnover in the German ICT market to reach €232.8 billion in 2025, a year-on-year increase of 4.6%, following a 3.3% rise the previous year (Bitkom e.V., 2025). With over 1.37 million people employed, the ICT sector has become Germany's single largest industrial employer, surpassing traditional manufacturing sectors such as automotive and mechanical engineering (Bitkom e.V., 2025).

The same pattern is visible at the European level. According to Eurostat (2025), Germany hosted approximately 2.3 million ICT specialists in 2024, the largest national contingent in the European Union, representing more than one-fifth (22.1%) of the EU's total ICT workforce. The data indicate that, EU-wide, the number of ICT specialists grew by 62.2% between 2014 and 2024. This rate was nearly six times the corresponding rise in total employment (10.6%) and reflects the accelerating pace of digital transformation across the continent.

The European Commission's Digital Decade programme has set a formal target of 20 million employed ICT specialists by 2030 (Eurostat, 2025). With the current figure exceeding 10 million, achieving this ambition requires a near-doubling of the workforce within six years. Sectoral expansion on this scale is itself a macroeconomic force. Each new digital initiative generates incremental demand for the same finite pool of qualified IT professionals.

Despite this growth, the ICT sector faces a persistent shortage of qualified IT professionals. Recent data reported a decline from the unprecedented peak of 149,000 unfilled IT positions in 2023 to 109,000 in 2025 (Bitkom e.V., 2026). The decline reflects a cyclical downturn as firms scale back hiring amid recessionary

pressures and geopolitical uncertainty. The underlying talent shortage remains unresolved. The 2025 figure stands as the fourth-largest skills gap on record. As a result, 85% of surveyed companies continued to perceive a deficit, 79% expected the situation to worsen, and IT vacancies still took an average of 7.7 months to fill (Bitkom e.V., 2026).

In response to the scale and persistence of this deficit, the Bundesagentur für Arbeit (2024) officially classifies a range of IT occupations as *Engpassberufe*, or shortage occupations. The classified occupations include software development and IT consulting (Bundesagentur für Arbeit, 2024). Triggering specific immigration-facilitation measures gives the designation concrete policy consequences and confirms that the scarcity spans economic cycles and cannot be resolved by short-term recruitment alone. Leading national economic institutes, such as the Institut der deutschen Wirtschaft Köln (IW Köln), confirm these figures. These institutes identify the skills shortage as the primary macroeconomic challenge threatening the future viability of the German business sector.

A shortage of roughly 573,000 qualified workers cost the German economy €49 billion in 2024, or 1.1% of total production potential (Burstedde & Kolev-Schaefer, 2024). This aggregate productivity loss is projected to increase to €74 billion by 2027 as the retirement of the Baby Boomer generation contracts the labour supply (Burstedde & Kolev-Schaefer, 2024). These figures are conservative and exclude downstream costs. The skills shortage is also associated with lower job satisfaction and increases the risk of staff overload (Kunath et al., 2023), generating productivity losses in addition to the direct output gap.

The challenge of retaining IT talent is a long-standing industry concern. Nearly two decades ago, Westlund and Hannon (2008) observed that the loss of IT personnel is a persistent organisational threat, as departing employees take essential knowledge of business processes and technical systems with them. Westlund and Hannon's (2008) warning regarding institutional knowledge loss has become more pressing as digital transformation has accelerated.

Unfilled vacancies represent only one consequence of the IT skills shortage. Staffing Industry Analysts (2023) reported that the shortage impairs firms' ability to deliver

projects on time and to launch new digital products and services. The shortage turns the human capital gap into a measurable competitive disadvantage. For German employers, talent retention has ceased to be a routine human resources (HR) concern and now ranks among their primary organisational priorities.

The consequences of this retention challenge unfold across three levels of analysis, and the framing of this study draws on all three. The macro level of the national economy and the meso level of the individual firm are not themselves under investigation here; they are examined because they quantify the practical stakes of the micro-level phenomenon this thesis investigates: the relationship between an IT professional and their immediate supervisor. Establishing the scale of these aggregate losses shows that what happens within the supervisory dyad has strategic consequences for firms and for the national economy, and thereby grounds the practice-oriented mandate of the DBA (Section 1.3).

At the *macro* level, disengagement precedes voluntary turnover and carries a measurable economic cost. Active detachment and emotional withdrawal together cost the German economy as much as €167.2 billion annually in lost productivity (Nink, 2024). Employees become actively alienated when dissatisfaction hardens into resentment and cognitive withdrawal from the work itself. Such detachment, which stems largely from failures in direct supervisory relationships, is a considerable and ongoing loss of human capital potential (Nink, 2024).

At the *meso* level of the individual firm, the financial impact is similarly severe. A single unfilled IT position in Germany costs an average of €37,300, aggregating lost output, delayed projects, and prolonged vacancy administration (Stepstone Group, 2022). Unfilled vacancies represent only a fraction of the total financial burden. A failed hire is an individual recruited, onboarded, and subsequently lost within a short period. Replacing such an employee can cost up to twice the departing employee's annual gross salary. The total burden includes recruitment fees, onboarding investment, early phase productivity loss, and team disruption (Geslin, 2025). For a senior software developer in Germany, the expense can easily exceed €150,000 per failed retention. Within the IT sector, replacement costs are inflated by the extended ramp-up time required for complex technical systems and the loss of tacit

architectural knowledge. Total replacement expenditure can reach up to seven times the departing professional's annual salary (Kochanski & Ledford, 2001).

External recruitment is also increasingly obstructed by financial barriers on multiple fronts. Bitkom e.V. (2026) reported that 63% of German companies struggle to fill IT vacancies because applicants' salary expectations are disproportionate to their demonstrated qualifications. Another 56% of companies stated that meeting the salary demands of prospective hires would disrupt their internal corporate pay structure. Because meeting external salary demands would compromise internal equity, organisations cannot resolve the talent deficit through recruitment alone. They must compete on the quality of their work environment and on internal, relational retention factors, which makes the immediate supervisory relationship a decisive retention lever.

Vacancy and replacement costs are not evenly distributed. The German *Mittelstand* consists of small and medium-sized enterprises that form the foundation of the national economy. For these firms, a single prolonged IT vacancy is a disproportionate strategic threat. Such a vacancy is capable of stalling an entire digital transformation initiative. Across the wider economy, the same pattern combines budgetary cost with strategic impediment.

Artificial intelligence (AI) adds another dimension to the economic pressures and is reshaping the structural features of the talent deficit. Barenkamp (2024) argued that automating routine tasks via AI is the most viable strategic option for German companies seeking to ease the *Fachkräftemangel* and sustain international competitiveness. AI automates these processes. At the same time, it generates net additional demand for specialised IT professionals (Bitkom e.V., 2026). AI deployment presupposes the very pool of highly qualified experts. The scarcity of this talent defines the crisis. The shift rests on a counter-intuitive condition: organisations must retain the very experts who design and govern the systems intended to relieve them, as well as evaluate their outputs.

At the code level, AI-powered coding assistants accelerate routine task execution, while the novel architectural and quality-assurance risks they introduce markedly

raise the demands placed on human technical judgement. The level of technical knowledge a manager needs to be seen as credible continues to rise.

A rapidly expanding digital sector, a chronic talent shortage, the documented economic cost of disengagement, and the escalating technical requirements for credible leadership together shape the German IT labour market. These conditions require employers to identify the organisational factors that most strongly predict whether an IT professional chooses to stay or leave. Organisational behaviour research reliably identifies job satisfaction as the primary predictor of voluntary turnover intentions (Griffeth et al., 2000; Mobley, 1977). Job satisfaction is also a meaningful positive correlate of individual job performance (Judge et al., 2001). Within this well-established chain, converging evidence points to a single, decisive factor: the immediate supervisor. As Buckingham and Coffman (1999) argued in their widely cited work, and as subsequent empirical research has confirmed, "people leave managers, not companies" (p. 33).

The quality of the direct supervisory relationship is the most consequential, and most directly actionable, organisational factor available to employers seeking to retain their most valuable talent. However, traditional HR satisfaction metrics frequently fail to capture the full extent of supervisory failure. The most dissatisfied employees, that is, those whose negative experience was severe enough to prompt their departure, have already left the organisation. Because departed talent cannot be sampled, an unquantified layer is added to the economic burden established earlier, and a methodological constraint evaluated later in this thesis is simultaneously introduced. The absence of former-staff data sharpens the urgency of understanding which specific managerial attributes predict, or undermine, IT professional satisfaction while the employment relationship remains intact.

In a labour market defined by such chronic scarcity, an organisation's most viable strategy lies in carefully preserving its existing talent by building a highly satisfying work environment, because recruitment alone is insufficient. Addressing the retention crisis requires identifying the primary factors associated with job satisfaction for IT professionals.

1.2 The Problem of Practice: Professional Identity and the "Manager" Factor

The broad field of IT job satisfaction encompasses a specific, practically meaningful, yet academically untested industry belief that requires focused investigation. The existing literature establishes that job satisfaction among software developers and other IT professionals is a complex, multi-dimensional construct shaped by various social, technical, and organisational determinants. Within this complexity, independent empirical evidence (Beecham et al., 2008; Storey et al., 2021) identified the immediate manager as a primary predictor of workplace satisfaction.

Despite this well-established empirical importance, the "Manager" factor continues to be a broad, under-specified construct. The precise definition of a "good manager" from the perspective of a software developer is still ambiguous. The specific attributes that define effective technical leadership, and in particular the threshold of technical competence a manager is expected to demonstrate, are as yet unresolved and empirically untested. Conflating distinct managerial dimensions within this construct limits both theoretical precision and practical applicability.

Under-specifying the Manager construct's technical dimension coexists with a deep-seated cultural tension, defined in this thesis as the Generalist Assumption. The Generalist Assumption legitimises the systemic promotion of non-technical generalists into IT management. This practice directly conflicts with the craft-based professional identity of software developers. Software developers typically value meritocracy and demonstrated technical proficiency above hierarchical authority (Marks & Scholarios, 2007).

Within this culture, a widely and strongly held belief has become established. Writing from a senior technology-leadership perspective, Szczepanski (2017) asserted that software engineers strongly prefer to be managed by individuals with current coding expertise. Szczepanski (2017) also included managers who have only recently transitioned away from active development roles (Rethink Your Org Chart section). I refer to this claim throughout the thesis as the Szczepanski Proposition. It captures

the prevalent belief within the engineering culture that a manager's technical credibility represents a fundamental professional expectation.

Talentcrowd (2023) reinforced this observation. The report observed that many managers without software development experience continue to struggle in leading their development teams. This struggle carries direct consequences for productivity and effectiveness.

Generative AI coding tools have intensified this professional expectation. When AI can produce functional code, a manager's value to the team increasingly shifts from syntactic knowledge toward the capacity to accurately evaluate AI-generated outputs. This capacity presupposes genuine programming literacy. Engineers widely hold the conviction that a manager who cannot read code or understand architectural trade-offs faces substantial credibility barriers to leading a software team effectively. The Generalist Assumption, however, has identifiable institutional origins.

1.2.1 Institutional Drivers: Managerialism and the Agile Leadership Vacuum

The Generalist Assumption became the prevailing HR model for IT management through the combined influence of managerialism and the Agile paradigm shift. Over time, these forces combined to create a technical leadership gap that displaced domain-specific competence from corporate promotion criteria and the scholarly agenda. The resulting vacuum carries major implications for social identity processes by institutionalising an out-group management structure.

1.2.2 German Institutional Realities

The specific German institutional context sharpens the relevance of this research problem. Germany's dual vocational training system, referred to as *Ausbildung*, and the well-established pathway of lateral entrants, known as *Quereinsteiger*, produce a distinctly heterogeneous IT workforce. Together with vocationally trained professionals, these career changers form a workforce whose actual technical competence is poorly predicted by formal academic credentials. In many labour markets, a university degree is a reliable proxy for technical capability. The German

IT sector is different. The proportion of ICT specialists holding a tertiary qualification has risen considerably over the past decade, increasing from 46.8% in 2014 to 56.2% in 2024. Nevertheless, Germany remains the EU Member State with the second-highest share of non-tertiary ICT specialists at 43.8% (Eurostat, 2025). This figure far exceeds the EU average of 32.4%.

New entrants show a similarly diverse educational profile. In 2025, only 27% of newly hired IT professionals held an IT or IT-related university degree, while 37% held dual vocational IT training certificates, known as *Fachinformatiker*. A further 27% were lateral entrants lacking a formal IT qualification, and 10% were university dropouts (Bitkom e.V., 2026; percentages do not sum to 100% due to rounding). The qualification profiles of these lateral entrants demonstrate the diversity of professional backgrounds within the sector. Among the surveyed *Quereinsteiger*, the most frequently reported qualifying backgrounds were practical IT experience (43%), vocational training outside IT (36%), IT bootcamps (26%), and independent study (25%) (Bitkom e.V., 2026). Multiple responses were permitted in this survey item (n = 242).

In practice, the German IT workforce encompasses professionals who may hold a master's degree in an unrelated discipline yet possess exceptional programming skill acquired through vocational training, independent study, or decades of hands-on practice. The opposite case also occurs: individuals with formal computer science qualifications who moved into purely managerial roles years ago may have allowed their technical skills to atrophy. The coexistence of these diverse entry pathways makes formal credentials an unreliable signal of a manager's current technical competence.

Because academic degrees frequently fail to reflect current ability, there is a strong theoretical rationale for operationalising the independent variable as a perceptual construct that captures what the subordinate actually observes and experiences in daily interactions. The persistent disconnect between formal credentials and functional competence accordingly informs the study's moderation hypotheses, specifically whether a formal computer science degree remains a meaningful professional-identity boundary.

Despite the pre-eminence of the "Manager" factor, the specific technical-competence dimension of this construct has not been tested empirically. By contrast, a strong and widely articulated industry belief asserts that programming competence is a critical managerial attribute, yet this belief has never been subjected to systematic, large-scale empirical testing. This mismatch between practitioner conviction and empirical evidence defines the research problem addressed by the present study: the absence of systematic investigation into the relationship between a manager's perceived programming competence and the job satisfaction of the IT professionals they supervise.

1.2.3 Theoretical Foundations

This study integrates three organisational psychology frameworks: Self-Determination Theory (SDT; Deci & Ryan, 1985), Leader-Member Exchange (LMX) theory (Graen & Uhl-Bien, 1995), and Social Identity Theory (SIT; Tajfel & Turner, 1979). Chapter Two develops an integrated "Core and Support" model, which argues that perceived managerial programming competence is a prerequisite for the trust and relational quality that, in turn, allow subordinates' basic psychological needs to be met. This perspective counters the identity threat posed by a lack of domain-specific technical leadership. The proposed theoretical pathway interconnects SDT, LMX, and SIT.

Selecting programming skill as the independent variable rests on debates concerning how programming aptitude is perceptually evaluated. Examining the underexplored "Manager" factor through this theoretical lens subjects widely held industry beliefs to systematic empirical testing.

1.3 Rationale, Professional Motivation, and the DBA Mandate

A traditional Doctor of Philosophy (PhD) aims primarily to generate theoretical knowledge. A Doctor of Business Administration (DBA), by contrast, requires investigating a systemic problem of professional practice to produce directly applicable management insights (Banerjee & Morley, 2013; Bourner et al., 2001).

The DBA mandate corresponds to the broader movement of evidence-based management (Rousseau, 2006). The evidence-based movement calls for organisational decision-making to be grounded in the systematic use of the best available research evidence, replacing uncritical reliance on conventional wisdom or personal experience.

This research problem originates directly from my own professional practice. I have worked as an IT consultant in the German market since 1997, and I have repeatedly seen developers disengage when they concluded that their manager could not properly evaluate their technical work. That recurring observation pointed to a gap: a strong practitioner conviction about the importance of technical credibility, unaccompanied by the empirical evidence needed to confirm or refute it. Resolving the tension between this practitioner conviction and the lack of formal empirical evaluation forms the core personal motivation for this doctoral research.

This motivation demands a reflexive account of my positionality as an insider researcher (Coghlan & Brannick, 2014). This overview encompasses the biographical origins of my research perspective and the specific methodological advantages of insider access. It also details the procedural protocols implemented to limit confirmation bias (Unluer, 2012).

Ultimately, the DBA, as Banerjee and Morley (2013) observed, demands this dual competence: the practitioner's capacity to identify problems that matter, coupled with the scholar's commitment to solving them with rigour.

1.4 Research Aim, Objectives, and Hypotheses

The aim of this research is:

To investigate the empirical relationship between the perceived programming skill of IT supervisors and the job satisfaction of IT professionals working in Germany.

Four Research Objectives (ROs) guided the study:

- **RO1:** To derive from existing theory a new factor influencing job satisfaction in the IT sector.
- **RO2:** To establish a valid and reliable measure of employee perceptions of the new factor, suitable for the German IT context.
- **RO3:** To generate a primary empirical evidence base on the new factor among IT professionals working in Germany.
- **RO4:** To refine existing theory within the field, based on a statistical analysis of the relationship between the new factor and job satisfaction.

These objectives address the following Research Question (RQ):

To what extent does the perceived programming competence of an IT manager predict the job satisfaction of the IT professionals they supervise, and what are the boundary conditions of this relationship?

To operationalise the research objectives and address the overarching research question, the study tested the following theoretically derived hypotheses on IT professionals working in Germany:

- **H1:** A positive correlation exists between Perceived Managerial Programming Skill and job satisfaction.
- **H2:** Perceived Managerial Programming Skill can significantly predict job satisfaction, even when controlling for employee age and programming time.
- **H3:** The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision is significantly stronger for Core Software Developers than for other IT experts.
- **H4:** The positive relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by career seniority, educational background, and company size.
- **H4a:** The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by career seniority, such that the positive relationship is stronger for subordinates with greater career seniority,

operationalised independently through two proxies: the subordinate's absolute age and their total professional experience.

- **H4b:** The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by educational background, such that the positive relationship is stronger for subordinates with a formal computer science degree compared to those with other educational backgrounds.
- **H4c:** The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by company size, such that the positive relationship is stronger for subordinates working in smaller companies compared to those in larger enterprises.

H1 tests the basic bivariate relationship. H2 isolates unique predictive power controlling for demographic variables. H3 and H4a to H4c specify boundary conditions using role-based, individual, and contextual moderators. H4a was deemed supported if at least one proxy yielded a statistically significant interaction effect.

The primary independent variable is a pre-specified two-dimensional composite. It captures both absolute capability (Q13) and role adequacy (Q14), consistent with French and Raven's (1959) dual conception of Expert Power. The adequacy facet carries an inherent risk of construct overlap with the supervisory-satisfaction outcome. To address the overlap, a confirmatory robustness analysis using the absolute capability metric alone (Q13) was pre-planned (see Section 4.4.3.2). This robustness analysis establishes the uncontaminated lower bound of the focal effects. Chapter Two develops the integrated theoretical framework from which these hypotheses are deductively derived.

1.5 Research Scope, Definitions, and Delimitations

1.5.1 Scope and Methodological Delimitations

Construct Delimitation. This study measured perceived managerial programming competence, the subordinate's subjective evaluation, which remains distinct from objective coding ability. Delimiting the independent variable to a perceptual construct focuses the study on the experiential reality of the subordinate. The theoretical

rationale for this decision is grounded in the trust-formation dynamics of Leader-Member Exchange theory and the identity drivers of Social Identity Theory.

Population Delimitation. The target population was restricted to IT professionals in formal employment relationships, excluding freelancers, independent contractors (*Freiberufler*), and sole proprietors (*Gewerbetreibende*). The construct validity rationale and operational enforcement for this exclusion are detailed in the methodology.

Geographical Delimitation. The study was delimited to IT professionals working predominantly in Germany. This single-country focus was a deliberate choice to control for macroeconomic, cultural, and institutional variables that would otherwise confound interpretation. Germany's specific labour market characteristics create a distinct institutional context. These characteristics include its dual vocational training system (*Ausbildung*), its formal designation of IT roles as *Engpassberufe*, and its comparatively low Power Distance score on Hofstede's cultural dimensions framework (Hofstede, 2001). The geographical delimitation controls for cross-cultural confounds, but it necessarily limits the direct generalisability of findings to other national contexts. Cross-cultural and cross-sectoral replication is identified as a priority for future research (see Section 6.5).

Methodological Delimitation. The study employed a cross-sectional survey design. This design captures data at a single point in time and cannot empirically establish causal directionality. The full methodological rationale, accepted trade-offs, and governing terminological conventions are detailed in Chapter Three, while the interpretive consequences for causal inference are evaluated in the final discussion.

1.5.2 Definitions of Key Terms

To ensure terminological precision across the connected domains of organisational behaviour, leadership theory, and software engineering, the following definitions govern the use of key terms throughout this thesis. Each entry provides a constitutive definition that establishes what the term means; how each construct is operationalised and measured is detailed in Chapter Three.

Core Software Developer. An IT professional whose primary daily activity is writing code, occupying a different professional identity position from one who programs only occasionally or not at all. This definition deliberately rejects classification based on nominal job titles or formal human resources designations, which are inconsistent and unreliable across organisations and countries.

Engpassberufe. A formal designation within the German labour market classification system, applied by the Bundesagentur für Arbeit (2024) to occupations experiencing a sustained shortage of qualified professionals.

Generalist Assumption. The prevailing human resources model of promoting non-technical individuals into IT management on the basis of general leadership credentials or administrative proficiency.

Job Satisfaction. Following the cognitive-evaluative tradition consolidated by Weiss (2002), job satisfaction is defined in this study as a stable, reflective evaluative judgement of one's work situation across multiple facets.

Perceived Managerial Programming Skill. A subordinate's subjective evaluation of their direct supervisor's programming competence.

Quereinsteiger. A German institutional term for lateral entrants or career changers. Within the IT sector, it denotes professionals who enter technical roles without formal computer science education or dual vocational IT training (*Ausbildung*).

Szczepanski Proposition. A prevalent belief within the engineering culture, stated verbatim by Szczepanski (2017) as "Programmers want to report to programmers - or at the very least, to recently promoted ex-programmers" (Rethink Your Org Chart section).

1.6 Significance of the Research

The study's contributions span both theoretical and practical domains, consistent with the DBA mandate (see Section 1.3).

1.6.1 Theoretical Contribution

This thesis makes several contributions to the scholarship on organisational behaviour and IT leadership. The research provides the first large-scale empirical test of the Szczepanski Proposition through deductive hypothesis testing (H1 to H3), supplemented by an exploratory attitudinal measure capturing the target population's conscious agreement. While Storey et al. (2021) established the "Manager" factor as the primary determinant of developer satisfaction, they left the technical-credibility threshold within that factor undefined; examining this construct empirically extends the job satisfaction literature within the IT domain.

A second contribution is the integrated SDT-LMX-SIT "Core and Support" model, which details the specific route through which a manager's perceived technical competence is hypothesised to predict subordinate job satisfaction. This model addresses a documented theoretical gap in the SDT-LMX linkage (Premru et al., 2022) and offers a domain-specific extension of the three core organisational behaviour theories to the under-researched context of IT leadership, investigating whether domain-specific technical competence acts as a foundational prerequisite for a manager's ability to provide authentic autonomy support and competence affirmation.

The study also shifts the programming-aptitude debate from the analysis of student grades to professional competence evaluation in the workplace, testing whether IT professionals evaluate their manager's programming skill as a pass-or-fail requirement or on a continuous scale.

Alongside the main effect, the moderation hypotheses evaluate whether the relationship between perceived technical competence and job satisfaction operates uniformly across the German IT workforce or is contingent upon specific individual and contextual boundary conditions.

1.6.2 Practical Contribution

The study's practical significance stems from its direct relevance to the talent retention crisis facing the German IT sector. Google's "Project Oxygen" initiative

identified technical advisement as one of the core behaviours distinguishing effective managers (Garvin, 2013), setting a practical precedent. The present study complements this qualitative, company-internal finding with quantitative, cross-sectional evidence and a theoretical explanatory mechanism. In particular, the study tested whether an empirical sufficiency threshold exists at which a manager's technical credibility transitions from inadequate to acceptable in the professional perception of their subordinates, with several directly applicable implications for management practice.

By empirically testing whether formal academic credentials or perceived programming skill are stronger predictors of subordinate satisfaction, this thesis directly evaluates credential-centric HR promotion pathways on an evidence base, with far-reaching implications for talent management strategy.

Evaluating actual programming time as a strictly behavioural criterion for distinguishing Core Software Developers from other IT experts provides organisations with a concrete, task-based metric. This metric supports the design of reporting-line structures that align managerial competence profiles with team identity needs. In an economy experiencing persistent IT talent attrition, this study tested whether the technical credibility of the immediate supervisor is one of the most controllable and cost-effective retention interventions available. This factor, largely invisible to traditional HR metrics, may be essential for organisations combating the persistent *Engpassberufe* crisis.

1.7 Thesis Outline

Five chapters follow. Chapter Two surveys the literature and builds the integrated theoretical framework from which the hypotheses are derived. Chapter Three sets out the post-positivist methodology, the cross-sectional survey design, and the analytical strategy. Chapter Four reports the empirical results, and Chapter Five interprets them. Chapter Six outlines theoretical contributions, practical recommendations, limitations, directions for future research, and a concluding reflection on talent retention in the German IT sector.

The main text is followed by a reference list formatted in APA 7th edition and six appendices. These appendices cover abbreviations (Appendix A), the full bilingual survey instrument (Appendix B), the literature search and screening protocol (Appendix C), ethics documentation (Appendix D), supplementary statistical outputs (Appendix E), and the location of the raw data (Appendix F).

2 Literature Review

2.1 Introduction

This chapter sets out the theoretical foundation for the study. It begins by conceptualising job satisfaction as a stable cognitive-evaluative judgement, before turning to the cross-cultural measurement challenges that motivate the adoption of a theoretically appropriate German-language instrument. Placed within the socio-technical environment of the IT profession, the construct points to the immediate manager as a primary determinant of subordinate satisfaction and retention. Within this relationship, a manager's domain-specific technical competence stands out as an empirically untested yet practically consequential antecedent. To specify the psychological mechanisms through which such competence may shape subordinate satisfaction, the chapter develops an integrated "Core and Support" model combining Self-Determination Theory (SDT), Leader-Member Exchange (LMX) theory, and Social Identity Theory (SIT). Defining the model's boundary conditions then allows the review to derive the study's formal, testable hypotheses.

2.2 Review Strategy and Protocol

Relevant literature was identified and synthesised through a transparent, methodologically defensible process. This DBA thesis draws on a diverse literature that spans established psychological theories and rapidly evolving industry practices. Given this breadth, a documented protocol was required to combine transparency with the contextual flexibility expected in DBA research.

2.2.1 Rationale for a Semi-Systematic Review

The choice of methodology for this review is a critical decision, as the selected approach shapes the nature of the knowledge that can be produced (Snyder, 2019). The range of review methodologies can be viewed as a spectrum of epistemological orientations, anchored by the highly structured, objectivist systematic literature

review (SLR) at one end and the more interpretive, subjectivist narrative review at the other (Varpio et al., 2024).

The SLR's rigid protocols ensure transparency and reproducibility. However, its narrow focus on a single, tightly defined question may be too restrictive for exploring complex, real-world business problems (Snyder, 2019; Tranfield et al., 2003). Conversely, while the narrative review offers interpretive flexibility, this method has been widely criticised for methodological opacity and susceptibility to researcher bias (Tranfield et al., 2003).

Between these two poles, the semi-systematic review offers a middle course. Snyder (2019) describes the approach as designed "for topics that have been conceptualized differently and studied by various groups of researchers within diverse disciplines" that hinder a full systematic review process, because "to review every single article that could be relevant to the topic is simply not possible" (p. 335; see also Wong et al., 2013). This flexibility does not, however, release the reviewer from systematic discipline. The research process must remain transparent and follow "a developed research strategy that enables readers to assess whether the arguments for the judgments made were reasonable" (Snyder, 2019, p. 335), with thematic analysis as the characteristic mode of synthesis. The requirement for an assessable strategy separates the semi-systematic review from the ad hoc narrative reviewing criticised above. The qualifier "semi" thus refers to the calibration of systematic rigour to the breadth of the research problem; it does not signal a reduced standard of care. The present study operationalises Snyder's transparency requirement through the documented four-phase protocol, explicit inclusion and exclusion criteria, and software-based audit trail set out in Section 2.2.3, and its research problem exhibits the multidisciplinary profile Snyder describes, spanning organisational psychology, information systems, and software engineering scholarship as well as practitioner discourse (Section 2.2.2).

Hiebl's (2023) methodological review of 232 systematic reviews confirmed that systematic approaches have become "the new normal" (p. 229) in management research, yet many review authors adapted their sample selection strategies to the individual characteristics of the literature they reviewed (p. 236). Wang and Chugh (2014) exemplified this pragmatic stance, describing their use of SLR as "a guiding

tool" for shaping the review according to their research focus and objectives, not as "an orthodox methodology with a concrete set of rigid rules" (p. 26). The semi-systematic approach adopted in this thesis reflects the same orientation.

2.2.2 Incorporating Practitioner Literature

A literature review that confines itself strictly to peer-reviewed academic journals risks presenting an incomplete picture of the existing literature, particularly in an applied field such as management where scholarship often lags behind practice (Adams et al., 2017). As Hiebl (2023) observed, the exclusion of such material from a review's sample selection "necessarily leads to smaller review samples and therefore potentially to questions regarding the comprehensiveness of these reviews" (p. 234).

To ensure this research is grounded in the practical realities of the profession, this review incorporates grey literature, defined as the diverse body of material made public outside of traditional academic peer-review processes (Adams et al., 2017). Several sources central to this study's research problem, including the Szczepanski Proposition and Google's "Project Oxygen" initiative (Garvin, 2013), are practitioner-generated artefacts whose inclusion is justified by this methodological rationale. Treating these sources as valid and necessary evidence aligns the review with the applied orientation of the DBA.

2.2.3 Review Protocol

A formal protocol guided the identification, selection, and analysis of the literature (Okoli, 2015), employing a comprehensive strategy to achieve conceptual completeness and control for single-method biases (vom Brocke et al., 2015). The process consisted of four distinct phases, as outlined in Table 2.1.

Table 2.1

Review Protocol Phases

Phase	Objective	Key Activities	Rationale & Bias Mitigation
1: Foundational Keyword Search	To identify a core set of highly relevant "seed" articles.	Broad search across key academic databases using defined keywords.	Establishes a broad, relatively unbiased search scope based on content, avoiding the limitations of citation-only searches.
2: Citation Network Expansion	To map the intellectual structure of the field and uncover interconnected research streams.	Backward and forward citation tracking ("snowballing") from seed articles, accelerated with CNA tools.	Combining with Phase 1 mitigates CNA-specific biases such as preferential attachment and self-citation.
3: Saturation and Screening	To ensure conceptual completeness and the relevance of the final literature sample.	Continued iterative search until no new concepts emerged. Applied pre-defined inclusion/exclusion criteria to all articles.	Ensures the review is founded on a broad and relevant body of work, guided by explicit criteria.
4: Documentation	To ensure transparency, traceability, and a clear audit trail of the review process.	Managed all search results, screening decisions, and final references using bibliographic software (Zotero).	Keeps the process documented and reproducible.

Note. CNA = Citation Network Analysis, SLR = Systematic Literature Review.

Phase 1 commenced with a broad keyword search across a curated selection of academic databases and search engines (Levy & Ellis, 2006). These sources included Scopus, PsycINFO, Business Source Complete (via EBSCOhost), PubMed, ScienceDirect, IEEE Xplore, Google Scholar, and Semantic Scholar. Targeted web searches (via Google Search) were also conducted to retrieve practitioner-generated grey literature. This scope substantially exceeds the mean of three databases reported for systematic reviews of management research conducted through database searches (Hiebl, 2023), thereby reducing the likelihood of overlooking relevant research items.

In Phase 2, the resulting seed articles were expanded through backward citation tracking and forward citation tracking (Levy & Ellis, 2006; Webster & Watson, 2002). Backward tracking involved reviewing reference lists to identify foundational works, while forward tracking located more recent citing articles. This process, commonly referred to as "snowballing" (Wohlin, 2014, p. 1), was accelerated by the Citation Network Analysis (CNA) tool LitMaps (McLaren & Bruner, 2022).

This iterative cycle (Phase 3) continued until thematic saturation was reached, guided by the pre-defined inclusion and exclusion criteria presented in Table 2.2. Thematic saturation was defined as the point at which new searches no longer yielded novel concepts or key citations (Levy & Ellis, 2006; Webster & Watson, 2002).

Table 2.2

Inclusion and Exclusion Criteria

Criterion Category	Description	Rationale / Clarification
Inclusion Criteria		
Subject Matter	The study's primary focus is on the relationship between managerial/leadership attributes and employee outcomes, OR the source provides foundational psychological, sociological, or macroeconomic theory essential for contextualising the research variables (e.g., SDT, SIT, or labour market reports).	This is the core thematic relevance test.
Population	The study population consists of IT professionals, software developers, engineers, or other knowledge workers in a technical context.	This criterion ensures the findings are relevant to the specific context of the thesis. Conceptual papers were included if their principles were applicable to this population.

Criterion Category	Description	Rationale / Clarification
Publication Type	1. Peer-reviewed academic articles (empirical, theoretical, reviews, meta-analyses). 2. Seminal academic books and scholarly book chapters. 3. Grey literature (e.g., industry reports, doctoral theses, white papers or web pages from reputable sources).	1. Ensures academic rigour and a foundation in established theory and contemporary empirical evidence. 2. Captures foundational psychological, sociological, and organisational theories that form the core theoretical framework and were originally published in book format. 3. Aligns with the DBA mandate to incorporate practitioner knowledge and ground the research in a real-world context. Practitioner sources are treated as primary evidence of the "industry notion" motivating the study. Reputable sources are defined as publications by recognised institutional bodies, large-scale surveys, or practitioner platforms subject to established editorial oversight.
Language	Publication is written in English or German.	Reflects the primary languages of the relevant academic and practitioner discourse and the researcher's linguistic competence.
Accessibility	Full text of the publication was accessible to the researcher.	A pragmatic criterion to ensure all included literature could be fully analysed.
Publication Date	No strict chronological cut-offs were enforced. Older literature was eligible provided the underlying paradigm remains relevant.	The historical development of the discipline of software engineering naturally limits the amount of specialist literature available. The focus was on contemporary literature; however, pioneering organisational theories made it necessary to include foundational texts regardless of their age.

To support the traceability of this process (Phase 4), all references identified and retained across the preceding phases were catalogued in the reference management software Zotero (Chigbu et al., 2023).

2.3 The Construct of Job Satisfaction

2.3.1 Defining Job Satisfaction: The Cognitive vs. Affective Debate

Historically, the field of job satisfaction has been dominated by an influential but conceptually ambiguous definition proposed by Locke (1969), who characterised job satisfaction as a "pleasurable emotional state resulting from the appraisal of one's job" (p. 316). Locke's formulation established the view of satisfaction as an essentially affective phenomenon.

Contemporary scholarship conceptualises job satisfaction as an attitude, namely a stable evaluative judgement about one's job (Weiss, 2002). This conceptualisation distinguishes satisfaction from transient affective experiences such as moods and emotions that fluctuate with daily workplace events (Brief & Weiss, 2002). An attitude represents a more enduring cognitive assessment. Failing to separate these constructs created a paradox in the literature: job satisfaction was defined in affective terms, yet researchers predominantly measured the construct with instruments that captured cognitive evaluations (Brief & Roberson, 1989).

The cognition-affect debate has a rich intellectual history, with Locke and Taylor (1990) exploring the interplay between cognition and affect, arguing that an individual's core values, which are cognitive constructs, govern their emotional responses to work experiences. The authors argued that stress and other affective reactions arise from a cognitive appraisal that a work situation threatens these values, establishing a clear causal link where cognitive appraisals produce emotional reactions.

Affective Events Theory (AET), proposed by Weiss and Cropanzano (1996), offers a process model that effectively resolves this tension. AET holds that features of the work environment lead to specific work events, such as receiving praise or meeting a deadline, which in turn trigger immediate affective reactions like moods and emotions. These transient affective experiences then accumulate and feed into the more stable cognitive evaluative judgement that defines job satisfaction. AET distinguishes between "affect driven behaviors", which are direct consequences of momentary feelings, and "judgment driven behaviors" like turnover intentions, which

are consequences of the overall job satisfaction attitude (Weiss & Cropanzano, 1996, p. 13).

Modern attitude theory separates the overall evaluative judgement from its key antecedents: cognitive beliefs and affective experiences (Judge et al., 2020). An employee's overall satisfaction is a composite evaluation, shaped both by rational calculations about the job's cognitive features and by the cumulative emotional quality (affect) of their daily work life (Weiss, 2002). Job satisfaction is conceptualised as a stable, reflective evaluative judgement of one's work situation across multiple facets, and is the key dependent variable.

2.3.2 Foundational Antecedents: The Person-Situation Debate

The question of why some individuals are satisfied with their work while others are not has been explained through two primary theoretical perspectives: those that emphasise the characteristics of the work situation and those that focus on the disposition of the person.

2.3.2.1 The Situational Perspective

The situational perspective holds that job satisfaction is primarily a reaction to the external work environment and the intrinsic nature of the job itself. Process theories focus on the cognitive processes of evaluation within this environment. For Adams (1963), satisfaction depends on the perceived fairness of one's input-to-outcome ratio relative to a referent other.

Equity Theory can be understood as a specific application of the broader principles of Social Exchange Theory (SET), which extends the evaluative logic to encompass long-term relational obligations governed by norms of reciprocity (Cropanzano & Mitchell, 2005).

The most influential situational theory is the Job Characteristics Model (JCM) developed by Hackman and Oldham (1976). The JCM maintains that five core job dimensions produce three critical psychological states, which in turn lead to high internal work motivation and job satisfaction (Hackman & Oldham, 1976). These five core job dimensions are Skill Variety, Task Identity, Task Significance, Autonomy, and

Feedback. The resulting psychological states are experienced meaningfulness of the work, experienced responsibility for outcomes, and knowledge of results.

The JCM's core propositions have been replicated across successive meta-analyses (Fried & Ferris, 1987; Humphrey et al., 2007; Parker et al., 2017). A large-scale longitudinal meta-analysis by Wegman et al. (2018) demonstrated that its core characteristics remain stable predictors of job satisfaction across contemporary work environments, effectively addressing concerns that digitalisation and shifting organisational structures might have attenuated its predictive power. Contemporary work design research supports this temporal stability. Fundamental JCM characteristics remain primary determinants of humane work design even amid AI-driven task transformations, explaining more variance in work motivation than extrinsic reward systems (Gagné et al., 2025; Ohly et al., 2025). The JCM's empirical strength is directly relevant to the present study, because the IT-specific satisfaction factors identified in the literature represent contemporary manifestations of the JCM's core dimensions.

2.3.2.2 The Dispositional Perspective

The dispositional approach offers a counter-argument and holds that job satisfaction is, to a large degree, a function of an individual's stable personality traits. This perspective gained support from findings that job attitudes were surprisingly stable over time, even when individuals changed jobs (Hulin & Judge, 2003). Key dispositional constructs have been shown to be reliable predictors of job satisfaction (e.g., Core Self-Evaluations and Positive and Negative Affectivity; Judge et al., 2020). This perspective suggests that personality shapes both the static level of satisfaction and the pattern, or trajectory, of satisfaction over an individual's career, affecting the attitude's stability and how the attitude changes in response to work and life events (Erdogan et al., 2012).

2.3.2.3 Synthesis: An Interactionist View

The situational and dispositional approaches are not mutually exclusive. The modern consensus is an interactionist perspective, where neither the person nor the situation alone is sufficient to explain job satisfaction. The primary theoretical framework for this perspective is Person-Environment (P-E) fit theory, which formalises the idea

that satisfaction arises from the congruence between the person and the environment (Edwards et al., 1998). Within this interactionist approach, situational factors such as support can be moderated by other variables, including job type (Ng & Sorensen, 2008). Personal dispositions shape how individuals perceive and react to the characteristics of their work situation, and any adequate explanation must incorporate this interplay.

2.3.3 Key Organisational Outcomes of Job Satisfaction

At the organisational level, job satisfaction is a central construct precisely because it predicts strategically vital outcomes. The negative relationship between job satisfaction and voluntary turnover, a macroeconomic priority (Section 1.1), rests on a strong meta-analytic foundation. Mobley's (1977) seminal process model established the psychological process by which dissatisfaction gives rise to withdrawal cognitions, job search behaviour, and ultimately voluntary departure. The landmark meta-analysis by Griffeth et al. (2000) quantified this link, synthesising decades of research to confirm a consistent, moderate negative relationship between job satisfaction and actual employee turnover. Empirical work has reaffirmed this relationship across different industries and cultural contexts, building upon the century-spanning body of turnover research synthesised by Hom et al. (2017).

Section 1.1 also introduced the link between job satisfaction and individual job performance. While this relationship was historically considered weak (Iaffaldano & Muchinsky, 1985), updated meta-analyses have confirmed the link between satisfaction and performance to be meaningful, with a correlation of .30 (Judge et al., 2001). Alongside these established outcomes, job satisfaction is a recognised antecedent of Organisational Citizenship Behaviour (OCB), defined as discretionary extra-role behaviours that support the organisation (Podsakoff et al., 2000).

Recent research has shifted from confirming these attitudinal links to demonstrating the powerful, direct role of the manager in shaping these critical outcomes. Mirzaei et al. (2024) found that perceived manager competence predicted both higher job satisfaction and lower turnover intention among clinical nurses. These findings establish line-manager competence as a primary correlate of retention and

satisfaction, providing a practical and financial rationale for examining which specific managerial attributes drive these outcomes.

2.4 The Measurement of Job Satisfaction

Defining job satisfaction as a stable evaluative judgement (Section 2.3.1) necessitates reliable measurement strategies. A long-standing tension exists between affective and cognitive approaches (Section 2.4.1), alongside a fundamental divergence between global and facet-based measurement philosophies (Section 2.4.2). These debates directly shaped the major international instruments currently dominating the field (Section 2.4.3).

2.4.1 Capturing Affect versus Cognition in Measurement

A core paradox underlies the measurement of job satisfaction. This conceptual tension carries a direct methodological consequence. Despite Locke's (1969) foundational emphasis on affective reactions, the empirical operationalisation of the construct has overwhelmingly favoured cognitive appraisal (Brief & Weiss, 2002; Section 2.3.1). As Fisher (2000, p. 186) observed, most satisfaction scales assess the cold cognitions (Sandelands, 1988), that is, beliefs, judgements, and comparisons, "rather than hot emotions, the level at which the job is actually experienced".

Relying on cognitive evaluations to measure job satisfaction stems partly from a practical measurement challenge. True affective states, such as moods and emotions, are transient and episodic and are therefore difficult to capture with traditional, static questionnaires, which are better suited to assessing stable evaluative judgements (Hulin & Judge, 2003). Research has sought to clarify this distinction by operationalising these constructs separately. For instance, moods are defined as pervasive feeling states not necessarily tied to a specific object, capturing how people feel at work, whereas attitudes like job satisfaction are more stable knowledge structures about the job. George and Jones (1996) provided a clear example of this methodological separation by using a dedicated instrument, the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), to measure mood, while using the Minnesota Satisfaction Questionnaire (MSQ; Weiss et al.,

1967) to measure job satisfaction. This distinction allowed the authors to examine the distinct roles each construct plays in predicting organisational outcomes like turnover intentions.

Alternative methodologies such as experience-sampling methods (ESM; Sonnentag & Zijlstra, 2006) offer the capacity to capture such transient daily fluctuations, complementing the stable evaluative assessments produced by traditional survey instruments. An awareness of this cognitive bias in traditional scales, and that such methodological alternatives exist, is essential for evaluating the established measurement tools in the field.

2.4.2 Global vs. Facet-Based Approaches

Measuring job satisfaction generally follows two distinct philosophies. The global approach assesses an employee's overall satisfaction with their job as a whole, often using a single item or a small number of general questions. The facet-based approach instead measures attitudes towards specific, distinct aspects of the job, such as pay, supervision, and the work itself (Haarhaus, 2016).

The global approach has a long history, with early work by Brayfield and Rothe (1951) describing how they constructed a reliable and valid quantitative index of "'over-all' job satisfaction" (p. 307). Their explicit goal was to create a measure applicable to a wide variety of jobs, and to achieve this breadth, the authors deliberately eliminated items referring to specific job aspects such as pay or working conditions to isolate a general attitudinal factor.

While conceptually straightforward, the most common implementation of the global approach, the single-item measure, has faced psychometric scrutiny. A meta-analysis by Wanous et al. (1997) investigated the validity of single-item measures, finding acceptable convergent validity. However, their analysis also offered a detailed critique regarding reliability, estimating their minimum internal consistency at .45 to .69, which may not meet rigorous psychometric standards. For these reasons, the facet-based approach is dominant in research. Its primary advantage is its diagnostic utility. The facet-based approach allows researchers and practitioners to identify the

specific sources of dissatisfaction, which is a prerequisite for designing effective interventions (Haarhaus, 2016).

2.4.3 Review of Foundational International Scales

Three major English-language, facet-based instruments have dominated the field and have been the subject of extensive validation, establishing a benchmark for measurement.

- The *Job Descriptive Index (JDI)*: Among the most widely used and carefully constructed measures, the JDI assesses five core facets: Work, Pay, Promotions, Supervision, and Co-workers (Smith et al., 1969). The instrument asks respondents to describe their job using a list of 72 adjectives and short phrases (e.g., "satisfying", "boring") with a "Yes," "No," or "?" response format. Its construct validity has been thoroughly supported through decades of research, as summarised in a major meta-analysis by Kinicki et al. (2002).
- The *Minnesota Satisfaction Questionnaire (MSQ)*: The MSQ is a more detailed instrument designed to measure how well a job fulfils an employee's needs (Weiss et al., 1967). The long form assesses satisfaction with 20 distinct facets, including aspects like Ability Utilisation, Creativity, and Moral Values, using 100 items, while a 20-item short form is also available.
- The *Job Satisfaction Survey (JSS)*: The JSS is a 36-item scale measuring nine facets, including Pay, Promotion, Supervision, Benefits, Contingent Rewards, and Nature of Work (Spector, 1985).

These instruments, developed primarily in the United States, provide the essential backdrop for understanding the subsequent need for careful cultural and linguistic adaptation in other contexts, such as Germany.

2.5 Cultural and Linguistic Adaptation

Rigorous research in a new cultural and linguistic context requires a complex process of cross-cultural adaptation to ensure construct validity. Simple translation alone is insufficient.

2.5.1 Theoretical Foundations of Cross-Cultural Adaptation

The growing interest in cross-cultural research necessitates standard and validated practices for adapting instruments. Applying an instrument in a new cultural group involves more than translating text into another language, which is an all-too-common practice. The process must take account of the linguistic and cultural differences among populations to ensure the instrument remains valid (Van de Vijver & Hambleton, 1996). Researchers have three main options: apply a literal translation, adapt parts of the instrument, or assemble a new instrument based on the original construct. The choice among these options is determined by the types and severity of potential threats to validity (Van de Vijver & Hambleton, 1996).

Detailed multi-stage protocols represent the gold standard for cross-cultural adaptation (Beaton et al., 2000). However, their foundational mechanism is back-translation, a classic technique for identifying conceptual discrepancies between source and target versions (Brislin, 1970). The overarching objective of such protocols is to maximise semantic, idiomatic, and conceptual equivalence. The specific translation procedure adopted in this study is set out in Chapter Three.

2.5.2 Threats to Validity

"Bias" is a generic term for all factors that jeopardise the validity of comparisons between groups. He and van de Vijver (2012) and Van de Vijver and Hambleton (1996) distinguished three main types:

- *Construct Bias*: This is the most fundamental threat and occurs when the construct being measured is not equivalent across cultures. This non-equivalence can manifest as differences in how the construct is conceptualised or in the specific behaviours the construct elicits. For example, the behaviours that define "good supervision" might differ between German and other cultural contexts.
- *Method Bias*: This refers to threats to validity that arise from the administration process or the instrument's characteristics. Common sources include differences between cultural groups in social desirability, acquiescence (the tendency to agree with items), or familiarity with specific response formats such as Likert

scales. The procedural and statistical controls for these biases are addressed in the methodology.

- *Item Bias*: Also known as Differential Item Functioning (DIF), item bias refers to anomalies at the level of individual items. An item is biased if individuals from different cultures with the same underlying level of the trait (e.g., the same actual job satisfaction) do not have the same probability of endorsing that item. Such discrepancies often result from poor word choice or inaccurate translation, where a seemingly literal rendering has a different connotation in the target language.

2.5.3 Challenges in Adapting Scales for German Research

Given the potential for these biases, the availability of properly adapted and validated instruments for the German context requires close theoretical examination. Carefully adapting a major Anglo-American psychosocial questionnaire is a substantial scientific undertaking, as literal translation alone is insufficient to guarantee validity without introducing construct or item bias (Van de Vijver & Hambleton, 1996). A preliminary review of the major international scales (JDI, MSQ, JSS) reveals that fully validated, psychometrically documented German versions are either unavailable or have not been independently validated for specific occupational contexts. This scarcity explains why German-speaking researchers have often found it necessary to develop their own instruments. A detailed comparative evaluation of the validation status of these adaptations and German-origin alternatives is presented in Tables 2.3 and 2.4.

2.6 Measurement in the German Context and Instrument Selection

The scarcity of validated translations (Section 2.5.3) prompted German-speaking researchers to develop native job satisfaction instruments. Evaluating these available German-language adaptations and native instruments enables the identification and theoretical justification of the specific tool selected for the present study.

2.6.1 Evaluation of Available German-Language Instruments

Fully validated German adaptations of the major international job satisfaction scales are either unavailable or insufficiently documented. Table 2.3 summarises the validation status of these adaptations.

Table 2.3

Validation Status of German Adaptations of International Scales

International Scale	German Version	Translation / Adaptation Type	Published Psychometric Validation in German
Job Descriptive Index (JDI)	Arbeitsbeschrei-bungsbogen (ABB)	Adaptation and extension (adds 2 facets)	Neuberger and Allerbeck (1978, 2014)
Minnesota Satisfaction Questionnaire (MSQ)	Unavailable (Weiss, 2022, Translations section)	N/A	N/A
Job Satisfaction Survey (JSS)	German JSS (GJSS)	Translation	Liu et al. (2004), but requires context-specific scrutiny

Given these constraints, the evaluation turned to instruments that were either extensively adapted for, or developed natively within, the German-speaking context.

Three principal German-origin options each present practical or psychometric limitations: the Arbeitsbeschreibungsbogen (ABB; Neuberger & Allerbeck, 1978), the Skala zur Erfassung der Arbeitszufriedenheit (SAZ; Fischer & Lück, 1972), and the German adaptation of the Copenhagen Psychosocial Questionnaire (COPSOQ; Nübling et al., 2005). The ABB's 79-item length presents a practical drawback in survey research (Haarhaus, 2016). The SAZ has been criticised for its unconfirmed facet structure and ambiguous wording (Neuberger & Allerbeck, 1978). The COPSOQ's broad multi-construct scope, in which job satisfaction forms only one of thirty scales, makes it unsuitable as a focused job satisfaction measure for the present study. A comparative overview of these instruments is presented in Table 2.4.

Table 2.4

Comparative Overview of Major Job Satisfaction Scales in German-Speaking Research

Scale (Abbreviation)	Origin / Theoretical Basis	German Developer/ Translator	No. of Items	Facets Measured	Response Format
Arbeitsbeschreibungs-bogen (ABB)	JDI adaptation	Neuberger and Allerbeck (1978)	79	7 (Colleagues, Supervisor, Activity, Working Conditions, Organisation, Development, Pay)	4-point Yes/No; 7-point Faces
Skala zur Erfassung der Arbeitszufriedenheit (SAZ)	German original	Fischer & Lück (1972)	37	9 (intended, but structure unconfirmed)	Not specified
Copenhagen Psychosocial Questionnaire (COPSOQ)	Danish original	Nübling et al. (2005)	141	Job satisfaction is one of 30 scales	5-point ordinal
Kurzfragebogen zur Erfassung von Allgemeiner und Facettenspezifischer Arbeitszufriedenheit (KAFA)	Based on JDI/ABB	Haarhaus (2016)	30	5 (Work Itself, Co-workers, Development, Pay, Supervision) plus General	5-point Likert-type

These limitations motivated the identification of a more efficient and focused alternative.

2.6.2 Identification and Justification of the KAFA

The instrument adopted for this study was the Kurzfragebogen zur Erfassung von Allgemeiner und Facettenspezifischer Arbeitszufriedenheit (KAFA; Short Questionnaire for the Assessment of General and Facet-Specific Job Satisfaction; Haarhaus, 2016). The KAFA was selected as the most appropriate instrument on the following theoretical and methodological grounds:

- *Theoretical Foundation.* The KAFA is conceptually grounded in the measurement traditions of both the JDI (Section 2.4.3) and its German equivalent, the ABB (Section 2.6.1), ensuring continuity with decades of foundational job satisfaction research (Haarhaus, 2016).
- *Structure and Efficiency.* As an efficient 30-item questionnaire utilising a 5-point Likert-type response format, the KAFA measures overall satisfaction and five key facets without the excessive respondent burden of the 79-item ABB or the 141-item COPSOQ (see Table 2.4), a consideration that is particularly important for voluntary survey research (Haarhaus, 2016).
- *Relevance to the IT Profession.* Its five-facet structure, comprising Work Itself, Co-workers, Development Opportunities, Pay, and Supervision, maps directly onto the satisfaction drivers most frequently identified in the IT-specific literature (Beecham et al., 2008; França et al., 2020), making the instrument highly appropriate for this study's target population.
- *Construct Isolation.* For the present study, the KAFA's analytically distinct Supervision facet cleanly isolates the subordinate's evaluation of the manager from other work environment variables, enabling a precise evaluation of the downstream attitudinal outcomes associated with the relational processes proposed by LMX theory and Social Identity Theory (see Section 2.9), particularly the role-based moderation hypothesised in H3. Separating the subordinate's evaluation of the manager from their assessment of other job elements, such as the work itself or pay, is therefore essential for testing H3.
- *Psychometric Properties.* Haarhaus (2016) established sound factorial, convergent, and discriminant validity and excellent internal consistency across two heterogeneous German samples.

Taken together, these criteria operated as a decision framework rather than a post-hoc justification. The KAFA was the only candidate instrument that simultaneously satisfied all five, whereas each rival failed at least one: the ABB on respondent burden, the SAZ on validated facet structure, the COPSOQ on construct focus, and the translated GJSS on the depth of documented German validation (see Tables 2.3 and 2.4).

2.7 Job Satisfaction in the Information Technology Sector

The IT profession occupies a distinct socio-technical environment that elevates talent retention to a primary business priority. Within this environment, the immediate manager emerges as the central determinant of an IT professional's job satisfaction, a finding that situates the core research problem directly within the long-standing industry debate over the relative importance of a manager's technical versus managerial competence.

2.7.1 IT Profession's Unique Context

Recent attitudinal data reveal that the macroeconomic talent deficit (Section 1.1) is mirrored at the level of individual IT professional satisfaction. The situation in Germany is particularly concerning when placed in an international context. The largest global survey of software developers found that German developers reported the lowest job satisfaction (19%) among the top responding countries, lagging significantly behind nations such as the United States (29%) (Stack Overflow, 2025). This low satisfaction creates an attrition risk: the same study found a record-high turnover intention, with 35% of German IT professionals considering a job change in the next six months (Stack Overflow, 2025). Understanding the drivers behind these severe turnover intentions requires moving beyond macroeconomic statistics to the unique characteristics of IT work itself.

The retention problem reflects socio-technical features that set IT apart from other knowledge work. Chief among them is the rapid pace of technological change, which creates a constant risk of skill obsolescence and necessitates a commitment to continuous learning (Agada, 2013; Prommegger et al., 2020). This cycle of rapid obsolescence and continuous upskilling is coupled with the prevalence of project-based work. Such project-based structures can build stronger loyalty to a specific project or team, often superseding attachment to the employing organisation as a whole (Agada, 2013). Traditional career paths have become increasingly blurred, giving rise to "hybrid" roles that demand a mixture of both technical and managerial competencies (Jiang et al., 2020; Prommegger et al., 2020).

The general satisfaction-turnover link has been specifically replicated within IT populations. Agada (2013) and Oosthuizen et al. (2019) confirmed a consistent negative relationship between job satisfaction and the intention to leave an organisation among IT professionals. The negative satisfaction-turnover link persists even in a competitive labour market where external pull factors, such as unsolicited job offers, are common. Within this competitive labour market, the internal push of dissatisfaction outweighs the external pull of unsolicited offers as a driver of turnover intention (Agada, 2013). Retention, in other words, is largely an internal problem that organisations can materially influence by cultivating a satisfying work environment.

2.7.2 The Manager as the Central Factor in IT Job Satisfaction

While numerous factors contribute to the overall work environment, the literature increasingly points to the immediate manager as the primary predictor of an IT professional's job satisfaction. Beecham et al. (2008) and Storey et al. (2021) converged on the same conclusion from different datasets: the retention challenge identified in Section 2.7.1 narrows to a single, actionable organisational factor, specifically the attributes and behaviours of the direct supervisor.

2.7.2.1 Empirical Evidence for the Primacy of the Manager

On the question of what keeps software engineers engaged and in post, systematic reviews point to one answer: the immediate manager. Across 92 software engineering studies, "Good management", encompassing senior management support, team-building, and good communication, emerged as one of the most frequently cited motivators (Beecham et al., 2008, Table 8). That primacy persists in contemporary environments: across 44 distinct determinants of developer satisfaction, "Having a good manager" ranked first overall (Storey et al., 2021, p. 2132).

The "Manager" factor ranks highest and has a wide reach: a negative appraisal of the manager correlated with dissatisfaction across 15 further operational dimensions (Storey et al., 2021). No other single factor exhibits comparable secondary effects. The manager appears to amplify or dampen the subordinate's wider work experience, ranking first among organisational predictors of IT professional satisfaction.

Yet the "Manager" factor remains a broadly defined construct. As currently operationalised in the literature, it encompasses a heterogeneous mix of interpersonal behaviours, such as recognition, feedback provision, and goal clarity, alongside less clearly defined attributes such as domain-specific expertise and technical credibility. Conflating these distinct managerial dimensions into a single undifferentiated construct limits both theoretical precision and practical applicability. The primary literature reflects this analytical imprecision: Beecham et al. (2008) acknowledged a "conflicting and partial picture" (p. 860) of what motivates software engineers, and no consensus has emerged on which managerial attributes and behaviours are most effective. Storey et al. (2021) ranked the manager as the primary factor predicting satisfaction, yet they left the technical-credibility threshold required of that manager undefined. This lack of consensus may reflect the distinct role expectations held by different types of subordinates, a concept examined through this study's Social Identity framework (see Section 2.9.5). What remains unclear is precisely why managers matter.

The broader literature on IT job satisfaction confirms the importance of factors that are directly mediated by the manager. The perception gap between developers and leadership, visible in the record-high turnover intentions and declining satisfaction levels reported in Section 2.7.1, makes the manager's mediating role more pressing. Top-down organisational initiatives alone do not resolve this and must be complemented by bottom-up, developer-led approaches to Developer Experience (DevEx), a discipline that "focuses on the lived experience of developers and the points of friction they encounter in their everyday work" (Noda et al., 2023, p. 44). Such bottom-up approaches rely on a manager with sufficient technical literacy to interpret and act on developer feedback, placing the immediate supervisor at the centre from a practice-oriented perspective.

Organisations that empower individual teams to tackle Developer Experience (DevEx) improvements "transform at a much faster rate than top-down efforts alone would achieve" (Noda et al., 2023, p. 49). How quickly such transformation actually occurs depends on the immediate supervisor's capacity to coordinate these bottom-up initiatives. Such bottom-up approaches are highly effective for diagnosing socio-technical incongruence and pinpointing extraneous cognitive load, dimensions that

empirical research confirms significantly impact developer, team, and organisational outcomes (Forsgren et al., 2023). One such approach is friction logging, a practice enabling engineering teams "to track and improve upon issues that users experience" while using a product (Bifulco & Gerard, 2022, What Is a Friction Log? section). Originally a product quality assurance tool, friction logging has been adopted within DevEx programmes as a structured, bottom-up feedback mechanism through which developers systematically document the extraneous cognitive frictions they encounter in their daily work environment.

To coordinate bottom-up improvement initiatives, formally recognised Developer Experience (DevEx) teams or champions are increasingly used. As Atlassian (2025) observed, these teams are "uniquely positioned to bridge the gap between leadership and engineering, helping surface real pain points and prioritize solutions" (p. 14). These bottom-up approaches require a specific managerial precondition: the immediate supervisor must be sufficiently technical to interpret developer-generated friction logs and push for the implied architectural or process improvements. On this point, the DevEx literature connects directly with the managerial-competence question examined in Section 2.8; the specific organisational instruments through which this principle can be operationalised are discussed in Section 5.8.3.

Table 2.5 synthesises the key drivers of satisfaction, including psychological safety, autonomy, clear goals, recognition, and feedback, all of which fall directly within the manager's sphere of influence.

Table 2.5

Key Factors Influencing IT Professional Job Satisfaction and Developer Experience, by Factor Category

Category	Specific Factor/Motivator	Description	Key Supporting Studies
Collaboration and Culture	Psychological Safety	The perception that one can take interpersonal risks without fear of negative consequences.	Cerqueira et al. (2025), Greiler et al. (2023)

Category	Specific Factor/Motivator	Description	Key Supporting Studies
	Supportiveness and Knowledge Sharing	An environment where colleagues are helpful, and knowledge is shared openly.	Greiler et al. (2023)
	Good Communication	Clear, proactive, and effective communication within the team and from leadership.	Beecham et al. (2008), Cerqueira et al. (2025)
Developer Flow and Fulfilment	Autonomy	The degree of freedom and discretion an employee has in deciding how to accomplish their tasks.	Bhuiyan and McKinzie (2025), Greiler et al. (2023), Jeon et al. (2012)
	Challenging and Meaningful Work	Work that is stimulating, allows for the use of a variety of skills, and is perceived as significant.	Beecham et al. (2008), Bhuiyan and McKinzie (2025)
	Making Progress without Obstacles	The ability to work without being impeded by technical or procedural roadblocks.	Graziotin et al. (2017), Greiler et al. (2023)
Management and Leadership	Recognition and Feedback	Receiving appreciation for good work and getting regular, constructive feedback on performance.	Beecham et al. (2008), Cerqueira et al. (2025), Jeon et al. (2012)
	Clear Goals and Requirements	Having a clear understanding of task objectives, scope, and requirements.	Cerqueira et al. (2025), Greiler et al. (2023)
	Career Development Opportunities	Having opportunities for professional growth, learning new skills, and discussing career progression.	Cerqueira et al. (2025), Gribanova and Abeltina (2019)
	Work-Life Balance	The ability to maintain a healthy equilibrium between professional and personal life.	Jamal et al. (2021), Jeon et al. (2012), Oosthuizen et al. (2019)

A deeper theoretical analysis reveals that many of these manager-mediated factors identified in the IT-specific literature represent contemporary manifestations of the core job dimensions specified in Hackman and Oldham's (1976) seminal Job

Characteristics Model (JCM; Section 2.3.2.1). For instance, the emphasis on "Autonomy" and "Recognition & Feedback" in the IT context directly corresponds to the JCM's dimensions of Autonomy and Feedback. Similarly, the need for "Challenging & Meaningful Work" is a clear reflection of the JCM's principles of Skill Variety, Task Identity, and Task Significance, which collectively contribute to the experienced meaningfulness of work (Hackman & Oldham, 1976). This correspondence indicates that the IT-specific satisfaction factors are context-specific expressions of the JCM's universal dimensions. The underlying psychological mechanisms of job satisfaction therefore remain consistent even within the IT profession's distinctive socio-technical environment.

The pervasive demand for flexible working arrangements, a defining feature of the IT labour market, adds weight to the manager's mediating role. A total of 43% of German companies reported that their inability to meet applicants' expectations for mobile working is a primary cause of unfilled IT vacancies (Bitkom e.V., 2026). In such remote or distributed settings, the manager often becomes the primary, and sometimes only, consistent conduit for organisational culture, support, and communication (Jamal et al., 2021; Russo et al., 2024). Remote and distributed working makes a manager's ability to maintain trust and demonstrate organisational fairness increasingly consequential (Colquitt, 2001).

Traditional research on IT leadership has often focused on categorising broad leadership styles, such as transformational or transactional leadership (Westlund, 2011). However, the substance of a manager's day-to-day interactions appears more critical to software practitioners than adherence to a specific, named leadership style. Interpersonal fairness, defined as the degree to which an employee feels treated with dignity and respect by the manager, exerts the largest positive influence on job satisfaction in the IT sector (Sesari et al., 2026). The centrality of interpersonal fairness requires identifying which attributes actually enable a manager to act fairly in a technical setting. Although fairness is not a primary variable in the tested model, perceptions of fairness are downstream of the investigated trust and LMX dynamics, making equity and organisational justice a relevant secondary perspective.

2.7.3 The Technical versus Managerial Competence Debate

The manager's central role opens a long-standing debate within the IT industry: what is the optimal blend of competencies for an effective IT manager? This tension is rooted in the historical conceptualisation of IT careers along a dual-track, grounded in the theory of career anchors. Early research into this dynamic by McMurtrey et al. (2002) empirically established this dual-track career model, distinguishing between technical and managerial orientations. Their study set a clear empirical precedent for person-environment (P-E) fit interaction models in IT job satisfaction, demonstrating that the impact of an individual's career orientation on their satisfaction is significantly moderated by their specific technical work environment.

This contextual dependency brings into focus the central tension in IT leadership: the relative importance of a manager's technical versus managerial competence. More recent research has directly addressed this tension by examining the impact of both on the job satisfaction of IT professionals. Core management skills can outperform technical proficiency as direct predictors of job satisfaction. In Zolbanin and Sarathy's (2014) study, a manager's ability to make effective use of team skills and represent the team to senior leadership was a significant predictor, while direct IT competence had no significant independent effect in the presence of strong managerial skills. This null result for direct technical effects contradicts a widespread belief in the engineering community that technical credibility is a managerial prerequisite, so the empirical record and industry intuition diverge on this point. Industry practitioners consider technical credibility essential for a manager to earn team respect, communicate effectively on technical matters, and make informed decisions.

The modern IT environment, with its increasingly hybrid roles, complicates this dichotomy. Research by Jiang et al. (2020) found that while a purely managerial role was associated with the highest career satisfaction among experienced IT professionals, a moderate blend of technical and managerial demands emerged as a strong secondary preference. This preference pattern validates the concept of the successful "hybrid" manager and suggests that the relationship between technical and managerial demands is not a simple zero-sum trade-off.

Jiang et al.'s (2020) validation of the hybrid role suggests that the effect of a manager's technical skill may be more indirect than previously understood. Technical competence may not be a significant direct predictor of job satisfaction when strong managerial skills are present. This thesis argues instead that technical skill acts through a different psychological pathway: trust and the resulting satisfaction of basic psychological needs, which has received little attention in the IT context. Technical competence is treated here as a foundation that allows managerial skills to take effect and earns the respect needed for a positive leader-member relationship.

This unresolved tension between the empirical evidence for the pre-eminence of managerial skill and the persistent industry belief in the necessity of technical credibility leads to the central inquiry of this thesis. To answer it, the study tested formal hypotheses concerning the direct, predictive, and moderated effects of a manager's perceived programming skill. The outcomes of interest were overall IT professional job satisfaction and, specifically, the satisfaction with supervision facet.

2.8 The Manager's Technical Competence

2.8.1 From Managerial Style to Technical Competence

Generic leadership styles and broad process factors cannot account for the empirical centrality of the immediate manager, a finding confirmed across multiple studies. A more granular analysis of specific, tangible managerial attributes is required.

The persistent threat of severe institutional knowledge loss through IT staff attrition (Westlund & Hannon, 2008; see Section 1.1) demands an investigation into the specific managerial attributes driving retention. This need is reinforced by research showing that using a formal Software Development Methodology (SDM) had no statistically significant direct relationship with overall job satisfaction, whereas leadership style did (Burchell, 2011).

However, even the study of leadership styles provides an incomplete picture. For instance, a study of software developers by Westlund (2011) found that while transactional styles like contingent-reward and active management-by-exception were significantly related to job satisfaction, the components of transformational

leadership were not significant predictors when controlling for other factors. This lack of predictive power suggests that broad stylistic labels are insufficient and points to the need to investigate more fundamental managerial attributes.

The greater weight of tangible over abstract managerial competencies receives empirical support from recent research by Rachmawati and Suyatno (2021). In a study examining the effect of school principals' competencies on teachers' job satisfaction and work commitment, the researchers found that a principal's tangible, observable competencies, notably their interpersonal and technical competence, were significant, positive predictors of both outcomes. The researchers also found that the principal's conceptual competence had no significant effect on either job satisfaction or work commitment. Rachmawati and Suyatno's (2021) finding revealed a pattern of subordinate psychology: employees' attitudes are shaped primarily by the tangible, daily realities of their interaction with a manager. A subordinate directly experiences their manager's technical guidance (or lack thereof) and interpersonal treatment. A manager's abstract strategic vision or "conceptual competence" operates at a level of remove. Subordinates do not directly observe this conceptual competence. The fact that this principle holds true in a completely different domain strengthens its generalisability and suggests that the primacy of tangible competence is a universal aspect of leader-follower dynamics that extends across professional domains. Thite (2000) reached a compatible conclusion in an earlier study, reporting that combining transformational and technical leadership behaviours augments transactional leadership and leads to higher project success. These findings directly challenge the common counterargument that a manager's strategic vision supersedes their domain-specific skills.

Although tangible, domain-specific competence appears to matter more than abstract managerial attributes, the academic study of IT leadership has largely overlooked it.

The dominance of generic leadership models limits their application to knowledge-intensive domains like software development. Using broad labels such as transformational or transactional, research assesses process facilitation but ignores actual domain knowledge.

Two parallel forces in corporate practice account for the concentration on leadership styles: the ideology of managerialism and the Agile paradigm shift. Between them, these forces created the technical leadership vacuum described in Section 1.2.1 and pushed domain-specific competence out of corporate promotion criteria and out of the scholarly agenda.

The first force, managerialism, is the corporate ideology holding that management is a universally transferable skill independent of domain-specific expertise (Klikauer, 2013; Parker, 2002). Under this doctrine, the capacity to administer budgets, conduct performance reviews, and facilitate meetings is deemed sufficient for leadership, regardless of whether the manager comprehends the substantive work their team performs. Applied to the IT sector, this ideology legitimises appointing managers with no software development background to lead teams of highly specialised software engineers. Appointing non-technical managers over specialised engineers is the source of the identity threat examined in this thesis.

The second force is the Agile paradigm shift. Under the traditional sequential development model commonly known as Waterfall, the project manager occupied a singular point of both administrative and technical authority, with technical competence embedded as a managerial prerequisite (Royce, 1970). The corporate adoption of Agile frameworks dismantled this unified role. Scrum decomposes project leadership into distinct accountabilities: the Product Owner who determines what the team builds and the Scrum Master who facilitates how the team works. Neither role requires programming expertise (Schwaber & Sutherland, 2020). When organisations scaled Agile through enterprise frameworks (Nerur et al., 2005), this disaggregation was further formalised: technical decisions were routed to dedicated architect roles, while day-to-day team management defaulted to process-oriented functions carrying no built-in technical mandate.

The key consequence was the creation of a technical leadership gap. The Waterfall-era engineering manager, combining administrative authority with technical credibility, had no direct equivalent in the Agile role taxonomy. In practice, HR departments addressed this leadership gap by creating Delivery Manager positions defined almost exclusively by process facilitation competence. The resulting disaggregation of technical authority converged with the managerialist ideology. If

management is viewed as a generic, transferable skill, and Agile frameworks have formally separated technical decisions from managerial authority, the institutional rationale for requiring IT managers to possess programming competence disappears.

What this thesis terms the Generalist Assumption emerged directly from this historical alignment between managerialist ideology and the organisational architecture of Agile at scale. Though the assumption originated in the engineering community, the phenomenon now extends across corporate governance structures. This entrenched reliance on generic management credentials introduces the risk described by Peter and Hull (1969) as the "Peter Principle." In hierarchical organisations, employees tend to be promoted on the basis of competence in their current role until they reach a level at which they are no longer competent. Applied to the IT sector, the Principle predicts that promotion criteria based on credentials routinely place individuals lacking domain-specific expertise into technical leadership positions, institutionalising the very leadership deficit analysed earlier in this section. Removing domain competence from the formal criteria for IT management appointments has, at the same time, removed it from the scholarly agenda.

Ignoring domain competence is not a harmless simplification; it imposes real analytical costs. Where substantive knowledge is a precondition for credible guidance, leadership models that divorce style from expertise explain very little. Confronting this gap requires shifting the analytical focus from generic leadership styles to specific technical capabilities, rigorously testing the Szczepanski Proposition (Szczepanski, 2017; see Section 1.5.2). Empirically evaluating this proposition determines whether domain-relevant technical competence is a necessary antecedent to effective leadership behaviours and positive team outcomes in IT contexts.

2.8.2 The Mechanism of Influence: How Technical Skill Becomes Expert Power

To understand how a manager's technical skill influences their team, it is necessary to first establish the core mechanism of leadership influence: social power. Within

this framework, a manager's technical competence is converted into expert power, a form of influence particularly effective in knowledge-work contexts.

2.8.2.1 Position vs. Personal Power

Managerial influence is an exercise of social power. The seminal work of French and Raven (1959) establishes an enduring taxonomy that categorises social power into five bases. These five bases are broadly grouped into two forms: *Position Power*, which is derived from a formal role within an organisation and includes legitimate, reward, and coercive power; and *Personal Power*, which is derived from an individual's own attributes and includes expert and referent power. Legitimate power stems from one's formal title, reward power from the ability to provide positive outcomes, and coercive power from the ability to punish. Referent power differs: it rests on interpersonal appeal and charisma, while expert power is granted to an individual based on their perceived knowledge and skills.

2.8.2.2 Why Personal Power Prevails in IT

All managers possess some degree of position power, but its effectiveness is context-dependent. In knowledge-work environments, such as software development, where employees are highly skilled and value autonomy, personal power is a more effective source of influence. Subordinates' task commitment and ratings of managerial effectiveness relate significantly more strongly to a leader's personal power than to their formal position power (Yukl & Falbe, 1991). A manager's personal attributes, including technical competence, matter far more for generating positive outcomes than hierarchical authority alone.

2.8.2.3 Leader Credibility

The link between a manager's attributes and their ability to wield personal power is their perceived credibility. However, while the term is widely used, the construct's academic conceptualisation has been historically inconsistent. A systematic literature review by Williams et al. (2023a) found that the construct of leader credibility has a "murky framework" (p. 1751) and lacks a consistent definition across the literature, often being conflated with related concepts such as trust. To address this gap, Williams et al. (2023b) synthesised 66 peer-reviewed articles to develop a clear, evidence-based model for building leader credibility. Their model proposes that

credibility is built upon two core dimensions: Competence and Character. Particularly relevant for this thesis, the Competence dimension is specified as being composed of three sub-dimensions: interpersonal competence, leader competence, and technical competence. The model draws a direct, theoretically grounded link between a manager's demonstrable technical skills and the development of their overall credibility.

2.8.2.4 Expert Power as a Function of Technical Credibility

Expert power was originally defined as the social influence granted to an individual based on others' perception that they possess superior knowledge and skills in a relevant domain (French & Raven, 1959). While this seminal taxonomy provides the historical foundation for understanding managerial influence, its original constructs remain highly relevant today. Methodological evaluations such as Wood's (2013) comparative analysis have demonstrated that French and Raven's unfragmented five-factor model remains empirically sound. The model also predicts global social power more effectively than later, more complex taxonomic revisions. Contemporary scholarship continues to refine and validate its role in modern, knowledge-intensive environments (Lachmi et al., 2025; Savolainen, 2021). For instance, Raven et al. (1998) advanced the original framework into a power/interaction model, explicitly categorising expert power as a highly effective "soft" power base. Unlike "harsh" or coercive bases of positional power, soft bases such as expert power facilitate deeper, internalised changes in a subordinate's cognitive structure. The subordinate genuinely believes the leader's guidance is correct, resulting in a more stable and independent form of influence (Raven et al., 1998). More recently, Savolainen (2021) reaffirmed that expert power primarily manifests when targets rely on their faith in the superior, domain-specific knowledge of the influencing agent.

This form of power is a relational construct that followers attribute on the basis of perceived expertise. A formal hierarchical title alone cannot generate expert power. Expert power is a direct outcome of leader credibility. In a systematic review of leader credibility antecedents, Williams et al. (2023b) identified technical competence as the fundamental prerequisite for establishing leadership credibility, defining this construct to encompass professional experience, a track record of success, and expert knowledge. By demonstrating this domain-specific competence,

a manager establishes the foundation required for teams to willingly grant them expert power.

The potency of this dynamic is theoretically formalised in the Theory of Expert Leadership (TEL). TEL holds that organisations perform substantially better when led by individuals possessing "inherent knowledge", a combination of deep technical expertise and high ability in the core business activity that cannot be substituted by generalist managerial competence alone (Goodall, 2012, p. 2). Empirical evidence across diverse sectors supports the proposition. In the fast-moving, highly technical environment of Formula One racing, constructor teams led by former racing drivers, those possessing the deepest core-business expertise, systematically outperform teams led by engineers or general managers (Goodall & Pogrebna, 2015). Artz et al. (2017) corroborated TEL's central tenet across multiple datasets, with a manager's domain-specific expertise emerging as the dominant empirical predictor of subordinate job satisfaction, a finding examined in full methodological detail in the following section. Taken across these very different sectors, expert leaders who understand the core work of their subordinates produce tangible positive effects.

Empirical evidence across several field studies supports the sequence linking a manager's competence to expert power and subsequent positive subordinate outcomes. A systematic critique of major field studies applying French and Raven's (1959) framework found "clear and unambiguous" evidence connecting expert power to satisfaction with supervision (Podsakoff & Schriesheim, 1985, p. 393). Every reviewed study obtained positive relations. Using a national random sample of 476 managers across more than 45 industries, Rahim (1989) corroborated these findings with the psychometrically rigorous Rahim Leader Power Inventory (RLPI). This analysis established expert power as a significant positive predictor of supervisory satisfaction ($\beta = .18$) even after controlling for demographic and job-related variables. Expert and referent power, the two personal power bases, accounted for the majority of the 46% unique variance explained.

Among first-tier engineering supervisors, subordinate-rated technical skill significantly predicted attributions of expert power and mediated positive subordinate outcomes, whereas the supervisor's educational degree added no significant

explanatory value (Hysong, 2008). Observed competence drives the attribution of expertise; formal credentials do not.

The primacy of perceived expertise is reinforced by Worley and Teplitz (1993), who found that both project managers and project personnel in technically staffed U.S. matrix organisations rated expertise as the single most helpful source of influence for project success, significantly surpassing formal authority. These empirical findings converge with Goodall's (2012) Theory of Expert Leadership: a manager's functional technical proficiency produces actionable expert credibility.

The reliance on expert power is particularly evident among highly qualified knowledge workers. For example, in an empirical investigation of science research professionals, a highly technical cohort analogous to software developers, Meng et al. (2014) found that subordinates perceived expert power as the most frequently exercised leadership base, surpassing legitimate positional power. Meng et al. (2014) demonstrated that expert power was significantly and positively associated with both behavioural compliance and satisfaction with supervision ($\beta = .21$, $p = .037$). This result converges with the general findings of Podsakoff and Schriesheim (1985) and Rahim (1989) within a domain-specific technical context. In highly technical environments, then, a manager's domain-specific expertise forms the primary basis of influence (Meng et al., 2014).

This reliance on expert knowledge is further echoed in professional consulting dynamics, where Lachmi et al. (2025) confirmed that expert power is the most dominant and influential power base, significantly outperforming identity-based referent power in enhancing a follower's self-efficacy. Similarly, in internal team dynamics, Issac et al. (2023) found that employees operating under leaders with strong expert power are more likely to engage in knowledge sharing, a critical behaviour for team success. Across these studies, a manager's technical competence emerges, via its contribution to credibility, as the primary basis of expert power. In addition to generating social influence, such competence is a prerequisite for the core functions of leadership in a technical domain, as the next section shows.

2.8.3 Why Technical Competence is Essential for Leadership

A manager's technical competence provides a source of influence and is required for the core function of leadership in a technical domain. This consistency of findings reframes the question from one of employee preference to one of leadership effectiveness: without domain-specific skill, a manager cannot exercise the problem-solving capabilities that complex software development demands.

2.8.3.1 A Skills-Based View

A skills-based model of leadership argues that effective leadership is essentially a process of solving "novel, ill-defined problems with which people are presented in organisational leadership roles" (Mumford et al., 2000, pp. 156-157). This perspective shifts the focus from a leader's style to their capabilities, including problem-solving skills, solution construction, and social judgement. In a technical context like software development, exercising these core problem-solving skills is impossible without relevant domain knowledge. As Ziccardi (2018) argued, a manager with little hands-on experience lacks the necessary skills to realise the full implications of technical decisions, such as adopting a new language or communicating the impact of technical debt to non-technical stakeholders. Without this deep knowledge, the manager is reduced to "repeating what someone else said, without having the real knowledge to support your position" (Ziccardi, 2018, para. 10).

Generative AI coding assistants make this requirement more demanding. They promise sizeable productivity gains in software engineering, but their adoption also creates serious socio-technical difficulties. Raw speed gains initially drove optimism surrounding generative AI. Access to GitHub Copilot reduced task completion time by 55.8% in a controlled experiment, disproportionately benefiting less experienced and older developers (Peng et al., 2023). As the original researchers cautioned, "AI assistance can increase code quality if it suggests code better than the programmer writes, or it can reduce quality if the programmer pays less attention to code" (Peng et al., 2023, p. 8).

A broader evaluation that looks past raw speed reveals a different picture. Applied through the multidimensional SPACE framework, the evidence revealed a

"productivity paradox", where generative AI accelerates individual task execution without generating meaningful improvements in software quality, satisfaction, or team collaboration (Afroz et al., 2025). Novel cognitive frictions explain the paradox. Integrating AI introduces an "underestimated overhead" of time-intensive hallucination correction and complex prompt engineering, risking a decline in critical effort where developers become "cognitive misers" (Banh et al., 2025, p. 10).

Choudhuri et al. (2025) validated and extended these findings, demonstrating that developers face a severe "verification burden" (p. 20) alongside persistent challenges with "goal maintenance"(p. 19), the sustained cognitive effort required to keep AI-generated outputs aligned with overarching task objectives. Empirical analysis indicated that AI-assisted development introduces significant adverse effects on code maintainability by markedly increasing code churn and duplicated logic (Harding & Kloster, 2024). Additionally, controlled experiments have demonstrated that AI coding assistants frequently generate code containing exploitable security vulnerabilities (Pearce et al., 2022). The cognitive burden in software engineering is shifting from code creation to code evaluation.

The organisational cost of these cognitive frictions is already quantifiable. An extensive industry survey by Atlassian (2025) reported that 90% of developers lose at least six hours per week to organisational inefficiencies. The principal sources of friction are information seeking, the adoption of new technology, and context switching between tools. In monetary terms, an average loss of 10 hours equates to "a loss of $7,917,000 annually for a company with 500 developers" (Atlassian, 2025, p. 8). At a deeper level, these productivity losses reflect a systemic misalignment between the cognitive demands of AI-augmented development and the organisational structures governing software development. This gap between cognitive demands and organisational governance widens when AI tools are deployed top-down without technically informed governance, which strengthens the case for managerial programming competence in the generative AI era.

These cognitive frictions carry a specific implication for the managerial competence argument. As AI tools increasingly act as what Paz (2025) characterised in the report's title as an "army of juniors", producing high volumes of functional but architecturally unverified code, the manager's role shifts from overseeing syntax to

governing architectural integrity. A manager lacking programming competence cannot effectively review AI-assisted code for subtle security vulnerabilities (Pearce et al., 2022). Nor can they identify architectural maintainability issues, such as the increased code churn and Don't Repeat Yourself (DRY) violations empirically associated with AI-generated outputs (Harding & Kloster, 2024). Such non-technical managers cannot credibly provide the competence-affirming feedback required by SDT when mentoring junior developers, who may place uncritical trust in generative tools. This tendency towards uncritical trust risks accelerating the cognitive decline and skill erosion emergent from unmanaged generative AI reliance (Banh et al., 2025; Choudhuri et al., 2025).

Practitioner observations directly confirm the shift from code creation to code evaluation. In a survey of experienced software engineering professionals, de Campos et al. (2024) found that although respondents anticipated generative AI would augment coding speed and process quality, they consistently identified human expertise, creativity, quality assurance, and project management as the domains least likely to be transformed. These higher-order cognitive activities remain heavily dependent on human judgement. Generative AI shifts managerial technical skill from a matter of subordinate preference to a component of organisational risk management.

The functional necessity of managerial competence receives strong empirical validation from the personnel economics literature, which directly links managerial competence to both worker productivity and well-being. Demonstrating the scale of the impact on work efficiency, Lazear et al. (2015) analysed over 5.7 million worker-day observations. The researchers found that "[r]eplacing a boss who is in the lower 10% of boss quality with one who is in the upper 10% of boss quality increases a team's total output by more than adding one worker to a nine-member team would" (p. 823). The variance in boss effects markedly exceeded the variance in individual worker effects (Lazear et al., 2015).

Complementing this output-oriented evidence, Artz et al. (2017) demonstrated that these competence effects extend to subordinates' subjective well-being. Across seven different forms of evidence drawn from U.S. and British datasets, they found

that "a boss's technical competence is the single strongest predictor of a worker's job satisfaction" (Artz et al., 2017, p. 419).

The competence-satisfaction relationship holds even under fixed-effects estimation, that is, when the same worker is observed before and after a change in supervisor, ruling out stable personality traits as a confound (Artz et al., 2017). The sensitivity analyses conducted by Artz et al. (2017) also revealed that the strength of this relationship varies across workers and workplace contexts. Table 7 of their study found mild evidence that the marginal effect of supervisor competence on job satisfaction may be larger for older employees.

The competence effect also holds for both small and large firms, with a slightly elevated coefficient for smaller establishments. Artz et al.'s (2017) moderation evidence therefore provides a direct, data-grounded justification for this thesis's inclusion of moderating variables, specifically age (H4a) and company size (H4c), to model the boundary conditions of the core relationship accurately. Furthermore, recent industry data from Bitkom underscores the acute practical relevance of these specific factors within the German IT sector, where small enterprises face disproportionate market pressures and the retention of older professionals has become a macroeconomic priority.

2.8.3.2 Empirical Validation

A leader's technical proficiency does not exist in isolation; it actively promotes positive, value-creating behaviours in subordinates. In high-tech telecommunication firms, a leader's technical competence exhibited a significant positive relationship with subordinates' innovative work behaviour and learning work behaviour, with learning behaviour partially mediating the innovation pathway (Minh et al., 2017). The mediation finding is instructive: a manager's domain expertise stimulates the continuous learning that, in turn, enables the team's capacity to innovate.

2.8.4 The "Technical Enough" Hybrid Manager

The argument for managerial technical competence requires qualification to remain grounded in organisational reality. The argument must withstand two potential counter-arguments: first, that it creates a false dichotomy between technical and

managerial career paths; and second, that it sets an impossibly high standard requiring managers to be the foremost technical experts on their teams.

2.8.4.1 The Viability of the Hybrid Manager

The historic IT career model, offering a binary choice between a purely technical and a purely managerial track, is now outdated. Modern IT work, particularly in project-based and agile environments, places mixed demands on professionals. Empirical evidence challenges the assumption that mixed roles are by their nature unsatisfying. Jiang et al.'s (2020) finding that a moderate blend of technical and managerial demands is a viable and satisfying configuration confirms that the simplistic technical-versus-managerial dichotomy is insufficient.

2.8.4.2 Sufficiency, Not Supremacy

Arguing for a technically competent manager emphasises meeting a sufficient competence threshold, without requiring the manager to be the most skilled programmer on the team. High-profile industry evidence supports this concept. Google's "Project Oxygen" initiative is particularly instructive. As Garvin (2013) documented, Google, a company whose engineering culture was deeply sceptical of the value of managers, undertook a rigorous, data-driven research programme to determine whether managers actually mattered. The conclusion was unequivocal: they did. Among the eight key behaviours identified for effective managers, one was explicitly technical. The attribute's specific phrasing, "key technical skills that help him or her advise the team" (Garvin, 2013, p. 78), emphasises advisement and support over superior technical execution. Similarly, a large-scale study at Microsoft identified that a great engineering manager is technically strong enough to help the team make informed decisions (Kalliamvakou et al., 2019), once again emphasising sufficiency over supremacy. The sufficiency threshold links directly to productivity, as a "technical enough" manager is better positioned to provide "useful feedback about job performance". Murphy-Hill et al. (2021, p. 589) found this factor to be one of the top three most consistent and statistically significant predictors of developers' self-rated productivity across three different companies.

The effect of the technically sufficient manager extends beyond direct reports to the psychological climate and safety of the team.

2.8.5 Enabling Psychological Safety

A manager's competence is strongly associated with psychological safety, an outcome of particular importance for knowledge-work teams. A manager's technical skill is closely tied to their ability to cultivate a climate in which team members feel safe taking the interpersonal risks necessary for learning and innovation.

Team psychological safety is "a shared belief held by members of a team that the team is safe for interpersonal risk taking" (Edmondson, 1999, p. 350). Psychological safety is a climate of interpersonal trust and mutual respect where members feel comfortable speaking up, admitting mistakes, or asking for help without fear of embarrassment or punishment. Baskin (2023) described the construct as "mission critical in today's work environment" (para. 3) because psychological safety enables the learning behaviours that lead to higher performance (Edmondson, 1999; Edmondson & Lei, 2014).

Among these factors, leadership behaviour has been identified as the strongest single predictor in empirical work. Research by McKinsey found that the immediate leader has the strongest influence, with supportive and consultative leadership behaviours being the most effective in creating a positive climate (De Smet et al., 2021).

In a technical domain, a manager's ability to enact the key supportive and consultative behaviours is contingent on their technical competence. A manager without technical understanding cannot be genuinely supportive when a team member faces a technical roadblock, as their advice would lack credibility. Such managers cannot be truly consultative on technical decisions if they cannot grasp the trade-offs being discussed. A challenge from a non-technical manager can be perceived as uninformed pressure, creating an "anxiety zone", whereas the same challenge from a technically credible manager is more likely to be seen as a constructive effort to improve quality, creating a "learning zone" (De Smet et al., 2021, p. 6). By being able to ask insightful questions and even admit the limits of their own knowledge, the technically competent leader actively models the very vulnerability and learning behaviour that defines a psychologically safe environment (Baskin, 2023; Edmondson, 1999).

2.8.6 Anchoring Professional Identity and Driving Retention

A manager's technical competence also operates at a higher-order psychological level, linking directly to an employee's professional identity and, as a result, their intention to stay with an organisation. Social Identity Theory, which holds that individuals derive a substantial part of their self-concept from their membership in social groups, helps explain how technical competence shapes the salience of professional identity. Research has demonstrated that IT professionals across various roles possess a uniformly high degree of professional identity, forming a powerful in-group defined by shared skills, norms, and values (Chang et al., 2012).

The specific anchor of this identity varies; while customer-facing or broader IT roles often emphasise general professionalism, Core Software Developers base their occupational identity specifically on the craft of programming (Marks & Scholarios, 2007).

A technically credible manager, who is perceived as a member of this technical in-group, validates and sustains this core professional identity. A technically incompetent manager creates a serious identity threat, challenging a core part of an employee's social identity and eliciting a state of cognitive dissonance between their self-concept as a skilled expert and the reality of reporting to an out-group member. The need to resolve this threat can create a disturbance in expected turnover patterns, providing a primary, often overlooked driver of voluntary turnover even when employees are otherwise satisfied with their jobs (Chang et al., 2012). The contemporary AI transformation of software development is actively intensifying these identity pressures. Hicks et al. (2025), in a study of 3,267 software developers and managers, introduced the construct of AI Skill Threat, the experience of identity-based anxiety provoked when developers contemplate the implications of AI for their professional roles. The severity of this threat was not predicted by experience level: senior developers reported comparable anxiety to junior developers, indicating that the identity threat operates at a fundamental professional-identity level independent of any deficit in technical confidence (Hicks et al., 2025).

The uniformity of AI Skill Threat across experience levels carries a specific implication for the present thesis. If AI-induced identity threat pervades the developer

population regardless of seniority, a technically credible manager who validates the developer's professional identity buffers the developer against the psychological impact of a period of deep occupational change. Validating professional identity is a key psychological pathway linking a manager's competence to employee retention.

2.8.7 Justifying Programming Skill as the Independent Variable

Among the various competencies that comprise IT expertise, programming skill stands out as a uniquely potent signal of a manager's underlying technical ability, a quality that makes programming skill well suited as this study's independent variable.

2.8.7.1 The "Bimodal" Debate: From Statistical Myth to Perceptual Reality

There is a long-standing observation in computer science education that programming skill does not appear to follow a normal Bell curve distribution. An influential multinational study by McCracken et al. (2001) found a "bi-modal" distribution of scores on an introductory programming task, with a surprisingly large group of students performing very poorly (p. 129). The claim was popularised by an unreviewed but widely circulated paper, "The Camel Has Two Humps" (Dehnadi & Bornat, 2006), and supported by Corney (2009) and Robins (2010).

While one of the paper's authors later issued a formal retraction (Bornat, 2014), the underlying observations and the idea of a separation of "programming sheep from non-programming goats" (Dehnadi & Bornat, 2006, p. 16) remained an area of discussion and research. Subsequent detailed statistical analysis by Patitsas et al. (2020) of 778 separate grade distributions from computer science courses found that only 5.8% were genuinely multimodal. Their conclusion is that the belief in bimodal grades is likely a form of "instructional folklore" not backed by statistical reality (Patitsas et al., 2020, p. 91).

2.8.7.2 A Theoretical Synthesis: The Potency of Programming as a Signal

Although bimodality may be a statistical myth, the perception that programming represents a uniquely difficult, threshold skill persists with substantive theoretical justification. A systematic literature review by Berssanette and de Francisco (2022) confirmed that programming is a "highly cognitive skill ... acknowledged as being difficult to learn" (p. 440). Cognitive Load Theory explains why: learning to program

imposes a high intrinsic cognitive load, driven by the intrinsic complexity of the material and the degree to which its individual elements must be processed simultaneously (Sweller, 1994; Sweller et al., 1998). Empirical evidence corroborates this account; Liu et al. (2025) found that intrinsic cognitive load was the single strongest predictor of programming success, with students in lower-load conditions achieving significantly higher scores.

Programming proficiency is often read as evidence that a person has cleared a demanding cognitive hurdle. Within the IT profession, a manager who can write code credibly signals deeper analytical ability and domain expertise to their team, a quality that makes programming skill the chosen independent variable for this study.

2.9 Theoretical Framework

A thorough explanation for the hypothesised relationship between a manager's perceived technical competence and an IT professional's job satisfaction requires an integrated theoretical architecture. The integrated framework developed here therefore adopts a "Core and Support" model. Combining both perspectives permits a more complete explanation. Self-Determination Theory (SDT) is the core theoretical perspective, explaining *what* psychological needs must be satisfied for an individual to experience well-being and high-quality motivation. Complementing this core perspective, LMX theory provides the support perspective and explains *how* the dyadic, relational process between a manager and a subordinate is the primary route by which these psychological needs are met. This integrated model is informed by secondary perspectives from Social Exchange Theory, Role Theory, Equity Theory, and Social Identity Theory, which provide underlying principles for the dynamics of the supervisor-subordinate relationship.

2.9.1 Introduction to the "Core and Support" Model

Explaining how technical competence influences job satisfaction requires linking interpersonal processes with internal psychological states. The "Core and Support" model, introduced earlier in this chapter, bridges this requirement and is positioned here against the documented scholarly gap in the SDT-LMX linkage.

Independent bibliometric evidence confirms that this integration addresses a verified conceptual gap in the scholarship. Premru et al.'s (2022) three-technique bibliometric review of the entire LMX literature observed that "self-determination theory is not very well linked with LMX" (p. 13), despite prior meta-analyses having stressed the theoretical plausibility of such a connection (Martin et al., 2016). Their co-word analysis across three time intervals (pre-1999, 2000-2009, 2010-2017) failed to detect SDT as a keyword cluster in any period, and SDT did not appear in the evolving networks of collaborating scholars that have shaped LMX scholarship. The present study's "Core and Support" model therefore addresses a documented gap in the literature.

Within this integrated framework, the three theories do not carry equal explanatory weight, and it is necessary to be explicit about the hierarchy between them. Self-Determination Theory is adopted as the core theory of this thesis, while Leader-Member Exchange Theory and Social Identity Theory serve as supporting theories. This designation follows the explanatory division of labour between the three perspectives. SDT is core because it supplies the causal account of the dependent variable: job satisfaction is theorised to arise from the satisfaction of the basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 1985), and every prediction advanced in this thesis ultimately terminates in that motivational account. The two supporting theories are, by contrast, proximate to the independent variable: they specify the relational and identity mechanisms through which a manager's perceived programming competence is theorised to reach those needs. LMX describes the dyadic exchange relationship that operates as the vehicle of need support (Graen & Uhl-Bien, 1995), and SIT explains how the subordinate's judgement of the leader's in-group prototypicality governs whether that vehicle can be established at all (Hogg, 2001; Tajfel & Turner, 1979). In short, SDT accounts for why technical competence should matter for satisfaction. LMX identifies the relational conduit through which it matters, and SIT specifies the conditions under which that conduit forms in the first place. Sections 2.9.2 to 2.9.6 develop each element of this hierarchy in turn. The theoretical contributions of the thesis (Section 5.7) are organised by the same hierarchy: the primary contribution extends the core theory (Section 5.7.2), and the secondary contribution refines the interface between the two supporting theories (Section 5.7.3).

2.9.2 Core Perspective: Self-Determination Theory (SDT)

Self-Determination Theory (SDT) is a macro-theory of human motivation, personality, and well-being that is centrally concerned with the social conditions that facilitate or hinder human flourishing (Deci & Ryan, 1985; Ryan & Deci, 2000). SDT has proven to be a well-validated and widely applied framework for understanding motivation in organisational contexts (Deci et al., 2017; Gagné & Deci, 2005).

2.9.2.1 Foundational Principles

The cornerstone of SDT is the proposition that all human beings have three innate and universal basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). These needs are innate rather than acquired and operate as essential "nutriments" for psychological growth, integrity, and well-being (Deci & Ryan, 1985, p. 121). Satisfying these needs is essential for optimal functioning, high-quality performance, and positive work outcomes, a finding strongly supported by meta-analytic evidence in the workplace (Nunes et al., 2024; Van den Broeck et al., 2016).

- The *Need for Autonomy* refers to the desire to self-organise experience and behaviour and to have an activity be congruent with one's integrated sense of self. Autonomy is the need to feel volitional, to be the author of one's own actions, and to act with a sense of choice (Deci & Ryan, 1985).
- The *Need for Competence* concerns the need to feel effective in one's interactions with the environment. Competence is the desire to exercise one's capacities and skills, to seek and master optimal challenges, and to feel a sense of mastery (Ryan & Deci, 2000).
- The *Need for Relatedness* is the need to feel connected to others, to care for and be cared for by others, and to have a sense of belongingness both with other individuals and with one's community (Ryan & Deci, 2000).

The unique characteristics of modern IT work make the satisfaction of these basic needs both especially relevant and unusually challenging. The rapid pace of technological change presents a constant challenge to the need for competence, requiring continuous learning while also creating the risk of skill obsolescence (Wong et al., 2025). The prevalence of distributed work arrangements, documented in

Section 2.7.2, further amplifies this dynamic by concentrating the subordinate's organisational contact through the immediate supervisor. In this context, the immediate manager becomes the primary agent for creating a work context that can consistently support all three needs.

2.9.3 The Manager's Role in Satisfying SDT Needs

SDT holds that the social context is the key determinant of whether an individual's basic needs are satisfied or thwarted. In the workplace, the immediate manager is the most proximal and influential aspect of that social context.

2.9.3.1 Mechanism: Creating an Autonomy-Supportive Context

The primary mechanism through which managers facilitate need satisfaction is by creating an autonomy-supportive interpersonal climate. An autonomy-supportive manager takes the subordinate's perspective, provides a meaningful rationale for tasks, offers choice, and encourages self-initiation (Deci et al., 2017).

Empirical evidence from corporate settings validates the autonomy-support mechanism. Employees' perceptions of their manager's autonomy support independently predict the satisfaction of all three basic needs: autonomy, competence, and relatedness (Baard et al., 2004). Need satisfaction subsequently functions as a direct predictor of higher performance evaluations and greater psychological well-being. An autonomy-supportive managerial style creates a need-satisfying environment that leads to positive organisational and personal outcomes (Baard et al., 2004).

2.9.3.2 Supporting Competence, Autonomy, and Relatedness

This thesis argues that a manager's perceived technical competence is a critical antecedent to their ability to enact autonomy-supportive behaviours authentically and effectively in an IT context.

A technically competent manager can deliver the credible, specific, and informational feedback needed to support a subordinate's need for competence (Halvari et al., 2021), whereas feedback from a non-technical manager may be perceived as lacking substance and failing to validate an employee's expertise (Assal et al., 2025).

Understanding the technical intricacies of the work also allows the manager to trust the team with meaningful control over implementation details, thereby supporting autonomy (Parker et al., 2001). Where such understanding is missing, managerial insecurity manifests as micromanagement and rigid process control. A shared technical vocabulary creates the basis for mutual understanding and respect, building the connection and shared identity that underpin the need for relatedness (Santana & Robey, 1995).

2.9.4 Complementary Perspective: Leader-Member Exchange (LMX) Theory

SDT explains the psychological needs that must be met. Leader-Member Exchange (LMX) theory supplies the relational framework that explains the development and quality of the supervisor-subordinate dyad, which acts as the vehicle for need satisfaction.

2.9.4.1 Theoretical Foundations: From Dyads to Relationships

LMX theory departs from traditional leadership theories that assume managers use an average leadership style with all subordinates. Instead, the theory proposes that leaders develop unique, differentiated relationships with each of their direct reports (Dansereau et al., 1975). These relationships exist on a continuum from low-quality, transactional exchanges, known as the "out-group", to high-quality, relational partnerships, known as the "in-group" (Graen & Uhl-Bien, 1995). The theory's evolution from its origins in Vertical Dyad Linkage (VDL) to a modern, relationship-based approach is grounded in the principles of role theory and social exchange (Graen & Uhl-Bien, 1995).

Integrating LMX into this framework requires specifying its level of analysis. LMX scholarship has long suffered from misalignment between the level at which LMX is theorised and the level at which it is measured (Gooty et al., 2012; Krasikova & LeBreton, 2012). Duncan et al. (1984) termed this reductionist fallacy "pseudounilaterality" (p. 1335): examining inherently dyadic phenomena from only one party's perspective and thereby missing the relational core of the interaction. In a systematic review of contemporary LMX scholarship, Krasikova and LeBreton (2012) demonstrated that "pseudo-unilaterality" (p. 741) remains pervasive, finding that only

1 of 46 studies employed genuinely dyadic analytical techniques. LMX can be conceptualised at multiple levels: as a shared, objectively verified reciprocal exchange between two parties (the dyadic level), as a group-level property of a leader's differential relationships, or as the individual follower's internal perception of the relationship's quality.

To maintain strict conceptual alignment with this study's epistemological boundaries, the present thesis treats LMX exclusively as a theoretically inferred dyadic vehicle, rather than a measured construct. The study avoids conflating this dyadic exchange with an individual-level measurement by empirically operationalising only the proximal downstream attitudinal outcome: the subordinate's satisfaction with supervision. This measurement strategy reflects the intrapersonal nature of the framework's core perspective. SDT need satisfaction is an intrapersonal psychological state (Deci & Ryan, 1985). For this reason, the subordinate's measured attitude toward the manager is the proximal downstream correlate of these unmeasured dyadic exchanges, independent of any objectively verified reciprocal dyadic reality. This clear delineation deliberately excludes the empirical analysis of perception discrepancies between leaders and followers. In this formulation, LMX functions as the unmeasured relational vehicle through which the manager's attributes are theorised to either satisfy or frustrate the subordinate's basic psychological needs. This theoretical positioning clearly separates the unmeasured dyadic exchange from the study's measurement strategy (which captures the downstream attitude, Satisfaction with Supervision), the interpretive boundaries of which are assessed in the final discussion.

2.9.4.2 Meta-Analytic Evidence: LMX Consequences

The importance of LMX quality is well-established through extensive meta-analytic research spanning nearly three decades. The seminal meta-analyses by Gerstner and Day (1997) and Martin et al. (2016) demonstrated that high-quality LMX relationships are consistently and strongly linked to critical organisational outcomes. These outcomes include higher job performance, greater job satisfaction, stronger organisational commitment, lower turnover intentions, and increased organisational citizenship behaviours (Dulebohn et al., 2012; Gerstner & Day, 1997; Ilies et al., 2007; Martin et al., 2016). Wang et al. (2005) provided direct empirical evidence that

LMX quality is a genuine mediator of these positive outcomes rather than acting as a simple correlate. Their study demonstrated that LMX mediates the relationship between transformational leadership and both followers' task performance and organisational citizenship behaviour. This finding establishes LMX as a genuine transmission mechanism by which leadership attributes produce subordinate outcomes.

These findings have been confirmed and extended by post-2020 meta-analytic research, demonstrating the continued empirical validity of LMX theory:

A meta-analysis of 61 independent samples (N = 10,193) estimated the population correlation of LMX agreement at ρ = .35 (Yuan et al., 2023), a figure remarkably consistent with the ρ = .37 reported two decades earlier (Gerstner & Day, 1997). Random-effects meta-regression established LMX agreement as a meaningful situational moderator. Conceptualised as role consensus between leaders and followers (Matta et al., 2015), LMX agreement is associated with significantly stronger LMX-task performance (b = .50, p < .001) and LMX-OCB relationships (b = .51, p = .004) for follower-reported LMX (Yuan et al., 2023).

These meta-analytic results are directly relevant to the present study, as they emphasise that the degree to which leaders and followers share a common understanding of their exchange relationship represents a key contingency for turning high-quality LMX into tangible performance outcomes.

In a parallel development, Legood et al. (2021) meta-analysed 185 independent studies to examine trust as a mediating mechanism in the leadership-performance relationship, positioning LMX quality as a competing parallel mediator. Their findings demonstrated that trust in the leader and LMX quality provide distinct mediating pathways between leadership styles and other-rated performance outcomes. This meta-analytic evidence directly supports the theoretical distinction drawn in the present framework between cognition-based trust as the entry point and high-quality LMX as the relational vehicle through which a manager's technical credibility is converted into positive subordinate outcomes.

The continued theoretical evolution of LMX scholarship is further confirmed by the exponential growth of the LMX literature, which tripled between the 2000-2009 and

2010-2017 periods (Premru et al., 2022). Trust, social exchange, and the quality of the dyadic relationship have been identified as the enduring conceptual pillars of the field.

2.9.4.3 Building High-Quality LMX Through Trust

Trust is the central process through which high-quality LMX relationships are built. McAllister (1995) made the foundational distinction between two principal forms of interpersonal trust:

- Cognition-Based Trust:
  This form rests on a rational evaluation of a partner's track record, whether, in particular, the other party has demonstrated the competence and consistency required to fulfil role-related duties (McAllister, 1995). Cognition-based trust is, in essence, an evidence-based judgement of professional dependability.
- Affect-Based Trust:
  This form goes beyond rational calculation and is rooted in what McAllister (1995, p. 25) described as "the emotional bonds between individuals", where partners "express genuine care and concern for the welfare of partners." Affect-based trust reflects a deeper interpersonal attachment characterised by mutual emotional investment (McAllister, 1995).

Perceived technical competence, this thesis argues, is the primary input to cognition-based trust within IT dyads. A subordinate who reads the manager as technically reliable has the rational grounds on which cognitive trust can form, and, in turn, on which the deeper affect-based bond can later accrete (McAllister, 1995).

The critical distinction between cognitive and affective forms of trust has received substantial meta-analytic validation. Legood et al. (2021) demonstrated that cognitive and affective trust exhibit a high intercorrelation ($\rho = .77$), yet play functionally distinct roles in the leadership-performance relationship. When examined as parallel mediators alongside LMX quality, affective trust was the only significant predictor of both task performance and OCB; cognitive trust, when entered concurrently, did not independently predict either outcome (Legood et al., 2021). The progression from cognition-based to affect-based trust is consistent with LMX development theory (Graen & Uhl-Bien, 1995): in mature dyads, the deeper affective bond ultimately

drives the performance benefits of the relationship. This meta-analytic evidence supports the developmental sequence proposed in the present framework: Cognition-based trust, formed through the rational assessment of a manager's technical competence, is the necessary precondition (McAllister, 1995) for the subsequent emergence of affect-based trust, the deeper emotional bond that ultimately unlocks the performance benefits associated with high-quality LMX.

2.9.5 The Role of Social Identity in Trust Formation and LMX Quality

The relational cycle set out in the preceding paragraph does not form in isolation. Social Identity Theory (SIT; Tajfel & Turner, 1979) clarifies why, in the IT domain, a manager's perceived technical competence is the specific attribute that provides the foundation for cognition-based trust and facilitates a high-quality LMX relationship. According to SIT, a significant part of an individual's self-concept and self-esteem is derived from their membership in social groups.

Deriving self-concept from group membership leads to a fundamental cognitive categorisation of the social world into in-groups (to which one belongs) and out-groups. The developer's programming-centric occupational identity forms a tightly defined in-group distinct from broader IT roles (Chang et al., 2012; Marks & Scholarios, 2007). For developers, this identity as a programmer, developer, or engineer forms a central in-group membership.

Within this context, a manager's perceived technical competence, particularly their programming skill, provides a primary signal of their in-group "prototypicality" (Hogg, 2001, p. 89). A prototypical group member is an individual who is seen to embody the core values, characteristics, and norms of the group (Cicero et al., 2007). A technically competent manager is therefore perceived as an in-group member, "one of us", by virtue of demonstrating shared professional competence. Viewed through the lens of Social Identity Theory, the institutional forces introduced in Section 1.2.1 and critically analysed in Section 2.8.1 (the managerialist ideology and the Agile leadership vacuum) institutionalise an out-group management structure, a consequence that goes well beyond a simple skills mismatch. By routinely appointing non-technical facilitators to lead software teams, organisations place developers under individuals who lack in-group prototypicality. Shared identity, or its absence, is

a well-documented antecedent of trust and influence. Prototypical leaders earn more trust, higher effectiveness ratings and greater latitude, because followers read their actions as serving the group (Hogg, 2001). The manager's technical skill provides a cognitive shortcut to establishing legitimacy; this skill validates them as a prototypical leader of the technical in-group, which accelerates the formation of cognition-based trust and paves the way for a high-quality LMX relationship.

Rather than a transactional exchange of expertise for performance, the link between managerial competence and subordinate satisfaction operates as a relational process founded on identity affirmation. The prominence of identity affirmation is growing with the rapid integration of generative AI into software development. Hicks et al. (2025) demonstrated that developers embedded in environments characterised by brilliance beliefs and contest cultures, where innate technical ability is valorised and ruthless competition is the norm, experience significantly elevated AI skill threat and imposterism.

Developers who report strong learning cultures and a sense of belonging show substantially lower identity threat alongside higher self-reported productivity and team effectiveness (Hicks et al., 2025). These findings support the proposed SIT account. A technically credible manager, perceived as an in-group prototype, can cultivate the learning culture and sense of belonging that buffer identity threat. A manager viewed as an out-group member instead encourages the evaluative, performance-demonstrating behaviours typical of a contest culture, feeding the identity threat linked to dissatisfaction and turnover.

2.9.6 Integrating LMX and SDT: A Model of Relational Need Support

This integrated framework proposes a clear theoretical sequence. A manager's attributes, specifically their perceived technical competence, help to build a high-quality LMX relationship, primarily by establishing cognition-based trust, a process accelerated by perceptions of in-group prototypicality. The theoretical bridge connecting these frameworks, established by Graves and Luciano (2013), showed that LMX quality directly facilitates SDT need satisfaction. The autonomy-supportive climate theorised to emerge from this high-quality relationship is the proposed proximal mechanism through which the three basic psychological needs for

autonomy, competence, and relatedness are met. The resulting need satisfaction is then theorised to predict higher job satisfaction.

Empirical evidence strongly supports the proposed LMX-SDT integration. LMX quality significantly and positively predicts the satisfaction of all three basic psychological needs (Graves & Luciano, 2013). Complementing this direct effect, trust in the leader and LMX quality are empirically distinct mediating pathways between leadership and performance outcomes (Legood et al., 2021). The independent meta-analytic support confirms that treating trust as the initial psychological anchor and LMX as the evolving relational vehicle reflects two distinct mediating processes (Graves & Luciano, 2013; Legood et al., 2021).

Graves and Luciano (2013) supplied the empirical evidence necessary to integrate SDT and LMX, directly addressing the theoretical gap identified in Section 2.9.1. Their structural equation model demonstrated a direct link between the relational quality of the leader-member dyad (LMX) and the intrapersonal psychological states that SDT identifies as the proximal precursors to well-being and high-quality motivation, that is, basic need satisfaction.

2.9.7 Secondary Perspectives

Three additional theories provide key concepts that clarify specific aspects of the supervisor-subordinate dynamic within the integrated model.

2.9.7.1 Social Exchange Theory (SET)

As the theoretical parent of LMX, SET provides the underlying logic of reciprocity (Ahmad et al., 2023; Cropanzano & Mitchell, 2005; Homans, 1958). The theory explains that high-quality relationships are built upon a series of mutually rewarding, interdependent exchanges over time.

Andersen et al. (2020) refined the theoretical grounding of LMX in social exchange. Their literature review introduced a conceptual framework distinguishing between two dimensions. Social LMX is characterised by trust, lasting investment, and diffuse obligations. Economic LMX is characterised by formal, instrumental, quid pro quo transactions. Andersen et al. (2020) demonstrated that social LMX is consistently positively associated with favourable follower outcomes (work performance, OCB,

affective commitment), whereas economic LMX is almost uniformly negatively associated with these same outcomes. This social-versus-economic LMX distinction has direct implications for the present study. A manager's perceived technical competence is argued here to be a precondition for moving from an economic, contractually bounded exchange to a social LMX relationship built on genuine trust and mutual investment. Where technical credibility is missing, the relationship deteriorates and is pushed towards an economic exchange dynamic, which Andersen et al. (2020) consistently linked to reduced intrinsic motivation, lower affective commitment, and higher turnover intention. These outcomes work against organisations trying to retain knowledge workers. In this view, a technically non-credible manager tends to pull the dyad into a transactional exchange at a twofold cost to the organisation. The organisation loses the collaborative benefits of social LMX and at the same time incurs the negative outcomes that Andersen et al. (2020) associated with economic exchange.

2.9.7.2 Role Theory

This theory helps to explain the expectations that subordinates hold for their managers (Biddle, 1986). In a technical domain, IT professionals have a strong role expectation that their manager is competent in the substance of their work. A manager's ability to fulfil this expectation is a key determinant of their credibility and legitimacy (Chang et al., 2021).

2.9.7.3 Equity Theory

This theory provides a framework for understanding the importance of fairness in the exchange relationship (Adams, 1963, 1965). Perceptions of equity, that is, the belief that one's ratio of outcomes to inputs is fair relative to a comparison other, are necessary for maintaining a positive and satisfying exchange relationship (Pritchard, 1969). The central role of fairness in shaping employee attitudes is a central theme in organisational justice research (Adamovic, 2023b). Recent studies continue to affirm the importance of perceived fairness, showing that perceptions of interpersonal fairness are a major driver of job satisfaction for software practitioners, often through powerful emotional pathways (Adamovic, 2023a; Sesari et al., 2026).

2.9.8 Synthesis and Conceptual Model

The framework sets out a sequential, mediated relationship that integrates SDT, LMX, and SIT. Perceived Managerial Programming Skill (the independent variable) is a primary signal of in-group prototypicality (SIT) and was expected to speed up the formation of cognition-based trust. That trust underpins a high-quality LMX relationship, which in turn produces an autonomy-supportive climate in which the subordinate's basic psychological needs for autonomy, competence, and relatedness are met (SDT). Satisfaction of these needs then predicts higher job satisfaction (the dependent variable).

The four hypotheses follow directly from this model:

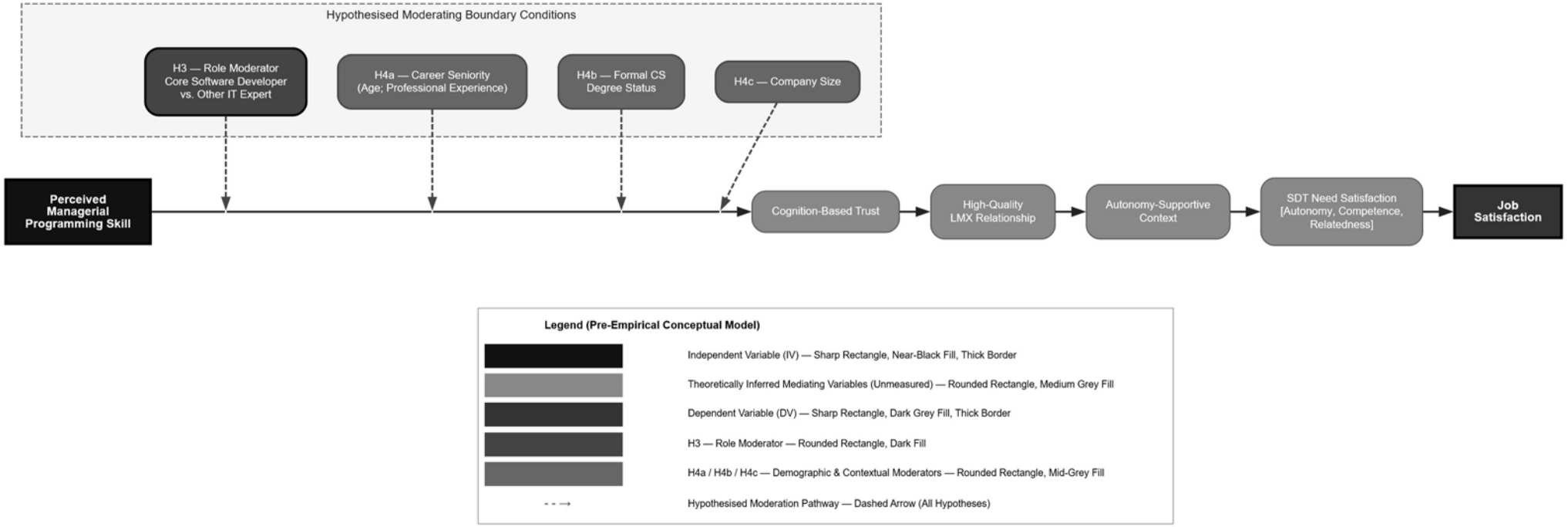
- **H1 & H2 (Correlation and Prediction)**: The positive relationship between Perceived Managerial Programming Skill and job satisfaction is theorised to be explained by the entire positive relational pathway. The strength of the links within this chain suggests that the independent variable is a significant predictor of the dependent variable, even when controlling for other factors. The satisfaction of intrinsic needs, which drives intrinsic motivation, is a reliable predictor of performance, particularly performance quality (Cerasoli et al., 2014), making this link practically significant.
- **H3 (Moderation by Role)**: The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision (the manager facet) was hypothesised to be significantly stronger for Core Software Developers than for other IT experts. The predicted difference arises because the centrality of programming skill to a subordinate's own role moderates the strength of the initial link in the model. Because programming skill is a highly visible indicator of competence and in-group prototypicality for software developers, this perceived capability is a potent, role-specific driver of cognition-based trust and LMX quality. Because LMX is by definition an unmeasured dyadic, relational construct in this study, the proximal measured attitudinal outcome of this theoretically inferred relationship is the subordinate's satisfaction with the supervisor specifically. For an IT expert whose role is less programming-intensive, this specific skill is less central to their evaluation of the manager.

- **H4 (Moderation by Individual and Contextual Factors):** Demographic characteristics, educational background, and organisational context were hypothesised to moderate the relationship by influencing the strength of the various links within the proposed model. For example, factors such as educational identity or company size may interact with leadership style to impact need satisfaction (McAnally & Hagger, 2024).

Figure 2.1 presents a visual representation of this theoretical mechanism as a conceptual model.

Figure 2.1

Hypothesised SDT-LMX-SIT Conceptual Model with Proposed Moderating Boundary Conditions



Note. All pathways are hypothesised; no empirical findings are represented. SDT = Self-Determination Theory (Deci & Ryan, 1985); LMX = Leader-Member Exchange Theory (Graen & Uhl-Bien, 1995); SIT = Social Identity Theory (Tajfel & Turner, 1979). The intermediate mediating variables (Cognition-Based Trust, High-Quality LMX, and SDT Need Satisfaction) form the theoretical explanatory mechanism and are not empirically measured in the study's cross-sectional design. Figure represents the author's own theoretical synthesis.

Figure 2.1 makes clear that the full theoretically inferred mediational sequence was not empirically tested in this study. The study hypothesised that the overall relationship between Perceived Managerial Programming Skill (the independent variable) and Job Satisfaction (the dependent variable) is moderated by the employee's role (H3) and by other individual and contextual factors (H4). The theoretical arguments suggest these moderators primarily influence the initial stages of this predictive pathway; specifically, affecting how effectively perceived skill builds Trust and high-quality LMX relationships.

Consistent with the conceptual positioning in Section 2.9.4.1, this theoretical model explicitly separates the unmeasured dyadic relational processes (LMX) from the measured individual-level outcomes. The framework does not claim to empirically model the reciprocal exchange process itself. Rather, it proposes that a specific antecedent, the subordinate's perception of the manager's technical competence, provides the foundation for unmeasured relational mechanisms that ultimately predict a specific individual-level attitudinal outcome: the subordinate's job satisfaction. Positioning the framework in this way keeps it congruent with its intrapersonal SDT core. The methodological implications of isolating the unmeasured dyadic theory from the individual-level measurement are detailed in Section 3.4.4.

2.10 Moderating Factors and Individual Differences

When, and for whom, does a manager's technical skill matter most? The main-effect pathway set out earlier is context-dependent, and an interactionist reading is required to identify the individual and contextual factors that shape its strength. The literature points to several such factors as likely moderators of the importance of a manager's technical credibility. Social Identity Theory, which explains the dynamics of "in-group" and "out-group" perceptions, provides a recurring theoretical perspective to understand these interactions. Foundational research in the IT domain has provided a clear empirical precedent for this type of person-environment interaction model, where an individual characteristic (such as career orientation) interacts with a contextual factor (such as technology sophistication) to predict job satisfaction (McMurtrey et al., 2002). This history strengthens the rationale for investigating such interactions in the current study.

2.10.1 The Influence of Age and Experience

The demographic shift towards an ageing workforce, coupled with a move away from seniority-based promotion systems, has made age-inverse supervisory relationships, where a younger supervisor manages an older subordinate, increasingly common (Kunze & Menges, 2017). The successful management of these relationships carries macroeconomic weight: motivating and enabling older employees to remain in the workforce until and beyond the standard retirement age is identified as one of the most effective short-term measures to address the national skills shortage (Gordo et al., 2022). This macroeconomic urgency is directly reflected in current industry sentiment: 67% of German companies identified the planned *Aktiv-Rente* (Active Pension), a policy instrument enabling retirees to earn additional income alongside their pension, as a measure that would concretely benefit their business (Bitkom e.V., 2026). Such age-inverse arrangements, however, can introduce severe relational challenges that threaten the supervisor-subordinate dyad and, by extension, the older employee's job satisfaction.

The core mechanism at play is status incongruence, defined as a perceived mismatch between an individual's characteristics, such as being older and more experienced, and their hierarchical role as a subordinate (American Psychological Association, 2023). Status incongruence runs counter to the traditional organisational norms and career timetables, where age and hierarchical position are typically correlated (Kunze & Menges, 2017). For the older subordinate, being managed by a younger individual can create a sharp awareness of their own perceived lack of career progress. This awareness can trigger negative emotions such as resentment, anxiety, anger, and even disgust (Kunze & Menges, 2017). Such hierarchical inversions can directly impede how trust forms, a critical antecedent to a high-quality LMX relationship.

Within Social Identity Theory, the status incongruence within age-inverse dyads can be understood as an identity threat. The older, more experienced subordinate may perceive the younger manager as an "out-group" member whose authority violates the status hierarchy of the "senior professional" in-group. In this context, a younger manager's demonstrated technical competence provides a powerful alternative source of status and legitimacy. Expert power (French & Raven, 1959) allows the

manager to offset the status incongruence caused by age. Workers are more willing to overcome the impression of unfairness generated by status incongruence when their managers demonstrate competence (Triana et al., 2025). An older, more experienced subordinate may be more willing to accept the authority of a younger manager whom they perceive as a genuine technical expert. The manager's technical credibility validates their position on grounds of technical merit, providing a basis for respect and encouraging a more positive LMX dynamic.

The empirical evidence, however, presents conflicting effects. Relational demography research has demonstrated that age dissimilarity within the superior-subordinate dyad can negatively affect work attitudes and interpersonal attraction, with subordinates in age-discrepant dyads reporting elevated role ambiguity (Tsui & O'Reilly, 1989). In age-inverse dyads specifically, older subordinates report lower job satisfaction and organisational commitment than those managed by older supervisors (Shore et al., 2003). They also evaluate the leadership behaviour of younger managers more critically, a dynamic partially explained by the Reverse Pygmalion effect (Collins et al., 2009). Yet relational quality can override demographic friction. High-quality LMX is a robust predictor of job satisfaction (Gerstner & Day, 1997), and in a German organisational context it mediates the age-satisfaction link specifically (Gellert & Schalk, 2012), a relational buffer against the adverse effects of age-inverse reporting lines. However, the interaction is complex. Older workers are more vulnerable to job insecurity, and this vulnerability can be exacerbated by age, making the stability of the supervisory relationship even more essential (Yeves et al., 2019).

The negative relationship between job insecurity and job satisfaction is often weaker for younger employees. Older employees tend to be more sensitive to economic insecurity and dependence on their current role, which amplifies this relationship (Yeves et al., 2019). A younger manager's ability to establish trust through demonstrated competence is a key functional factor, beyond any question of preference, in easing the heightened anxieties that older subordinates may face.

While true status incongruence relies on a relational age gap, an employee's absolute age and accumulated professional experience serve as the baseline

parameters for this dynamic, as greater absolute seniority necessarily increases the statistical probability of encountering age-inverse reporting lines.

2.10.2 Cultural Context and Leadership Expectations

Leadership effectiveness is not culturally universal; the attributes and behaviours that followers expect from an effective leader are heavily shaped by national culture (Lambiase et al., 2024; Welsch et al., 2024). The value placed on a manager's technical credibility is culturally contingent. The cultural dimensions identified by both The Culture Factor Group (2023; formerly "Hofstede Insights") and the GLOBE project provide a well-established framework for understanding these variations and for justifying this thesis's focus on the German context.

Analysis of Germany's cultural profile using Hofstede's (2001) dimensions reveals a unique combination of values: low Power Distance (score of 35), high Individualism (67), high Masculinity (66), high Uncertainty Avoidance (65), and very high Long-Term Orientation (83) (The Culture Factor Group, 2023). The two most relevant dimensions for leadership expectations are Power Distance and Uncertainty Avoidance. The low score on Power Distance indicates that hierarchy is not accepted uncritically; authority must be earned, and leadership is expected to be participative and open to challenge based on expertise. The high score on Uncertainty Avoidance signifies a strong preference for clarity, systematic planning, and the use of established rules and expertise to reduce ambiguity and anxiety.

The GLOBE project data confirms this profile. The Germanic Europe cluster, which includes Germany, scores high on Performance Orientation, Assertiveness, and Uncertainty Avoidance, while simultaneously desiring very low Power Distance (GLOBE 2020, n.d.). This cluster values leaders who are charismatic and participative but rejects leadership styles that are self-protective or overly status-conscious (GLOBE 2020, n.d.).

These findings suggest that the prototypical leader in the German cultural context is a consultative expert. Subordinates expect a manager to possess the deep technical expertise necessary to provide clear, fact-based direction and to create well-thought-out plans, thereby satisfying the cultural need to avoid uncertainty. At the same time,

Germany's low power distance means subordinates expect this expertise to be applied in a consultative and participative manner that respects their professional autonomy. A manager's technical competence therefore represents a fundamental prerequisite for their legitimacy. Within this context, a technically incompetent manager is perceived as failing to embody the culturally-defined leadership prototype, which undermines their authority and ability to influence.

Recent meta-analytic evidence provides direct empirical support for the role of national culture in LMX dynamics. Yuan et al.'s (2023) meta-analysis demonstrated that LMX agreement was significantly stronger in horizontal-individualist (HI) cultures, characterised by high individualism and low power distance, than in vertical-collectivist (VC) cultures, accounting for over 13% of the total between-study heterogeneity. Germany, as a prototypical HI culture (The Culture Factor Group, 2023), therefore represents a context in which leaders and followers are more likely to achieve role consensus and in which the performance-enhancing benefits of high-quality LMX are predicted to be strongest. The demonstrated cultural amplification of LMX agreement strengthens the present study's rationale for investigating the LMX-forming role of technical competence within the specific German IT context. The cultural conditions for strong LMX agreement are already in place, making the content of the exchange, specifically technical credibility, a particularly relevant predictor.

Because the present study's sampling frame was delimited to professionals working predominantly in Germany, national culture functions as a fixed contextual boundary. The cross-cultural falsifiability of this assumption is flagged as a direction for future research.

2.10.3 The Moderating Role of Educational and Professional Identity

Within the IT field, a subordinate's educational background can profoundly shape their professional identity and, in turn, their expectations of management. A fundamental distinction exists between a formal computer science (CS) degree and non-technical educational paths. In SIT terms, a shared educational background marks in-group membership powerfully, establishing the CS/non-CS boundary as a particularly sharp identity divide.

CS programmes are typically rooted in theory, mathematics, algorithms, and the fundamental principles of computation, training graduates to design and build new technologies from the ground up (Marks & Scholarios, 2007). The resulting intellectual formation often cultivates a professional identity of a creator, builder, or engineer at a fundamental level. Their professional "in-group" consists of others who share this deep theoretical understanding and speak the same precise technical language (Tomer & Mishra, 2016). For an individual with this identity, a manager's programming and algorithmic skills are particularly important. A manager who cannot engage in deep technical discussions or appreciate the theoretical underpinnings of their work may be perceived as an "out-group" member, regardless of their managerial title. This perception can undermine the manager's credibility, making the establishment of cognition-based trust difficult for a high-quality LMX relationship.

An IT professional from a non-CS background, such as a systems administrator or a lateral entrant from a non-STEM field, may still value technical competence but place less emphasis on pure programming skill. Their "in-group" identity is likely defined by a different set of competencies, such as systems architecture, infrastructure management, or business process analysis. While they expect a manager to be technically conversant, the specific signal of programming prowess may be less central to their evaluation of the manager's in-group status. Research by Lee and Jung (2023) supported the importance of this identity link. Although their ICT graduate respondents were, in general, critical of the practical applicability of ICT education as a discipline, each respondent's own job satisfaction was still positively predicted by their perceived transferability, the subjective fit between the knowledge they had personally acquired at university and the tasks they perform in their current role (Lee & Jung, 2023). The resulting heterogeneity in professional identity is deeply embedded in the German labour market. The coexistence of university graduates, vocationally trained *Fachinformatiker*, and lateral entrants (*Quereinsteiger*) produces a workforce in which formal credentials are a poor proxy for current technical competence (Section 1.2.2). This compositional diversity confirms the theoretical need to empirically test whether a formal CS degree continues to function as a meaningful in-group boundary under Social Identity Theory, or whether the technical identity of the software engineering profession has transcended academic origins.

2.10.4 Organisational Context

The context in which a leader operates can moderate the importance of their specific skills. The relative importance of technical and managerial competence depends on which social identity is most prominent within a specific organisational environment.

Company size is a key contextual variable that shapes this dynamic. In small companies and start-ups, managerial roles are often fluid, with leaders acting as practising managers who remain directly involved in hands-on technical work (Quirino, 2024). In this environment, technical competence is highly visible and has a direct, daily impact on team performance and product development. The organisational culture often promotes a strong, shared identity centred on the act of "building a product," making a manager's technical credibility essential to being accepted as part of the core "in-group".

As companies grow into large enterprises, managerial roles tend to become more specialised and focused on processes, budgeting, strategic alignment, and navigating internal bureaucracy (Hecks, 2025). Research suggests that as company size increases, direct, interpersonal leader-follower interaction may become less important, as formal systems and procedures can substitute for some leadership functions (Eva et al., 2021). The primary value a manager provides may shift from direct technical guidance to managing organisational barriers, securing resources, and navigating political dynamics. In this context, while a basic understanding of technology remains beneficial, deep, hands-on technical skill may become less critical than strong traditional management and political competencies. The relevant in-group for a manager might shift from the technical team to a cohort of other managers, with the primary identity being based on managerial, not technical, competence.

Industry dynamics exert a similar contextual influence. In a rapidly innovating sector such as artificial intelligence, a manager's ability to stay current with cutting-edge technology is vital for guiding the team effectively. In a more stable industry where IT primarily supports established business processes, the emphasis might shift towards reliability, security, and process adherence, therefore changing the specific nature of the "technical competence" that is most valued by subordinates. Table 2.6

summarises the study's boundary conditions in two panels. Panel A presents the fixed cultural context that theoretically justifies the predicted baseline strength of the main effect (Section 2.10.2). Panel B presents the empirically testable boundary conditions whose predicted interaction effects are derived from the theoretical mechanisms reviewed in this section.

Table 2.6

Contextual Boundary Conditions and Proposed Moderating Factors

Panel A: Fixed Contextual Boundary (Not Empirically Tested)			
Contextual Factor	*Key Theoretical Mechanisms*	*Rationale for the Baseline Prediction*	*Key Supporting Literature*
National Culture (Germany)	Hofstede's / GLOBE's Dimensions; Social Identity Theory (Leader Prototypicality)	Germany's high Uncertainty Avoidance and low Power Distance create a cultural context in which competence signals the expected consultative-expert leader prototype, providing the theoretical basis for predicting a strong positive baseline relationship across the entire sample.	The Culture Factor Group (2023), GLOBE 2020 (n.d.), Lambiase et al. (2024), Yuan et al. (2023)
Panel B: Empirically Tested Moderators			
Moderating Factor	*Key Theoretical Mechanisms*	*Predicted Interaction Effect*	*Key Supporting Literature*
Career Seniority, operationalised via subordinate age and total professional experience	Status Incongruence Theory; Social Identity Theory (SIT)	Stronger positive relationship when subordinate is older / more experienced: competence legitimises authority and mitigates identity threat.	American Psychological Association (2023), Kunze and Menges (2017), Yeves et al. (2019),
Subordinate Educational Background	SIT (In-group/Out-group Bias)	Stronger positive relationship for subordinates with a CS degree: programming skill is a core in-group identity marker.	Lee and Jung (2023), Marks and Scholarios (2007)
Organisational Context (Company Size)	Contingency Theory of Leadership; SIT (Identity Salience)	Stronger positive relationship in smaller, agile companies (technical "builder" identity is more prominent) vs. larger, bureaucratic firms.	Hecks (2025), Quirino (2024)

Note. Panel A lists the macro-level cultural context, which is held constant by the single-country research design (Section 1.5.1) and therefore cannot be tested as a statistical interaction term; it serves as the theoretical rationale for the predicted baseline strength of the main effect. Panel B lists boundary conditions that vary across respondents, which directly inform the formal hypotheses derived in Section 2.11. CS = Computer Science.

2.11 Hypothesis Development and Theoretical Predictions

The integrated theoretical framework established in Section 2.9 generates specific, testable predictions for each research hypothesis.

2.11.1 Hypothesis 1: Direct Relationship Prediction

- H1: A positive correlation exists between Perceived Managerial Programming Skill and job satisfaction.
- Theoretical Foundation
  This hypothesis is directly predicted by the entire theoretical mediational sequence established in the integrated model. Self-Determination Theory states that satisfaction of the three basic psychological needs (autonomy, competence, and relatedness) leads to enhanced well-being and positive work outcomes (Deci et al., 2017; Ryan & Deci, 2000). Leader-Member Exchange theory demonstrates that high-quality dyadic relationships are strong predictors of job satisfaction, a finding established by major meta-analyses (Gerstner & Day, 1997; Martin et al., 2016). Recent meta-analytic research further confirms the unique predictive power of LMX for broader critical follower outcomes, such as task performance and OCB (Legood et al., 2021; Yuan et al., 2023). Graves and Luciano (2013) supplied the empirical linkage between these two frameworks, demonstrating that the relational quality of the leader-member dyad operates as a direct antecedent of basic psychological need satisfaction.
- Mechanism
  A manager's perceived programming competence is theorised to provide the foundation for cognition-based trust (McAllister, 1995), a process accelerated by the perception of the manager as an in-group prototype (Hogg, 2001). This theoretically inferred trust serves as the foundation for high-quality LMX relationships, which are theorised to align with an autonomy-supportive climate that meets employees' basic psychological needs, predicting higher job satisfaction. French and Raven's (1959) power taxonomy supports this

prediction, as expert power (derived from technical competence) is particularly effective in knowledge-work contexts. This initial hypothesis therefore serves to test the overall predictive power of the entire proposed pathway.

- Prediction Strength
  Extensive meta-analytic support exists for both SDT and LMX relationships with job satisfaction. The estimated population LMX agreement correlation of ρ = .35 has remained stable across two decades of research (Yuan et al., 2023). Accordingly, a moderate to strong positive correlation was predicted, consistent with effect sizes found in organisational psychology research (Judge et al., 2001).

2.11.2 Hypothesis 2: Predictive Power Beyond Demographic and Occupational Controls

- H2: Perceived Managerial Programming Skill can significantly predict job satisfaction, even when controlling for employee age and programming time.
- Theoretical Foundation
  This hypothesis tests the unique predictive validity of technical competence beyond established predictors. The Job Characteristics Model (Hackman & Oldham, 1976) and dispositional theories (Judge et al., 2020) suggest multiple antecedents to job satisfaction. However, the theoretical framework developed here argues that managerial technical competence operates through a distinct psychological mechanism, namely the satisfaction of SDT needs via high-quality, identity-based LMX relationships, that is not captured by traditional job characteristics or dispositional measures.
- Mechanism
  While other factors may satisfy individual SDT needs (e.g., job design affecting autonomy), managerial technical competence was theoretically positioned to satisfy all three needs simultaneously through the relational mechanism of LMX. Williams et al. (2023b) demonstrate that technical competence is a foundational component of leader credibility, which enables the interpersonal behaviours necessary for need support across all three domains.

- Prediction Strength
  Based on the incremental validity literature in organisational psychology, technical competence was predicted to contribute significant unique variance beyond demographic, job-related, and other managerial factors, representing a small to medium effect size (Cohen, 1988).

2.11.3 Hypothesis 3: Role-Based Moderation

- H3: The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision is significantly stronger for Core Software Developers than for other IT experts.
- Theoretical Foundation
  Role Theory (Biddle, 1986) and Social Identity Theory (Tajfel & Turner, 1979) predict that the relevance of a leader's competence varies with the centrality of that competence to the follower's own role identity. Because the developer's programming-anchored identity (Section 2.8.6) contrasts with the more general professional orientation of other IT experts (Chang et al., 2012; Marks & Scholarios, 2007), programming competence serves as a specific, highly visible signal of in-group prototypicality for this cohort under Social Identity Theory.
  This hypothesis isolates the satisfaction with supervision facet, providing a focused test of the downstream attitudinal outcomes associated with dyadic LMX dynamics. Because identity validation and LMX operate at the dyadic level, a manager's in-group prototypicality is theorised to most directly predict the subordinate's attitude towards the manager. An overall job satisfaction score would dilute this effect by including unrelated elements such as pay or co-workers.
- Mechanism
  For Core Software Developers, programming competence represents the most direct indicator of a manager's credibility within their primary domain of expertise, which is theorised to facilitate stronger cognition-based trust and greater expert power (French & Raven, 1959). For other IT experts (e.g., system administrators, project managers), while technical competence remains important, it may be less central to their role identity and therefore

have a weaker impact specifically on their satisfaction with supervision. This hypothesis therefore tests an important boundary condition on the initial link of the model. Hypothesis 3 posits that converting perceived skill into cognition-based trust and, subsequently, into a high-quality LMX relationship is significantly stronger for subordinates for whom that specific technical skill is most central to their own professional identity. This conversion manifests as satisfaction with the manager.

- Prediction Strength
  The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision was predicted to exhibit a significantly steeper predictive slope for Core Software Developers than for other IT experts. Methodologically, a "stronger" relationship in this context refers strictly to the unstandardised interaction term (*B*) in a moderated multiple regression model, rather than a comparison of bivariate correlations (*r*), which are vulnerable to variance-based distortions. This prediction was based on how role centrality determines the strength of leader-member relationships (Graen & Uhl-Bien, 1995) and drew on the diagnostic utility of the facet-based measurement approach established in Section 2.4.2.

2.11.4 Hypothesis 4: Refined Moderation Hypotheses

- H4: The positive relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by career seniority, educational background, and company size.
  - H4a: The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by career seniority. The positive relationship is stronger for subordinates with greater career seniority. Career seniority is operationalised independently through two proxies: the subordinate's absolute age and their total professional experience. (Both proxies derive from the same theoretical mechanism, Status Incongruence Theory (Kunze & Menges, 2017), and were tested as separate moderation models in Chapter Four. H4a was deemed supported if at least one proxy yielded a statistically significant interaction effect.)

- H4b: The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by educational background, such that the positive relationship is stronger for subordinates with a formal computer science degree compared to those with other educational backgrounds.
- H4c: The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by company size, such that the positive relationship is stronger for subordinates working in smaller companies compared to those in larger enterprises.

These moderating predictions were grounded in the theoretical mechanisms and supporting evidence summarised in Table 2.6.

Within H4, career seniority (H4a) was tested through two independent proxies under a single theoretical rationale, while educational background (H4b) and company size (H4c) each test a distinct boundary condition.

2.12 Chapter Summary

The review has set out the job satisfaction literature, the role of managerial technical competence in the IT sector, and the conceptual measurement challenges specific to the German context, with the comparative psychometric evaluation and instrument selection given in Section 2.6. Where SDT, LMX theory, and Social Identity Theory overlap, a theoretical gap becomes visible, and the integrated framework fills it by describing a multi-step psychological sequence in which a manager's perceived technical competence acts as a signal of in-group prototypicality, builds trust, supports high-quality dyadic relationships, and contributes to the satisfaction of employees' basic psychological needs, with a predicted positive effect on job satisfaction. A fixed cultural boundary condition that justifies the predicted baseline strength is covered in Section 2.10.2, alongside moderating variables that capture the dyadic influence of age and experience, the role of educational and professional identity, and the effect of organisational context.

Rapid technological change, AI-driven disruption, and the prevalence of distributed work in the German IT sector (Bitkom e.V., 2026) have amplified the manager's role

as a primary conduit for organisational support and as a key mediator of employee well-being. Four testable hypotheses (with a refined set of sub-hypotheses for moderation) follow from the conceptual model, each with its theoretical foundation, proposed mechanism, and predicted strength. Chapter Three translates this framework into a methodological design.

3 Methodology

3.1 Introduction

Testing the SDT-LMX-SIT framework required a research design that isolated the predictive contribution of Perceived Managerial Programming Skill while controlling for covariates. The research objectives (RO1-RO4) and hypotheses (H1-H4c) defined in Section 1.4 guided the methodological choices detailed in this chapter. The analytical strategy addresses these hypotheses sequentially: bivariate correlation, controlled regression, and moderated boundary conditions.

Table 3.1 maps each research objective to its corresponding methodological approach, the hypothesis tested under that objective (where applicable), and the chapter section in which that approach is detailed.

Table 3.1

Mapping of Research Objectives to Methodological Choices, Hypothesis Tests, and Chapter Sections

Research Objective	Methodological Approach	Hypothesis Test	Chapter/Section
RO1: Derive a new factor from theory	Semi-systematic literature review; SDT-LMX-SIT framework synthesis	N/A (Theoretical foundation)	Chapter 2
RO2: Establish a valid measure	Survey instrument design; KAFA adoption; bilingual pilot testing	N/A (Instrument design)	Section 3.6
RO3: Generate primary empirical evidence	Cross-sectional web-based survey; convenience and snowball sampling	N/A (Data collection)	Section 3.5
RO4: Refine existing theory	Pearson correlation; hierarchical multiple regression; moderated regression; exploratory analyses	H1, H2, H3, H4a-c	Section 3.7

3.2 Research Philosophy and Paradigm

The methodological choices governing the present study are shaped, explicitly or implicitly, by a set of ontological and epistemological assumptions about the nature of reality and how knowledge of that reality can be obtained (Creswell & Creswell, 2023).

3.2.1 The Post-Positivist Stance

This study adopted a post-positivist philosophical stance. Emerging as a major evolution of naïve positivism, post-positivism accepts a critical realist ontology. The paradigm holds that an objective reality exists independently of the researcher, while simultaneously acknowledging that this reality can only be known imperfectly and probabilistically (Guba & Lincoln, 1994). The post-positivist stance represents a modified objectivism. The study aimed for objective measurement and replicable findings but rejected the naïve positivist assumption that perfect, value-free observation is achievable in social science research.

This epistemology fits the study because job satisfaction and perceived managerial competence are subjective judgements, not directly observable phenomena. Within post-positivism, such constructs can be measured through validated instruments while preserving empirical rigour and limiting researcher bias (Guba & Lincoln, 1994). The paradigm also recognises the social construction of knowledge, noting that respondents' perceptions are shaped by their professional context, cultural norms, and personal experiences. The paradigm still asserts, however, that meaningful, generalisable patterns can be extracted from aggregated data through standard statistical analysis.

3.2.2 Popperian Falsification as Epistemological Guide

Within this post-positivist framework, the study followed a hypothetico-deductive logic grounded in Popperian falsification (Popper, 1935). Following a hypothetico-deductive logic, the research design subjected each hypothesis to empirical testing, with the expectation that any or all hypotheses might be refuted by the data. This philosophical stance informs the interpretation of the findings. Within a falsificationist

framework, the non-support of a hypothesis represents a theoretically informative outcome. Demonstrating empirically that proposed relationships or boundary conditions do not operate as theorised carries its own contribution to knowledge, an epistemological framing that guides the interpretation of the findings in Chapter Five.

3.2.3 Epistemological Fit for the IT Domain

The adoption of a post-positivist, quantitative approach reflects a considered alignment with the epistemological culture of the target population. Empirical analyses of computing research consistently characterise the discipline as overwhelmingly positivist in its orientation (Ramesh et al., 2004), with qualitative and interpretive methods applied infrequently. IT professionals are trained, through their education and daily practice, to reason in terms of logic, quantifiable metrics, and empirical data. Post-positivist alignment has several practical implications for the present study. It preserves paradigmatic consistency with the dominant computer science research tradition, uses an empirical format familiar to respondents (with expected benefits for receptivity and response validity), and improves the practical credibility of the findings among the IT managers and HR professionals the study is designed to inform.

3.3 Researcher Positionality and Reflexivity

Within a post-positivist framework, true objectivity is recognised as a regulatory ideal that research can approach but never fully attain. Acknowledging the researcher's positionality and implementing specific mechanisms to mitigate subjective bias is a methodological necessity (Berger, 2015). For a professional doctorate such as the DBA, reflexivity demands a critical examination of how my personal history, epistemological worldview, and career trajectory intersect with the phenomenon under investigation. Reflexive practice also requires an account of the decisions taken to ensure that this intersection strengthens the inquiry without distorting it.

3.3.1 Biographical Origins of the Research Perspective

My interest in these workplace dynamics has personal roots. Growing up as an immigrant to Germany in a bicultural household, I learned to navigate in-group and

out-group boundaries early on. Experiencing both belonging and outsider status first-hand made me naturally observant of similar divides later in life. This background explains why Social Identity Theory (Tajfel & Turner, 1979), with its focus on how groups identify their members and build trust, aligns so strongly with what I observe daily in the IT sector.

A second biographical thread connects directly to the research question itself. My father, originally trained as a mechanical engineer in Czechoslovakia, retrained as a programmer at IBM after emigrating to Germany, and subsequently pursued a career as an IT consultant. Growing up in a household where the professional world of information technology was a constant presence, I was exposed from an early age to its hierarchies, its culture, and the interplay between technical expertise and managerial authority. Exposure to this familial IT environment cultivated an intuitive, pre-professional awareness of the phenomenon that this thesis terms the "Manager" factor. The observation that technically credible leaders were spoken of with respect, while technically uninformed managers were a source of frustration and professional disengagement, remained a pre-theoretical observation until the doctoral programme provided a formal analytical framework.

My later training in medicine and computer science reinforced a preference for measurable evidence and testable claims. The post-positivist approach in Section 3.2 is therefore not a stance adopted for this DBA alone; it reflects how I have worked throughout my career.

3.3.2 The Insider Advantage

As a practitioner with nearly three decades of continuous experience in the German IT sector, I approach this research as an insider (Coghlan & Brannick, 2014). I began as a self-taught programmer, co-founded a medtech start-up drawing on my dual training in medicine and computer science, and then worked as a freelance IT consultant from 1997 until 2025. During that period I moved from hands-on software engineering into senior roles in architecture, programme management, and agile leadership. These roles involved long-term engagements with multinational corporations across Germany, Switzerland, and the United Kingdom. The projects

spanned sectors including automotive, banking, insurance, pharmaceuticals, and telecommunications.

Throughout this consulting work, my most valuable role was often acting as a translator between management and engineering teams. Because I could read the code and also discuss business objectives, both sides tended to trust me: IT staff treated me as a technically credible in-group peer, while executives relied on me to clarify complex IT situations. Years in that intermediate position gave me direct exposure to the friction, lowered morale, and inefficiencies that arise when non-technical managers attempt to lead highly technical teams without the domain credibility the teams expect.

I hold an MBA awarded jointly by Durham University and EBS University (2013-2015). Additionally, I co-authored a practitioner-oriented textbook addressing talent management challenges in the IT sector (Saller & Terber, 2020). That publication was targeted at a practitioner audience and did not employ an academic research methodology. However, the process of articulating practitioner observations for that audience exposed the stark absence of sound empirical evidence underpinning widely accepted industry beliefs about the role of technical competence in IT leadership. The realisation that an entire domain of practitioner conviction rested solely on anecdote not only contributed to the specific research questions pursued in this thesis but also heightened my awareness of the confirmation bias risk introduced by my prior practitioner engagement. The methodological safeguards designed to mitigate this specific risk are detailed in Section 3.3.3.

Having personally progressed from a pure programmer writing code to a generalist managing complex, cross-functional software development teams, I have experienced the "Manager" factor from both the supervisory and the subordinate perspective of the supervisor-subordinate dyad. I have directly experienced and observed the contrasting dynamics between technically competent (and incompetent) managers and their teams' morale, satisfaction, and performance across a spectrum of corporate environments. In this regard, the research question represents the empirical formalisation of a long-standing observation. As described in Section 3.3.1, this observation originated during my childhood exposure to my father's professional world, well before my own career began. It was subsequently

reinforced over decades of consulting practice. The lived experience of this contrast was the primary motivation for seeking to empirically investigate a phenomenon that is widely discussed anecdotally within the IT industry but remains under-researched in the academic literature.

Three methodological implications follow. First, the research question is anchored in authentic professional challenges rather than abstracted ones, grounding the inquiry in practical reality. Second, it provided a close cultural understanding of the target population, affording the contextual insight necessary to operationalise complex constructs in a manner that resonates with active practitioners, particularly the decision to classify Core Software Developers based on actual daily programming time (Section 3.6.4). Third, this established professional standing facilitated access to a mature, geographically and sectorally diverse professional network, which was essential for initiating and executing the study's snowball sampling strategy within a characteristically difficult-to-reach population of highly skilled experts.

3.3.3 Mitigating Insider Bias

Insider proximity also carries an epistemological cost. Decades of anecdotal observation across the technical-managerial divide, combined with a biography sensitive to in-group/out-group dynamics, risk influencing study design, analysis, or interpretation in ways the researcher may not immediately recognise.

The primary methodological risk is confirmation bias (Coghlan & Brannick, 2014; Unluer, 2012): the potential to unconsciously design a study that validates a pre-existing practitioner conviction, thereby compromising the objectivity of the empirical test. Because I have worked across the technical-managerial divide since the late 1990s, I began this DBA believing that managers must have technical credibility to keep their teams satisfied. To prevent my own consulting experience from biasing the research, I built strict procedural safeguards into the study design.

First, consistent with the falsificationist commitment outlined in Section 3.2.2, the hypotheses were derived deductively from the integrated SDT-LMX-SIT framework (developed in Chapter Two) before any data were collected, and were formulated to permit empirical refutation. Personal anecdote therefore did not serve as the basis for hypothesis formulation.

Second, the study relied on a third-party, psychometrically validated instrument for the dependent variable. Utilising the KAFA (Haarhaus, 2016), whose psychometric properties were established independently of me, ensured that measuring job satisfaction was insulated from any items I constructed that might inadvertently lead respondents.

Third, all analytical procedures applied pre-defined statistical thresholds executed in IBM SPSS Statistics. The significance level was fixed at $\alpha = .05$ before data collection, so that inferential decisions rested on the statistical output rather than my judgement during the hypothesis-testing phase.

Fourth, I maintained a clear methodological separation between data generation and interpretation. Because the data were collected via an anonymous, self-administered web survey, I had no direct interpersonal influence over the respondents during the data collection phase, and I constructed no interpretive narrative until the final statistical outputs were fully generated.

Fifth, the bilingual survey instrument was independently reviewed during a structured pilot phase (Section 3.6.7) by a panel of seven IT professionals drawn from three countries and spanning diverse industry backgrounds. Their in-situ evaluation of both language versions provided an external check on item clarity, cross-language equivalence, and face validity that was not solely dependent on my own judgement.

These five mechanisms were designed to keep the empirical evaluation within the limits of post-positivist quantitative testing. My professional background therefore serves to ground the research design in the realities of industry practice, without predetermining its conclusions. A reflection on the effectiveness of these safeguards in maintaining objectivity during data analysis is provided in the concluding chapter (Section 6.6.1).

3.4 Research Strategy and Approach

3.4.1 Deductive Methodology

This study employed a deductive research methodology (Bryman, 2016), proceeding logically from theory to variables, measurement, and testing. The integrated SDT-

LMX-SIT framework (Chapter Two) generated specific hypotheses, which were operationalised into measurable constructs and subjected to statistical evaluation via a structured survey.

3.4.2 Rationale for a Quantitative Approach

The research objectives require a quantitative approach: testing predictive variance, measuring correlational strength, isolating unique predictive contributions through hierarchical regression, and evaluating interaction effects through moderation analysis. These requirements demand numerical data, statistical inference, and the capacity to generalise findings. Alongside these core analytical requirements, the quantitative approach is reinforced by its epistemological congruence with the positivist scientific culture of the IT domain, as argued in Section 3.2.3.

3.4.3 Cross-Sectional Survey Design

The study employed a cross-sectional survey design, capturing a snapshot of dyadic relational perceptions and attitudes across the German IT workforce. This design was well suited to the study's objectives for several reasons. First, the target population, IT professionals working in Germany, is large and geographically dispersed across the country. The Bundesagentur für Arbeit (2025) estimated this population at more than 1.12 million formally employed professionals, embedded within a digitally native workforce accustomed to online communication. A web-based survey was the most scalable and resource-efficient method for reaching this population. Second, the study's primary constructs, Perceived Managerial Programming Skill and job satisfaction, are evaluative judgements that can be reliably captured through self-report questionnaire items at a single point in time.

Selecting a cross-sectional survey design involved a deliberate methodological trade-off. Because the design captures data at a single measurement occasion, this cross-sectional approach cannot establish causal directionality or track the reciprocal evolution of the LMX dyad over time. In particular, a reciprocal pathway in which broadly satisfied employees retrospectively inflate their evaluations of their manager's competence cannot be ruled out on the basis of cross-sectional evidence

alone (Podsakoff et al., 2003). This methodological trade-off was accepted to maximise the study's reach and scale.

A cross-sectional web survey was the most practical way to obtain an adequately powered sample from a geographically dispersed and high-turnover IT workforce. The design prioritised the statistical power necessary to test the model's complex boundary conditions (H4) over the temporal depth that a longitudinal panel study would have provided. The specific interpretive consequences of this constraint, including the reciprocal inflation pathway, structural survivorship bias, and their combined impact on causal inference, are evaluated in Section 6.4.1. Accordingly, the following terminological convention governs the remainder of this thesis: terms such as "predictor," "predictive power," and "effect" denote statistical associations within the context of multiple regression (variance explained), not empirically established temporal causality.

3.4.4 Level of Analysis and Single-Source Measurement

The theoretical framework treats LMX as an unmeasured dyadic vehicle and restricts empirical operationalisation to the proximal downstream attitudinal outcome: the subordinate's satisfaction with supervision. This strict separation matches the intrapersonal focus of SDT and has specific methodological implications.

The study expressly refrains from operationalising LMX as a shared relational construct (see Section 2.9.4.1), thereby avoiding the pseudo-unilaterality fallacy (Gooty et al., 2012; Krasikova & LeBreton, 2012). The present design makes no claim to measure the reciprocal exchange process itself, which would require matched dyadic data from both parties. Consistent with the intrapersonal focus of SDT (Deci & Ryan, 1985), the study instead measures the proximal attitudinal outcome: the subordinate's satisfaction with supervision (the KAFA supervision facet). Measuring the distinct attitudinal endpoint at the individual level from a single source preserves conceptual clarity and aligns directly with the study's core theoretical framework, keeping the dyadic LMX construct safely within the theoretical domain.

The absence of manager-reported data also precludes the empirical examination of the self-other agreement dynamics introduced in Section 2.9.4.1 (Atwater &

Yammarino, 1992). The present study cannot determine whether managers who overestimate their own technical competence produce systematically different satisfaction outcomes compared to those whose self-assessments align with their subordinates' evaluations. The specific limitations and methodological boundaries associated with this design are assessed in the final discussion.

3.5 Target Population, Sampling Strategy, and Administration

3.5.1 Defining the Population

The target population for this study encompassed IT professionals who were working in Germany. This population includes, but is not limited to, software developers, systems administrators, IT architects, business analysts, test managers, IT project managers, and related technical roles across all industries. According to the Bundesagentur für Arbeit (2025), approximately 1.52 million ICT professionals were economically active in Germany in 2024, of whom more than 1.12 million were in standard employment subject to social security contributions. As this study excluded self-employed contractors, this subset of dependent employees most accurately reflects the relevant target population. Within this group, software development and programming formed the single largest occupational subgroup, accounting for approximately 341,000 employees. Broader international classifications that encompass adjacent technical roles and alternative employment forms yield higher overall estimates (e.g., 2.3 million ICT specialists in Germany under the OECD/ISCO-08 definition; Eurostat, 2025).

3.5.2 Selection and Exclusion Criteria

To isolate the specific relational dynamic at the core of the theoretical framework (i.e., the LMX-based supervisor-subordinate dyad), several inclusion and exclusion criteria were applied.

Inclusion criteria: Respondents were required to (a) be currently employed, or have been employed within the preceding six months, as an IT professional; (b) be

working primarily in Germany; and (c) provide informed consent via the survey's introductory disclaimer.

Exclusion criteria: Self-employed contractors, including freelancers, sole proprietors, and managing directors of their own companies, were excluded from the analytical sample. Excluding self-employed contractors is theoretically motivated. Freelance IT professionals and managing directors typically operate outside formal reporting structures, either reporting to clients on a project basis or managing themselves. These self-employed individuals do not participate in the stable, hierarchical supervisor-subordinate relationship characterised by the power dynamics and ongoing relational exchanges that LMX theory describes (Graen & Uhl-Bien, 1995). Operationally, while the survey instrument accommodated self-employed respondents by capturing their specific employment form (Q4) and providing them with tailored instructions (Q4A), these responses were systematically excluded post hoc. During the data preparation phase, an SPSS filtering script was applied to remove all respondents who identified as self-employed (via Q3). This programmatic exclusion ensured that the final analytical sample strictly comprised formal employee-supervisor dyads, meeting the theoretical requirements of the study exactly.

3.5.3 Sampling Technique

Given the large and geographically dispersed target population, and the absence of a national sampling frame for the German IT workforce, a non-probability sampling approach was employed. I recruited an initial convenience sample by drawing on my extensive professional network of IT consultancy across diverse industries and organisations. This initial sample was then expanded through snowball sampling, whereby participants were encouraged to refer additional IT professionals from their own professional circles. Distribution channels encompassed targeted email outreach, postings on professional networking platforms (LinkedIn, Xing), solicitations on specialist IT forums, professional interest mailing lists, and continuous in-person recruitment. The temporal deployment of these channels is set out in Section 3.5.5.

Non-probability convenience and snowball sampling involves a methodological trade-off. This approach sacrifices the strict population representativeness and generalisability afforded by stratified random sampling, simultaneously introducing potential selection bias and risking an overrepresentation of professionals with relational characteristics similar to my own. No national sampling frame exists for the German IT workforce, and highly specialised IT professionals are typically resistant to unsolicited external surveying. Therefore, leveraging established insider ties via snowball sampling was a necessary compromise. The trade-off was made to prioritise successful community penetration and sufficient data acquisition over perfect population-level representativeness. These limitations are further discussed in Section 3.9.

3.5.4 Sample Size and Power Analysis

To determine the minimum sample size required for adequately powered statistical inference, a preliminary sample size calculation for population proportions was conducted. The target population was estimated at more than 1.12 million formally employed IT professionals in Germany (Bundesagentur für Arbeit, 2025). Based on this estimate, a minimum target of 384 respondents was calculated to achieve a 95% confidence interval with a 5% margin of error, assuming maximum population variance (p = .50).

This target ensured adequate representational precision for descriptive population estimates. Independent of this representational target, a post-hoc sensitivity analysis to determine the inferential power available for the study's regression models (reported in Section 4.2.5) was conducted using G*Power 3.1.9.7 (Faul et al., 2009), a dedicated statistical power analysis program.

All sensitivity calculations applied the Linear multiple regression Fixed model, R^2 increase test family with the non-central F-distribution method at α = .05 (Cohen et al., 2003). Each calculation determined the minimum Cohen's f^2 detectable at conventional statistical power (1 - β = .80) for the denominator degrees of freedom yielded by the specific hypothesis test. These sensitivity-derived f^2 values represent theoretical minimum-detectable thresholds, that is, the smallest focal effects the achieved sample size is statistically powered to detect. These thresholds are

therefore conceptually distinct from the empirically observed f^2 values computed from the regression outputs and reported in Section 4.4. Section 3.7.5 presents the computation formula and effect size benchmarks.

The final achieved sample size is reported in Section 4.2.1, and a post-hoc sensitivity analysis of the statistical power available for the study's inferential hypothesis tests is detailed in Section 4.2.5. The broader implications of any sample size shortfall relative to this target, concerning representational breadth, generalisability, and the interpretation of null findings, are evaluated in the final discussion.

3.5.5 Survey Administration and Distribution Strategy

The survey was implemented using SurveyMonkey, a commercial survey infrastructure provider, under the title "Arbeitszufriedenheit von IT-Experten" (Job Satisfaction of IT Experts). The survey was deployed bilingually in German and English; the rationale for this decision and the translation protocol are detailed in Section 3.6.6.

Bilingual Access and URL Strategy. The primary URL (https://de.surveymonkey.com/r/ArbeitszufriedenheitIT-Experten) featured a custom, self-explanatory identifier that I designed to enhance face validity and memorability for German-speaking participants, replacing the default alphanumeric string. This URL directed users to a German-language landing page containing clear English instructions for language switching. Conversely, an English-specific URL parameter (?lang=en) routed international respondents directly to the English version, accompanied by corresponding German instructions. A dedicated project email address (dissertation@terber.de) was established and displayed on both landing pages to handle participant queries.

Temporal Distribution Strategy and Rationale. The survey was published online on 17 May 2025, allowing for final live-environment verifications over the weekend before the official launch at 09:00 on Sunday, 18 May 2025. All pre-launch test data were permanently deleted. The formal data collection window extended from 18 May 2025 to 4 February 2026.

Given the reliance on non-probability snowball sampling, I adopted a planned, multi-wave distribution strategy. The temporal spacing of waves was theoretically motivated by two methodological rationales.

First, the staggered launch minimised unrecognised cluster risk by ensuring data collection did not coincide exclusively with periods of high absence, such as school holidays or corporate block leave. Second, this phased approach optimised referral momentum while preventing "community fatigue". Because IT professionals within my professional sphere frequently share mutual connections, a simultaneous mass broadcast could have resulted in individuals receiving multiple forwarded requests concurrently. Staggering the outreach ensured a delayed, organic spread through interconnected networks, wherein subsequent requests acted as natural reminders.

Recruitment was executed in five distinct communication waves, supplemented by continuous in-person solicitations throughout the collection window. Across all targeted email waves, a total of 152 individual emails were dispatched, of which four proved undeliverable, yielding a cumulative email delivery failure rate below 3%.

- **Wave 1, Initial Network Seeding (18 May 2025):** To generate early momentum and initiate snowball referrals, 48 targeted emails were sent to known direct professional contacts, alongside a broadcast on my LinkedIn profile (878 connections).
- **Wave 2, Post-Summer Re-Activation (7-8 October 2025):** To reach respondents unavailable during the holiday period and diversify the sample beyond my immediate professional reach, a second wave of 40 targeted emails was dispatched. Concurrently, an invitation was posted to the JobTalk mailing list of Mensa Germany, a high-IQ society whose members represent a diverse cross-section of professional backgrounds. The exact reach of this distribution list is unknown, as only an unspecified fraction of members subscribed to it.
- **Waves 3 and 4, Incremental Network Deepening (October-December 2025):** To extend penetration into second-degree network connections, successive recruitment waves targeting 29 individuals (20-24 October) and 35 individuals (7 November-3 December) were executed. These phases

leveraged LinkedIn to verify current employment contexts and locate up-to-date contact details prior to email outreach.

- **Final Broad Outreach, Sample Diversification (8-20 December 2025):** To diversify the sample, a concluding digital outreach phase encompassed posts to an expanded LinkedIn audience (902 connections), the Xing business platform (509 contacts), and the German IT professional forum Heise (heise.de/forum). Additionally, broader European IT communities were targeted via specialist platforms, including the Reddit community r/cscareerquestionsEU and various other technical forums. The access constraints encountered during this phase are discussed in Section 3.9.

The total number of recorded interactions and the final participant yield following the application of the filtering protocol are reported strictly as data outcomes in Chapter Four, Section 4.2.1.

Administration and Data Integrity Safeguards. Because the survey was anonymous, a design choice necessary to encourage candid evaluations of immediate supervisors, responses could not be linked to individuals. To safeguard data integrity during data collection and reduce the risk of inadvertent duplicate participation, SurveyMonkey deposited a cookie in the participant's browser on submission, which prevented repeat participation from that browser instance. To reduce the residual risk of deliberate circumvention (e.g., clearing cookies or utilising a different device), the administration protocol included regular, manual data integrity audits conducted approximately once a month throughout the collection window. These audits screened the incoming dataset for suspicious anomalies, such as clusters of rapid sequential completions without a clear promotional trigger, or identical response patterns across the 30-item KAFA instrument.

3.6 Survey Instrument and Variable Operationalisation

3.6.1 Variable Overview Table

To provide a consolidated overview of the study's measurement architecture, Table 3.2 maps each construct to its variable role, measurement level, scale origin, and corresponding survey question numbers.

Table 3.2

Variable Overview Matrix

Construct	Variable Role	Measurement Level	Scale Origin	Survey Question(s)
Overall Job Satisfaction	Dependent variable (DV)	Continuous (5-point)	KAFA (Haarhaus, 2016)	Q5-Q10 (30 items)
Satisfaction with Supervision	Dependent variable (DV)	Continuous (5-point)	KAFA Supervision facet	Q9 (5 items)
Perceived Managerial Programming Skill	Independent variable (IV)	Continuous (5-point; two-item composite)	Researcher-developed	Q13 (programming), Q14 (programming)
Is_Developer (≥ 50% programming time)	Grouping variable (H3)	Binary	Researcher-developed	Q12
Age	Moderator (H4a: career seniority proxy 1)	Continuous	—	Q26
Total Professional Experience	Moderator (H4a: career seniority proxy 2)	Continuous	—	Q27
IT Professional Experience	Exploratory control	Continuous	—	Q28
CS Degree	Moderator (H4b)	Binary (dummy-coded)	Researcher-developed	Q24, Q25
Company Size	Moderator (H4c)	Ordinal-to-continuous (5 brackets)	—	Q22
Gender	Exploratory control	Categorical	—	Q29
Migrant Status	Exploratory control	Binary	—	Q20

Construct	Variable Role	Measurement Level	Scale Origin	Survey Question(s)
Industry Sector	Exploratory control	Categorical	—	Q21
Weekly Working Hours	Exploratory control	Continuous	—	Q23
Manager's Formal Education	Exploratory control	Ordinal / Binary	—	Q16
Programming Time (%)	Covariate / Continuous moderator	Continuous	—	Q12

3.6.2 Methodological Suitability of the Chosen Instrument

The comparative evaluation in Section 2.6 identified the Kurzfragebogen zur Erfassung von Allgemeiner und Facettenspezifischer Arbeitszufriedenheit (KAFA; Haarhaus, 2016) as conceptually and psychometrically superior to alternative German instruments (e.g., ABB, SAZ, COPSOQ). From a methodological perspective, the KAFA is uniquely suited to the quantitative, cross-sectional web survey design adopted for this study. Survey fatigue and respondent attrition are material threats to data quality when researching highly specialised professionals such as software developers. The KAFA's efficient 30-item structure provides the necessary multi-facet diagnostic resolution without the prohibitive respondent burden of the 79-item ABB or the 141-item COPSOQ, making it highly effective for a voluntary online format. Additionally, its 5-point Likert-type response format allows for consistent statistical handling alongside the independent variable, satisfying the parametric assumptions required for hierarchical and moderated multiple regression analysis (Section 3.7). Finally, deploying a culturally native, psychometrically validated instrument intrinsically reduces the cross-cultural validity threats (He & van de Vijver, 2012) highlighted in Section 2.5.

In sum, the KAFA was a positive selection on convergent theoretical, psychometric, and practical grounds, and no alternative German-language instrument satisfied the full set of requirements: native German development and validation rather than translation, an analytically separable Supervision facet required for the targeted test of Hypothesis 3, a respondent burden compatible with voluntary online participation,

a response format supporting parametric moderation analysis, and published validation evidence across heterogeneous German samples (Haarhaus, 2016).

3.6.3 The Dependent Variable: KAFA (Haarhaus, 2016)

The dependent variables representing job satisfaction were operationalised using the Kurzfragebogen zur Erfassung von Allgemeiner und Facettenspezifischer Arbeitszufriedenheit (KAFA; Haarhaus, 2016). The theoretical rationale, historical psychometric validation, and detailed comparative justification for selecting this facet-based instrument are established in Section 2.6; its methodological suitability is outlined in Section 3.6.2.

To preserve the instrument's validated statistical properties, the specific wording of the descriptive adjectives remained identical to Haarhaus's (2016) original design. The 5-point Likert-type response format was applied in accordance with Haarhaus's (2017) follow-up validation, which demonstrated that the 5-point scale yields comparable psychometric properties to the original 11-point format.

In the survey deployment, the instrument's 30 items were mapped directly to six question blocks: Work Itself (Q5), Co-workers (Q6), Development Opportunities (Q7), Pay (Q8), Supervision (Q9), and General Satisfaction (Q10). To eliminate item-level missingness within the job satisfaction scales, all 30 KAFA items were configured as mandatory responses within the SurveyMonkey platform; respondents were required to complete each item before proceeding to subsequent survey sections. Section 3.7.1 sets out the data transformation procedures required prior to analysis, including the reverse-coding of the 13 negatively worded items.

Two continuous composite dependent variables were computed for hypothesis testing:

- Overall Job Satisfaction (KAFA_Overall): The arithmetic mean of all 30 KAFA items.
- Satisfaction with Supervision (KAFA_Manager): The arithmetic mean of the five supervision-specific items (Q9). As theoretically justified in Chapter Two, this analytically isolated facet was employed for the targeted testing of the

attitudinal outcomes associated with dyadic Leader-Member Exchange (LMX) interactions in Hypothesis 3.

The construct validity of the dependent composite constructs is grounded in the instrument's established psychometric properties (Section 2.6). By strictly retaining the original item content and response format, the present study preserves this validated measurement architecture. Preserving the original content and format ensures that the targeted use of the Satisfaction with Supervision facet (KAFA_Manager) accurately isolates the specific attitudinal outcome operating downstream of the LMX dyad required to test Hypothesis 3, free from semantic overlap with unrelated work environment variables.

Haarhaus's (2016) two-sample validation reported Cronbach's alpha between .87 and .91 across all facets, including the *Gesamtzufriedenheit* and *Vorgesetzter* scales relevant to this study; the facet-level coefficients are consolidated in Table 3.3 and are compared against the current-sample estimates in Section 4.2.3.

3.6.4 The Independent Variable: Perceived Managerial Programming Skill

The primary independent variable, *Perceived Managerial Programming Skill* (Mgr_Prog_Skill_2Item), was operationalised as a two-item continuous Likert composite capturing two theoretically distinct but conceptually related dimensions of the manager's technical credibility.

The first item captured the absolute perceived programming skill of the manager. The absolute skill rating was drawn exclusively from the "Programmierung" sub-item of survey question Q13, which asked respondents to rate their manager's knowledge in three areas on a scale from 1 (sehr schwach / very weak) to 5 (sehr gut / very good). The three areas were IT generally, software development, and programming. The second item captured the perceived sufficiency of the manager's programming skill for their managerial role. The sufficiency rating was drawn from the corresponding "Programmierung" sub-item of Q14, which asked respondents to rate the adequacy of their manager's knowledge on a scale from 1 (völlig unzureichend / completely inadequate) to 5 (völlig ausreichend / completely adequate).

Several operationalisation decisions require justification. The construct was measured at the perceptual level, not as objective coding proficiency: the subordinate's perception of the manager's competence functions as an antecedent to the pathways of trust formation and identity recognition (Sections 2.9.4.3 and 2.9.5). The remaining decisions concern item-level measurement choices within this perceptual domain.

First, only the sub-items on programming were extracted from the broader matrix questions Q13 and Q14. The sub-items measuring general IT knowledge and software development knowledge were excluded to maintain theoretical alignment with the study's focus on programming as a uniquely potent cognitive signal (Section 2.8.7).

Second, the comparative self-assessment item (Q15), which asked respondents to rate their manager's skills relative to their own, was excluded from the composite and from all analyses in this thesis. Relative competence comparison represents a conceptually distinct construct that falls outside the defined theoretical scope of this study; its inclusion would have introduced a qualitatively different evaluative dimension that could have compromised the construct validity of the composite scale. This item was retained in the survey instrument for supplementary data capture and is reserved for future research.

Third, computing the composite required complete responses on both component items. Although calculating a usable score from any case possessing at least one applicable item would have marginally increased data retention, the strict dual-item criterion was adopted to ensure construct validity. The two items capture theoretically distinct dimensions of perceived technical credibility: absolute capability (Q13) and perceived sufficiency for the managerial role (Q14). Therefore, permitting a single item to represent the entire composite would compromise the measure's conceptual integrity, effectively reducing a deliberately designed two-dimensional construct to a single-item proxy. The resulting composite sample size and its relationship to the individual item counts are documented in Table 4.2.

These two items captured the core theoretical concept of the subordinate's perception of managerial technical credibility, establishing construct validity. The items assessed two components: how capable the subordinate perceived the

manager's programming to be (Q13), and whether the subordinate judged that capability as sufficient for the managerial role (Q14). Measuring both dimensions reflects the theoretical distinction between Expert Power as a general resource and its adequacy within a specific Leader-Member Exchange dyad (French & Raven, 1959). Together, they capture the experiential appraisal of the supervisor's core technical competence required to test the SDT-LMX-SIT framework. However, it is necessary to delineate what this construct deliberately omitted: the measure did not cover granular technical leadership domains, such as specific programming language syntax, architectural design experience, or verifiable coding proficiency. This focused operationalisation bounds the study's findings to the perceptual domain of general programming credibility, restricting the identification of more precise, syntax-level technical alignments between manager and subordinate.

Operationalising the construct with only two items prioritised conceptual conciseness over psychometric length. Because the two items intentionally sample from related but conceptually distinct dimensions (absolute capacity versus contextual adequacy), a lower internal consistency compared to longer scales is a predictable mathematical consequence of a concise measure and does not indicate poor psychometric quality. As Darwish et al. (2016) observed, drawing upon the methodological frameworks of DeShon (1998) and Gerhart et al. (2000), scales comprising fewer measuring items mathematically yield lower reliability estimates compared to longer instruments.

Because conventional Cronbach's alpha is highly sensitive to scale length and is generally considered a conceptually limited metric for bi-item constructs (Cortina, 1993; Eisinga et al., 2013), the inter-item correlation (*r*) was adopted as the psychometrically preferred metric for evaluating internal consistency. Additionally, the Spearman-Brown prophecy formula (Cortina, 1993) was applied to mathematically project the reliability the scale would achieve if hypothetically lengthened to match a multi-item benchmark, thereby isolating the effect of scale brevity from per-item measurement quality. The empirical results of this reliability evaluation are reported in Section 4.2.3.

Operationalising the independent variable as a two-dimensional composite was a deliberate, theory-driven decision to measure the construct with two items. French and Raven's (1959) construct of Expert Power fundamentally relies on two

irreducible facets: raw technical capability (Q13) and the follower's contextual judgement that this capability suffices for the managerial role (Q14). A single-item measure would capture only one facet and under-represent the construct. Supporting this two-dimensional specification, DeShon (1998), Gerhart et al. (2000), and Darwish et al. (2016) demonstrated that concise composites remain psychometrically defensible provided their components are theoretically distinct.

Because the role-adequacy facet (Q14) is an evaluative judgement, it inherently shares conceptual surface with the supervisory-satisfaction dependent variable. This construct overlap represents a predictable methodological consequence of faithfully capturing Expert Power, rather than a latent defect. To address this tautological risk while preserving theoretical integrity, subgroup-specific inter-item correlations were specified (Section 4.2.3). Rather than treating the Q13-only metric solely as a sensitivity probe, the present study employs it as a pre-planned confirmatory robustness analysis designed to establish the conservative lower bound of the focal predictive effects (reported in Sections 4.4.1, 4.4.2, and 4.4.3.2).

3.6.5 Grouping and Moderating Variables

Is_Developer (H3). The core grouping variable for Hypothesis 3 was computed using a strict behavioural threshold: respondents dedicating 50% or more of their typical working time to active programming (Q12) were classified as *Core Software Developers*; those falling below this threshold were classified as o*ther IT experts*. The resulting subgroup sizes are reported in Section 4.3.4. The developer role was operationalised through a behavioural threshold based on actual task time rather than inconsistent corporate job titles (see Section 1.5.2). This operational choice is grounded in Role Theory (Biddle, 1986) and SIT, which predict that the daily cognitive reality of programming, independent of any nominal label, forms the identity-forming experience driving the moderation effect tested in H3. A sensitivity analysis was conducted in Chapter Four (Section 4.4.3.1) to evaluate whether this design choice held empirically.

Career Seniority: Age and Professional Experience (H4a). Age was measured as the respondent's absolute chronological age in years (Q26). Total professional experience was measured in years (Q27). Consistent with the conceptual definitions

(Section 1.4), these two continuous variables served as the formal, pre-specified proxies for career seniority in the confirmatory testing of the Status Incongruence proposition (Kunze & Menges, 2017). Because the survey instrument did not capture the manager's age, true relative status incongruence, meaning the specific age gap between a younger manager and an older subordinate, could not be directly computed. The use of the subordinate's absolute age as a proxy may therefore have attenuated the sensitivity of the H4a test.

CS Degree (H4b). Educational background was operationalised by cross-referencing two distinct survey items: the respondent's highest qualification level (Q24) and the open-ended free-text specification of the field or profession of that qualification (Q25). This cross-referencing was methodologically necessary because Q25 alone cannot distinguish between distinct educational paths. For example, Q25 cannot differentiate a respondent who completed a university degree in Informatik from one who completed a vocational *Fachinformatiker* apprenticeship in the same domain. This distinction is central in the German educational system. Because the field-of-study response (Q25) was qualitative, a systematic coding protocol was applied. Algorithmic string-matching in SPSS (e.g., extracting roots such as Informatik, Software, Computer Science) was combined with a thorough manual qualitative review. This combined approach ensured that typographical errors (e.g., *COM0PUTER SCIENCE*), abbreviations (e.g., *FIAE*), and bilingual designations (e.g., *Frontend Dev*, *Anwendungsentwickler*) were accurately mapped. A binary dummy variable was then computed. This variable isolated respondents who possessed both a formal university degree (Bachelor's, Master's, equivalent diploma, or Doctorate, as determined from Q24) and a major in a CS-specific or closely related technical discipline (as determined from Q25).

Company Size (H4c). Company size was measured ordinally across five substantive brackets (Q22): 1-9 employees, 10-49, 50-249, 250-5,000, and over 5,000 employees. The survey instrument included a sixth response option, "Weiß ich nicht oder möchte ich nicht angeben" ("I don't know or prefer not to say"), which was provided to reduce forced responding. These responses were treated as missing data and excluded from the ordinal-to-continuous conversion to preserve the metric properties of the scale. For the moderation analysis, the valid five-bracket variable

was treated as continuous (ordinal-to-continuous) to permit its inclusion as a moderator in hierarchical regression models.

Exploratory controls. Additional variables captured for exploratory analysis included IT-specific professional experience in years (Q28), gender (Q29), migrant status (Q20), industry sector (Q21), weekly working hours (Q23), and the manager's formal educational level (Q16). IT-specific professional experience was not pre-specified as a confirmatory H4a proxy; the variable was retained as an exploratory control to permit post-hoc examination of whether domain-specific tenure shows an independent association with the focal relationship, as reported in Section 4.4.4.1.

3.6.6 Translation and Bilingual Deployment

All survey questions and instructions were originally authored or sourced in German. The bilingual deployment was motivated by the international composition of the German IT workforce. Although the majority of IT professionals in Germany are native German speakers, a sizeable minority are international migrants for whom English is the primary professional language. Offering the survey in both languages promoted inclusivity, minimised language-based selection bias, and ensured accessibility for a diverse target population. To maintain a consistent linguistic frame of reference, respondents selected their preferred language at the start of the survey, but language switching within the questionnaire itself was restricted.

Translating a psychometric instrument such as the KAFA without compromising its validated psychometric properties is a substantial methodological undertaking (Van de Vijver & Hambleton, 1996). I executed a complete English translation. My bilingual proficiency is formally attested by a TOEFL score of 118 out of 120, obtained in 2013. This proficiency is practically grounded in nearly two decades of continuous professional English-language use in international IT settings, including investment banking teams in Switzerland and Germany and corporate engagements in London.

The translation procedure prioritised semantic equivalence over literal correspondence. In cases of divergent usage between American and British English, the British English variant was used throughout, consistent with the conventions of the awarding institution. I employed a multi-tool verification protocol: I supplemented

my initial draft translations with neural machine translation tools (e.g., DeepL) for longer phrasing, supplemented by the detailed bilingual German-English dictionary LEO for context-specific terminology. I then cross-checked the resulting English text for grammatical accuracy and natural register using Grammarly.

To safeguard conceptual equivalence, a back-translation protocol was implemented (Brislin, 1970). All translated English questionnaire strings were independently back-translated into German using both DeepL and Google Translate. Where back-translations diverged from the original formulation, the discrepancy was subjected to detailed contextual analysis. This analysis involved conducting targeted internet searches for specific terms within an IT professional context and consulting domain-specific software engineering trade literature. The Linguee parallel corpus database was queried to verify how specific psychological and technical terms are conventionally operationalised within professional environments. Through this iterative back-translation process, the conceptual integrity of the source instrument was preserved while accommodating essential idiomatic differences.

3.6.7 Pilot Testing

Prior to live deployment, the bilingual questionnaire was piloted to evaluate its clarity, comprehensibility, face validity, and cross-language equivalence. The prototype was deployed in situ on the SurveyMonkey platform to replicate the intended respondent experience, including visual layout, question flow, and response mechanics, avoiding reliance on decontextualised text files.

3.6.7.1 Expert Panel Composition and Procedure

I invited an initial purposive sample of 10 bilingual IT professionals from my extended professional network via email and LinkedIn. Following a single reminder, seven detailed reviews were completed (a 70% response rate) within a 2- to 12-day window. The panel was stratified to ensure both linguistic and demographic rigour:

Native English Cohort (*n* = 3): This group comprised three highly experienced expatriate IT professionals originally from the United Kingdom, the United States, and India, accurately capturing the primary demographic origins of native English-speaking IT migrants in Germany. The group included one woman and two men, all

holding advanced academic degrees: a PhD in Physics, an MBA, and a BTech in Computer Science. Their professional experience spanned roles such as Software Engineer, Principal Data Engineer, and Head of Risk Assessment across diverse industries in the DACH region. All three cohort members spoke fluent German.

Native German Cohort (*n* = 4): This group comprised four native German IT professionals geographically dispersed across Bavaria, North Rhine-Westphalia, and Berlin, ensuring broad coverage of regional professional idioms. All four panellists were current or former software developers operating in various roles across the Software Development Life Cycle (SDLC).

A key shared characteristic was that I had previously worked with each reviewer in professional IT settings. This established professional relationship ensured a high level of candour in the feedback, while the panellists' diverse backgrounds minimised the risk of uniformly biased evaluation.

3.6.7.2 Audit Trail of Refinements

The panel was tasked with carefully evaluating the prototype for typographical errors, grammatical weaknesses, and comprehension barriers. Native English speakers were explicitly requested to evaluate both language versions to validate cross-linguistic equivalence. The feedback generated a detailed audit trail, leading to several concrete methodological refinements prior to launch:

Validation of Psychometric Redundancy: Three German-speaking reviewers independently noted that the KAFA items (Q5 - Q10) were perceived as repetitive or overlapping. This feedback successfully validated the facet-based psychometric structure of the original KAFA instrument, which relies on multi-item semantic redundancy to ensure construct reliability (Haarhaus, 2016). The item structure was therefore left unaltered.

Orthographic Corrections and Source Rectification: A German-speaking reviewer identified a minor typographical error in a German answer option I authored, which I immediately corrected. This discovery prompted a second audit of the instrument. The audit identified and rectified a pre-existing typographical error embedded within

the original, published KAFA source material for item V4 (the misspelling "vetrauenswürdig" was corrected to the proper spelling "vertrauenswürdig").

Idiomatic English Refinements: The bilingual review process proved essential for resolving subtle idiomatic discrepancies. It formally served as a psychometric safeguard against the cross-cultural item bias defined earlier (He & van de Vijver, 2012; see Section 2.5.2). For example, the preliminary English translation of one KAFA item read: "My activities are quite uninteresting." An English-native reviewer highlighted that this phrasing felt unnatural in everyday usage. Following consensus checks with the other English reviewers and online corpus resources, the item was revised to: "My activities are not interesting." Similarly, the German KAFA item describing co-workers as "zerstritten" was initially translated as "discordant". A reviewer flagged this term as overly formal in a modern workplace context. Following cross-checking, the translation was updated to the highly intuitive idiom "at odds".

After implementing these refinements, all seven panellists formally confirmed that the final questionnaire was comprehensible and unambiguous in both languages. To prevent contamination of the primary research dataset, all anonymous response data collected during this prototype phase were permanently deleted from the SurveyMonkey database before the main study was launched.

3.6.7.3 Technical Usability Testing

In parallel with the linguistic and psychometric evaluations conducted by the expert panel, the survey instrument was systematically tested across the most prevalent desktop and mobile browsers and operating systems. Particular emphasis was placed on responsive design to ensure that all matrix questions, Likert scales, and text fields rendered correctly and could be comfortably navigated on both large monitors and smartphone displays. Testing confirmed full cross-platform compatibility without display or navigational errors, ensuring that device or browser incompatibility did not introduce a structural barrier to participation.

3.6.8 Measurement Validity Summary

Content and construct validity of all composite constructs were established prior to the empirical analyses. Table 3.3 summarises the prior validity evidence, historical reliability evidence where available, and the applied reliability evaluation strategy for each composite construct employed in the study's hypothesis tests. The sample-specific reliability coefficients derived from the present dataset are reported exclusively in Chapter Four (Section 4.2.3).

Table 3.3

Summary of Construct Validity, Prior Reliability Evidence, and Evaluation Strategy

Construct	Content and Construct Validity Evidence	Prior Reliability Evidence / Evaluation Strategy
Overall Job Satisfaction (KAFA_Overall; 30-item composite)	Researcher-computed composite derived from all 30 KAFA items. Its content validity is grounded in the validated six-scale KAFA architecture established by Haarhaus (2016; see Section 2.6). The present composite therefore builds on the validated KAFA item set deployed without modification, although it is not identical to Haarhaus's original five-item *Gesamtzufriedenheit* scale.	Historical reliability evidence from Haarhaus (2016) for the original five-item KAFA *Gesamtzufriedenheit* scale (α = .90, Sample 1; α = .88, Sample 2) is reported in Section 3.6.3. Current-sample reliability for the 30-item composite used in this study is reported in Section 4.2.3.
Satisfaction with Supervision (KAFA_Manager; 5 items)	Analytically isolated supervision facet of the KAFA, corresponding directly to Haarhaus's (2016) validated *Vorgesetzter* facet. Its targeted use is theoretically aligned with dyadic LMX dynamics, as justified in Section 2.6 and operationalised in Section 3.6.3.	Historical reliability for the KAFA supervision facet (*Vorgesetzter*; α = .91 in both Haarhaus, 2016, samples) is reported in Section 3.6.3. Current-sample reliability is reported in Section 4.2.3.
Perceived Managerial Programming Skill (Mgr_Prog_Skill_2Item; 2 items)	Researcher-developed two-dimensional composite reflecting the distinction between expert power and contextual adequacy (French & Raven, 1959). Domain-specific exclusions and the omission of the relative comparison item were theoretically justified in Section 3.6.3 to preserve construct clarity and alignment with the SDT-LMX-SIT framework.	No prior psychometric history exists because this is a novel researcher-developed composite. Its internal consistency was evaluated empirically in Chapter Four. In accordance with Section 3.6.3, inter-item correlation was treated as the primary reliability indicator for the bi-item construct, with Cronbach's alpha reported secondarily in Section 4.2.3.

Note. For the KAFA scales, see Section 2.6 (conceptual justification) and Section 3.6.3 (historical reliability).

Procedural and analytical design safeguards to reduce shared method variance were built into the study at the design stage (Section 3.7.3). These safeguards were supplemented by a post-hoc diagnostic (Harman's single-factor test), reported in Chapter Four (Section 4.2.4), and are evaluated substantively in Section 6.4.1.

3.7 Data Analysis Strategy

To address Research Objective 4, the data analysis evaluated the SDT-LMX-SIT framework in sequence. The analysis moved from baseline empirical correlations (H1) and the isolation of unique predictive variance (H2) to the moderating boundary conditions of the focal relationship (H3 and H4a to H4c).

3.7.1 Data Preparation and Filtering Protocol

I applied a sequential exclusion protocol to the raw dataset to isolate the target population, removing cases according to the following pre-defined criteria:

1. Respondents who failed to confirm informed consent could not proceed past the first page and abandoned the survey.
2. Respondents who did not identify as IT professionals at all (answering "Nein" / "No" to both Q2 and Q3) were removed via survey branching logic. Subsequently, all respondents who indicated they were self-employed contractors (Q3) were systematically excluded from the dataset post hoc via SPSS syntax. This two-stage exclusion brings the dataset into line with the target population definition.
3. Respondents reporting a primary work location outside of Germany (Q19) were excluded to control for macroeconomic and cross-cultural variations.

The exact number of cases removed at each stage of this protocol and the final functional sample size retained for analysis are reported in Section 4.2.1.

Categorical-to-continuous recoding. Categorical string variables derived from the survey's Likert scales were recoded into corresponding numerical continuous variables ranging from 1 to 5. The 13 negatively worded KAFA items were reverse-coded so that higher scores consistently represent more positive evaluations.

Responses of "Unbekannt" ("Unknown") in the managerial skill assessments (Q13-Q15) were coded as system-missing values to exclude them from numerical scaling.

Composite scale computation. Three primary composite variables were calculated: KAFA_Overall (arithmetic mean of all 30 KAFA items), KAFA_Manager (mean of the five supervision items), and Mgr_Prog_Skill_2Item (mean of the two programming skill items from Q13 and Q14). Because all KAFA items were configured as mandatory responses (see Section 3.6.3), all cases retained in the analytical sample possessed complete KAFA data, preventing item-level missingness for these scales. To preserve construct validity, computing the independent variable composite strictly required valid numerical responses on both component items (Section 3.6.4); as a result, an "Unknown" response on either item resulted in a missing composite score for that case. Following established psychometric conventions, composite scores derived from multiple Likert-type items were treated as continuous interval data, which is considered appropriate for parametric statistical analysis (Norman, 2010; Sullivan & Artino, 2013).

Available-case analysis. A protocol was established for handling respondents who completed all core analytical variables but discontinued participation before finishing the final demographic questions. Provided that such cases represented only a negligible fraction of the overall sample, applying complex imputation algorithms was deemed disproportionate (Little & Rubin, 2002). Instead, these cases were retained using available-case analysis. This was operationally executed by retaining valid cases on an analysis-by-analysis basis (via model-specific listwise deletion in regressions) to maximise statistical power without introducing systematic bias. The actual extent of late-stage attrition is reported in Section 4.2.1.

These transformations were specified before accessing the final dataset and implemented without deviation; their execution and resulting sample sizes appear in Section 4.2.2.

3.7.2 Non-Response Bias Testing

To test for potential non-response bias, any respondents who discontinued participation late in the survey, retaining complete data on the primary analytical variables but lacking demographic data, were treated as a proxy for non-responders,

based on the continuum assumption of time-trend extrapolation (Armstrong & Overton, 1977). Independent-samples *t* tests were conducted comparing fully completed responses against these discontinued responses. Because such late dropouts were anticipated to represent only a small fraction of the total sample, the resulting comparison inherently involved highly unequal group sizes. In accordance with the general *t* test protocol established for such disparities in Section 3.7.5, the Welch-Satterthwaite adjustment (equal variances not assumed) was adopted as the default. Hedges' *g* was therefore selected as the bias-corrected effect size metric (Field, 2024, p. 499). This metric is preferred over Cohen's *d* for very small groups because the adjustment explicitly corrects for the small-sample upward bias inherent in the uncorrected estimator (Hedges, 1981, pp. 112-113). Finding no statistically significant differences across all primary constructs was pre-specified as the criterion for confirming that retaining these cases did not introduce practical bias, consistent with a Missing Completely at Random (MCAR) or Missing at Random (MAR) assumption (Little & Rubin, 2002).

3.7.3 Controlling Common Method Bias (CMB)

Given the cross-sectional, single-source nature of the data, the potential for Common Method Bias (CMB) requires careful evaluation against established empirical baselines. Cote and Buckley (1987) estimated that method variance across construct validation studies averages 26.3% overall, ranging from 22.5% for job performance and satisfaction measures to 40.7% for attitude measures. The methodological design set the following rule in advance: if the unique variance (R^2) attributable to the focal predictor fell within this range, the variance's magnitude alone would not suffice to rule out a CMB artefact. Procedural, analytical, and diagnostic safeguards were implemented to assess the validity of observed effects. The empirical evaluation of this criterion is presented in Section 6.4.1. CMB was addressed through a combination of pre-planned procedural safeguards, an embedded analytical defence, and a post-hoc diagnostic.

Procedural safeguards. Two procedural remedies endorsed by Podsakoff et al. (2003, pp. 887-888) were embedded in the survey design:

- Logical separation: The predictor variable (managerial skills assessment, Q13-Q14) was positioned in a separate section from the criterion variables (KAFA job satisfaction items, Q5-Q10) within the survey flow, reducing artefactual covariance arising from item proximity.
- Assurance of respondent anonymity: Anonymity was guaranteed, and IP address logging was disabled, to limit social desirability bias.

Additionally, the KAFA instrument contains 13 negatively worded (reverse-coded) items as part of its validated psychometric structure (Haarhaus, 2016). These items were retained to preserve the instrument's validated factorial properties. While reverse-coded items are sometimes advocated as a means of disrupting acquiescence response sets (Hinkin, 1995), Podsakoff et al. (2003, p. 884) cautioned that such items may themselves produce spurious response factors. These reverse-coded items are acknowledged as an inherent feature of the adopted instrument, and the present study does not claim the items as a deliberate CMB countermeasure.

Analytical safeguard. Beyond the procedural measures, the use of hierarchical moderated multiple regression (MMR) for hypotheses H3 and H4a to H4c carries a built-in mathematical safeguard against CMB. Siemsen et al. (2010) showed that common method variance systematically attenuates interaction terms in regression models rather than inflating them. If some theoretically coherent interactions reach significance while others do not, that pattern of differential moderation is inconsistent with a pervasive method artefact, which would suppress all interactions indiscriminately. This constitutes the primary structural defence for interpreting the moderation outcomes of the study.

Statistical diagnostic. Harman's single-factor test was conducted post hoc. All continuous items comprising the primary independent and dependent constructs were loaded into an unrotated principal component analysis (PCA). Podsakoff et al. (2003, p. 889) cautioned that this test is insensitive and that extracting multiple factors does not, in itself, show that measures are free of common method variance. The test is therefore reported here as a widely used preliminary diagnostic, not as definitive statistical proof of the absence of CMB. The primary CMB defence rests on the procedural and analytical safeguards described above, specifically the

mathematical properties of the differential moderation design (Siemsen et al., 2010), evaluated empirically in Section 6.4.1.

3.7.4 Statistical Assumption Testing

Prior to evaluating the theoretical propositions, the dataset was tested against the core assumptions of multivariate parametric statistics (Field, 2024, pp. 269-270; Tabachnick & Fidell, 2019).

Multivariate outliers. Mahalanobis distances (D^2) were evaluated against a critical threshold of $\chi^2(3) = 16.266$, $p < .001$ (outcomes reported in Section 4.2.4).

Normality. Univariate skewness and kurtosis were evaluated against the acceptable ±2.0 range (George & Mallery, 2024). The pre-planned analytical strategy stipulated that if the independent variable exhibited a platykurtic (negatively kurtotic) distribution, as predicted by the bimodal perception thesis developed in Section 2.8.7.1, this distributional shape was to be interpreted as a substantive theoretical finding in its own right, distinct from a statistical assumption violation.

Linearity. Linear relationships were confirmed via visual inspection of bivariate scatterplots.

Homoscedasticity. Constant residual variance was confirmed via visual inspection of standardised residual plots (ZRESID vs. ZPRED).

Multicollinearity. Variance Inflation Factor (VIF) and Tolerance scores were computed at every block step, applying a conservative cut-off of VIF < 3.0 (Hair et al., 2019).

3.7.5 Hypothesis Testing Procedures

For consistency, effect sizes in all inferential analyses were evaluated against Cohen's (1988) conventional benchmarks for the behavioural sciences, summarised in Table 3.4.

Table 3.4

Consolidated Effect-Size Benchmarks (Cohen, 1988)

Metric	Application	Small	Medium	Large
r	Bivariate correlations (H1)	.10	.30	.50
f^2	Unique predictive variance in regression (H2-H4); power analysis	0.02	0.15	0.35
Hedges' *g*	Standardised mean differences (non-response bias)	0.20	0.50	0.80

Note. Hedges' *g* is used in place of Cohen's *d* when sample sizes are highly unequal (see Section 3.7.2).

All inferential statistical testing was executed using IBM SPSS Statistics, version 30, with the alpha level set a priori at .05. For all independent-samples *t* tests conducted in this study, the Welch-Satterthwaite approximation for degrees of freedom (equal variances not assumed) was adopted as the default under either of two conditions. These conditions were (a) a significant result on Levene's test for equality of variances ($p < .05$), indicating observed variance heterogeneity, or (b) extreme group-size disparities. As Field (2024, p. 301) notes, severe discrepancies in sample sizes substantially reduce the statistical power of Levene's test to detect variance heterogeneity, making the test an underpowered, and therefore inappropriate, basis for selecting between the pooled and separate-variance t-statistics. The Welch-Satterthwaite adjustment performs equivalently to the pooled *t* test when variances are in fact equal, while providing reliable protection when they are not. This default therefore entails no inferential cost under condition (b) and guards against inflated Type I error under condition (a).

H1 (Correlation). A Pearson product-moment correlation analysis was conducted to examine the strength and direction of the bivariate association between Perceived Managerial Programming Skill and overall job satisfaction. Effect size was interpreted using the *r* benchmarks in Table 3.4.

H2 (Hierarchical regression). To assess the predictive power of Perceived Managerial Programming Skill, a two-stage hierarchical multiple linear regression was employed. Hierarchical entry was explicitly selected over simultaneous entry to mathematically isolate the unique incremental variance attributable to the focal

predictor beyond theoretically prior demographic and occupational controls, consistent with the confirmatory logic of evaluating incremental validity (Cohen et al., 2003). Known demographic and occupational covariates were forced into Block 1 before introducing the independent variable in Block 2. This sequence isolated the unique variance (ΔR^2) attributable to the manager's technical credibility, controlling for baseline characteristics (Cohen et al., 2003). In Block 1, the respondent's age was entered as a proxy for dispositional and career-stage variations (Erdogan et al., 2012), and programming time to control for situational characteristics of the work itself (Hackman & Oldham, 1976). Isolating these effects first ensures that any variance subsequently attributed to the manager in Block 2 is uniquely associated with the manager's perceived technical competence.

Block 2 introduced the primary independent variable (Mgr_Prog_Skill_2Item). The focal metric is the ΔR^2 attributable to Block 2, which isolates the unique variance contributed by the manager's technical competence (Cohen et al., 2003). For hierarchical regression, the unique predictive contribution of focal predictors was quantified using Cohen's f^2 (computed as $\frac{\Delta R^2}{1-R^2_{full}}$; Cohen, 1988, p. 410; Selya et al., 2012). Effect sizes were interpreted using the f^2 benchmarks in Table 3.4.

H3 (Moderated regression). Hierarchical moderated multiple regression (MMR) was used to test the boundary conditions posited by Role Theory, Social Identity Theory, and the contextual moderators. MMR was preferred over subgroup approaches such as ANOVA because it keeps the independent variable continuous and so avoids artificial dichotomisation and the loss of statistical power that follows (Aiken & West, 1991; Hayes, 2022). The interaction term gives a direct statistical operationalisation of the theoretical concept of a boundary condition. For H3, a hierarchical moderated multiple regression was conducted to test the role-based moderation effect.

The dependent variable was narrowed to Satisfaction with Supervision (KAFA_Manager) as specified by the hypothesis, for a focused test of the proximal attitudinal correlate of LMX. The continuous independent variable was mean-centred prior to creating the interaction term to reduce multicollinearity (Aiken & West, 1991; Hayes, 2022). Block 1 entered the main effects (mean-centred managerial skill and

the binary Is_Developer variable). Block 2 introduced the interaction term (Centred Skill × Developer Role).

To maintain strict statistical conservatism and guard against Type I errors, all main effects and interaction terms across the study were evaluated using standard two-tailed significance tests (α = .05). This conservative inferential stance was maintained even for directionally hypothesised relationships (H1, H3, H4a-c) to permit the symmetric detection of unexpected counter-directional trends (as materialised for career seniority in H4a). Comparing subgroup bivariate correlations (*r*) is sometimes used to triangulate moderation, but it was excluded here. Correlation is highly sensitive to subgroup data variance (restriction of range). As the independent variable exhibits radically different distributional variances across the two professional subgroups (see Section 4.5.1), the standardised *r* values would mathematically diverge even if the unstandardised predictive slope (*B*) was identical. Moderation was evaluated strictly using the unstandardised interaction term (*B*) in the regression models, explicitly excluding the comparison of subgroup bivariate correlations (*r*). Relying on the unstandardised slope gives an unbiased test of the interaction effect (Aiken & West, 1991), precluding the structural biases inherent in variance-dependent correlation comparisons.

H4a-c (Moderation series). A series of hierarchical moderated regressions was conducted, following the same mean-centring protocol. The two career seniority proxies for H4a (age and total professional experience) were entered as continuous moderators in separate models; the binary moderator (CS degree) was dummy-coded. Company size was treated as continuous (ordinal-to-continuous). Each moderation model was tested against both KAFA_Overall and KAFA_Manager to ensure that null findings were not an artefact of the dependent variable specification.

3.7.6 Exploratory Analysis Protocols

In addition to the confirmatory hypothesis tests, exploratory analyses were pre-specified. Their exploratory (non-hypothesis-driven) status was justified by the absence of sufficiently strong theoretical bases in the existing literature to support formal hypotheses.

Distributional analysis of the independent variable. Kurtosis values were evaluated against ±2.0 thresholds, supplemented by Shapiro-Wilk normality tests and visual inspection of frequency histograms for the full sample and by subgroup (Core Software Developers vs. other IT experts). This analysis directly tested the "hollow middle" / bimodal perception thesis derived from Section 2.8.7.1.

Triangulation of the Szczepanski Proposition. An independent-samples *t* test was conducted on the explicit industry belief item (Q18), which directly assesses respondent agreement with the Szczepanski Proposition (Section 1.5.2). This industry belief item provided qualitative-to-quantitative triangulation, comparing implicit regression patterns with explicit respondent beliefs.

Formal education versus perceived skill. A two-stage hierarchical regression was conducted entering the manager's formal academic education (Q16, dummy-coded as university degree versus no university degree) in Block 1, followed by actual perceived programming skill in Block 2. This hierarchical model tested whether formal credentials possessed any independent predictive power over the subordinate's satisfaction with supervision; a credential irrelevance test grounded in the distinction between Legitimate Power and Expert Power (French & Raven, 1959).

To assess the generalisability of the H4 findings and check the main effect against unmeasured subgroups, a supplementary set of exploratory moderated regressions was conducted. These tests utilised the remaining contextual variables classified as exploratory controls in Table 3.2, specifically, employment within the core IT sector (derived from Q21), gender (Q29), migrant status (Q20), and weekly working hours (Q23), as additional interaction terms with the independent variable. The analytical protocol mirrored the mean-centring and hierarchical block structure specified for H4a-c in Section 3.7.5.

3.7.7 Sensitivity Analysis Design

The role-based moderation test (H3) relied on a researcher-defined behavioural threshold (50% programming time) to classify participants. Dichotomising continuous variables incurs a well-documented loss of statistical information, including reduced effect sizes and diminished statistical power, which can artificially obscure genuine

interaction effects (MacCallum et al., 2002). To address this constraint, a multi-step sensitivity analysis was designed to test whether the initial non-significance of the categorical H3 test represented a genuine absence of moderation, or merely a statistical artefact.

Title-based re-classification. Participants were re-classified into developers and other IT experts based on a qualitative semantic review and binary dummy-coding of their self-reported corporate job titles (Q11), irrespective of their actual programming time. A hierarchical moderation regression using this identity-based grouping tested whether the moderation effect was driven by social identity (a title) or cognitive task reality (actual programming behaviour).

Fully continuous moderation model. Programming time (Q12) was entered as a continuous moderator (mean-centred) to test whether the psychological importance of managerial skill increases linearly with daily programming intensity, without any categorical threshold.

Iterative threshold analysis. The binary classification was re-computed across thresholds of 0, 20, 30, 40, 50, 60, 70, and 80%, and the moderation regression was re-run at each. This tested whether the 50% cut-off reflects a genuine psychological boundary or a statistical artefact.

3.8 Ethical Considerations

This research was conducted in full adherence to the ethical guidelines established by the University of Gloucestershire, from which ethical approval was obtained prior to data collection. Because the target population comprised IT professionals residing in Germany, the data collection protocol was explicitly designed to fall entirely outside the material scope of the European Union's General Data Protection Regulation (GDPR, 2016), Germany's implementation of the GDPR (*Datenschutz-Grundverordnung*, DSGVO), and the German Federal Data Protection Act (Bundesdatenschutzgesetz, BDSG, 2017). By systematically precluding the collection of any personally identifiable information (PII), including names, email addresses, employer identifiers, geolocation data, and IP addresses, and by screening all free-text responses for inadvertently entered PII during data

preparation, the methodology ensured that the resulting dataset was strictly anonymous, thereby satisfying the legal exclusion defined in Recital 26 of the GDPR. Notwithstanding this scope exclusion, the substantive ethical principles underpinning these instruments (informed consent, anonymity, data minimisation, and secure handling) were treated as binding research-ethics commitments. The core ethical principles were operationalised through the following mechanisms.

- **Informed Consent and Voluntary Participation.** Prior to accessing any survey items, all participants were presented with a mandatory disclaimer (Q1). This disclaimer explicitly detailed the study's purpose, the estimated time for completion, and the respondents' rights, including the exclusive use of their data for research purposes. Participants were required to actively confirm their legal age of majority and their informed consent before proceeding. Participation was voluntary, and respondents retained the right to withdraw from the survey at any point prior to final submission without penalty.
- **Anonymity and Confidentiality.** To encourage candid responses, particularly regarding the sensitive evaluation of immediate supervisors, the survey was administered anonymously. No personally identifiable information (PII), such as names, email addresses, or corporate affiliations, was solicited at any stage. IP address logging was disabled within the SurveyMonkey deployment settings to prevent any digital tracking or deanonymisation of the respondents. The use of browser cookies to prevent duplicate participation (as detailed in Section 3.5.5) was limited to functional session management and did not collect or store personally identifiable information.
- **Data Minimisation (*Datensparsamkeit*).** In accordance with the German data protection principle of data minimisation, the questionnaire was designed to collect only the demographic and occupational data strictly necessary for evaluating the research hypotheses.
- **Secure Storage and Exclusive Use.** All collected raw data were stored securely on encrypted, password-protected systems accessible only to me. Participants were assured in the introductory disclaimer that their responses would be aggregated and utilised exclusively for the purposes of this doctoral research.

3.9 Methodological Limitations

Eleven primary methodological constraints are intrinsic to this research design. The first five concern measurement and inference: (1) potential sample size constraints, (2) a cross-sectional design preventing definitive causal inference, (3) non-probability snowball sampling introducing potential selection bias, (4) the proxy operationalisation of status incongruence, and (5) potential common method variance due to self-report measurement. The remaining four concern data quality and access: (6) translation equivalence risks, (7) sample-level survivorship bias, (8) residual duplicate participation risk inherent to anonymous designs, and (9) digital gatekeeping within online communities. Two additional constraints relate to the independent variable specifically: (10) its high-level abstraction, which captures broad perceptions of programming credibility but precludes the analysis of granular, syntax-level technical competencies, and (11) its inherently lower internal consistency as a two-item composite compared to the multi-item dependent scales. Random measurement error systematically attenuates observed regression coefficients towards zero (DeShon, 1998, p. 413; Gerhart et al., 2000, pp. 805-809). As a result, the reported effect sizes for Perceived Managerial Programming Skill likely understate the true population-level relationships.

Two of the eleven constraints warrant particular emphasis. Constraint (3) extends beyond a formal sampling caveat. Because the initial sample was seeded from my own professional network and expanded through referral chains, respondents were reachable only through interconnected professional communities. Referred participants tend to resemble their recruiters in seniority, sector, and professional outlook, so the achieved sample systematically excludes IT professionals outside these networks and may over-represent attitudes correlated with network membership. The direction of any resulting selection bias cannot be estimated from the data. The immediate consequence is low statistical generalisability: the findings strictly describe the sampled population and cannot be statistically generalised to the German IT workforce as a whole, still less to IT workforces in other national contexts. Chapter Four therefore claims analytical transferability rather than statistical generalisation (Section 4.6), and Section 6.4.1 evaluates the residual risks in detail.

Constraint (11) likewise deserves explicit emphasis. The study's central predictor rests on only two items (Q13 and Q14), a researcher-developed composite with no prior psychometric history. Beyond the mathematically expected reduction in internal consistency, a two-item measure samples the construct domain of technical credibility narrowly, and the role-adequacy item (Q14) shares conceptual surface with the supervisory-satisfaction criterion (Section 3.6.4). These properties constrain the evidential weight that any single test involving this composite can carry, and they bear directly on the interpretation of the role-based moderation hypothesis (H3), whose verdict in Chapter Four depends on the chosen operationalisation. The implications are evaluated in Sections 4.2.3, 4.4.3.2, and 6.4.1.

Procedural mitigations for these constraints (e.g., technical anonymity controls, structured forward- and back-translation protocols, and statistical remedies) have been detailed in their respective methodological sections above. A detailed critical evaluation of how these unresolved methodological boundaries impact the interpretation and generalisability of the empirical findings is provided in Chapter Six (Section 6.4.1).

3.10 Chapter Summary

This chapter operationalises the integrated SDT-LMX-SIT theoretical framework established in Chapter Two into a testable empirical research design. Within a post-positivist epistemological framework and following hypothetico-deductive logic, a quantitative, cross-sectional survey approach was adopted to align with the objectivist mental models of the IT target population (see Section 3.2.3).

The target population was defined as employed IT professionals residing in Germany, with self-employed contractors excluded on construct validity grounds (Section 3.5.2). Data were collected via a bilingual, web-based questionnaire deployed through a structured, five-wave distribution strategy spanning approximately nine months (Section 3.5.5). Distribution channels included targeted personal email outreach, professional networking platforms, specialist IT forums, and in-person recruitment. The English translation was produced through a structured forward-and-back-translation protocol and validated by a bilingual expert panel (Section 3.6.6). The instrument integrated the psychometrically validated KAFA

(Haarhaus, 2016) to capture job satisfaction and a bespoke bi-item composite to measure Perceived Managerial Programming Skill. The actual participant yield of the data collection process and the final functional sample size following the application of all exclusion criteria are presented in Chapter Four.

The analytical strategy comprised data cleaning, non-response bias testing, assumption verification, and Common Method Bias diagnostics. The formal hypothesis testing procedures ranged from Pearson correlation (H1) and hierarchical multiple linear regression (H2) to hierarchical moderated regressions (H3, H4a, H4b, H4c) designed to evaluate the predictive power and boundary conditions of the proposed model. The methodological limitations, particularly the cross-sectional design's constraints on causal inference and the non-probability sample's implications for generalisability, are acknowledged in Section 3.9.

The methodology operationalises the four Research Objectives. RO1 was achieved through the theoretical derivation of the new factor in Chapter Two. RO2 is addressed through the instrument design detailed in Section 3.6, RO3 through the data collection procedures outlined in Section 3.5, and RO4 through the analytical strategy specified in Section 3.7; their achievement is evidenced in Chapters Four and Five and formally audited in Section 6.2. These methodological choices and their acknowledged limitations frame the quantitative analyses presented in Chapter Four.

4 Results

4.1 Introduction

Chapter Four reports the quantitative findings. It tests the predictive link between managerial technical credibility and IT professional job satisfaction specified in Section 1.4, applying the methodological design of Chapter Three to the primary data collected from employed IT professionals in Germany. The data, collected via a cross-sectional web-based survey, represent the perspectives of a final, validated sample of employed IT professionals (N = 335) residing and working in the German IT sector. All statistical procedures, including data preparation, assumption testing, and hypothesis evaluation, were conducted using IBM SPSS Statistics (version 30). Sections 4.2 and 4.3 cover data preparation and sample characteristics. Section 4.4 reports the hypothesis tests, and Section 4.5 reports the exploratory findings.

4.2 Data Preparation and Assumption Testing

Before the primary hypothesis tests, a systematic data cleaning and preparation procedure was applied to verify the dataset's integrity. The raw dataset exported from the survey infrastructure comprised 558 survey responses collected between 18 May 2025 and 4 February 2026.

4.2.1 Data Cleaning, Filtering, and Non-Response Bias

The sequential filtering protocol defined in Section 3.7.1 reduced the sample in two stages. First, 74 cases were removed for early survey disqualification, lack of active employment, or self-employed contractor status. Second, 149 respondents reporting a primary work location outside of Germany (Q19) were excluded.

After this sequential filtering, the remaining dataset was examined for anomalies and missing values. Manual data integrity audits conducted throughout the collection window identified no evidence of data manipulation or suspicious patterns, such as clusters of rapid sequential completions or identical response sets. Closer inspection showed that a small subset of respondents (n = 5) completed all core analytical

variables (the job satisfaction scales and managerial skill assessments) but abandoned the survey before completing the final demographic questionnaire. Independent-samples *t* tests with the Welch-Satterthwaite adjustment and Hedges' *g* were applied, comparing the fully completed responses (n = 330) against the late dropouts (n = 5; see Table E1 in Appendix E). No statistically significant differences were found between the groups on any of the four tested variables. For overall job satisfaction, $t(4.19) = -0.34$, $p = .749$, Hedges' $g = -0.12$; for satisfaction with supervision, $t(4.21) = -0.16$, $p = .880$, $g = -0.06$; for Perceived Managerial Programming Skill, $t(4.10) = 0.31$, $p = .774$, $g = 0.16$; and for self-reported percentage of time spent programming, $t(4.11) = 0.46$, $p = .669$, $g = 0.22$. The negligible-to-small effect sizes indicate that retaining these cases introduces no practical bias when interpreted against the benchmarks in Table 3.4.

Because these analyses produced no evidence of systematic attrition bias, the missing data assumptions outlined in Section 3.7.2 were met, permitting available-case analysis. These five cases were retained, resulting in a final functional sample size of N = 335.

All KAFA job satisfaction items were configured as mandatory responses (see Section 3.6.3). Most concluding demographic and occupational questions were not mandatory. The key filtering criteria, such as work country and education level, were exceptions and remained mandatory.

In addition to the five unit dropout cases described above, item missingness occurred where respondents who completed the full survey elected to skip individual non-mandatory items. As a result, the sample sizes of specific demographic covariates in Table 4.2 fall slightly below the overall N = 335 (e.g., N = 320 for Age; N = 322 for Total Professional Experience). These cases were treated consistently through available-case analysis, as specified in Section 3.7.1.

4.2.2 Data Transformation and Scale Computation

Data transformations, including recoding Likert-type responses into numerical values (1 to 5), reverse-coding the 13 negatively worded KAFA items, and computing the

composite dependent variables (KAFA_Overall and KAFA_Manager), were executed as specified in Section 3.7.1.

The primary independent variable composite, Perceived Managerial Programming Skill (Mgr_Prog_Skill_2Item), resulted in $N = 307$ valid cases ($n = 312$ for the absolute rating and $n = 314$ for the sufficiency rating). The predefined behavioural threshold (Section 3.6.5) produced the binary grouping variable Is_Developer ($n = 123$ vs. $n = 212$); the full subgroup composition and its alignment with national workforce statistics are reported in Section 4.3.4. Qualitative free-text responses for fields of study (Q25) and job titles (Q11) were transformed into binary dummy variables following the protocols established in Sections 3.6.5 and 3.7.7.

4.2.3 Reliability Analysis

Before conducting the inferential tests, the internal consistency of the measurement scales within this German IT sample was evaluated using Cronbach's alpha (α). The 30-item overall job satisfaction composite demonstrated excellent reliability (α = .944), exceeding Haarhaus's (2016) five-item *Gesamtzufriedenheit* benchmarks (α = .88 - .90) as expected given the greater scale length (Section 3.6.4). The 5-item Satisfaction with Supervision subscale (α = .915) closely matched Haarhaus's *Vorgesetzter* benchmark (α = .91).

The two-item independent variable composite measuring Perceived Managerial Programming Skill produced a Cronbach's alpha of .778. The composite's reliability exceeds the conventional .70 threshold (Hair et al., 2019). The coefficient is, however, noticeably lower than the values obtained for the multi-item KAFA scales (e.g., α = .915 for the 5-item supervision subscale). Such an alpha gap is an expected mathematical consequence of scale brevity (Section 3.6.4); for bi-item constructs the inter-item correlation (r) is the psychometrically preferred metric. The two individual items exhibited a strong, highly significant positive inter-item correlation ($r = .639$, $p < .001$).

To evaluate whether the internal consistency of the composite differed across the two professional cohorts, subgroup-specific inter-item correlations were computed. For Core Software Developers, the inter-item correlation between absolute skill

(Q13) and perceived sufficiency (Q14) was very strong (r = .820, p < .001, n = 122), indicating near-synonymous evaluative judgements. For other IT experts, this correlation was markedly lower (r = .539, p < .001, n = 185). The divergence between subgroups confirms the criterion contamination risk anticipated in Section 3.6.4: non-developer respondents systematically decouple absolute programming capability from its perceived sufficiency for the managerial role. To ensure this measurement asymmetry did not distort the H3 moderation findings, the pre-planned single-item robustness check using Q13 alone was executed, as reported in Section 4.4.3.2. The theoretical and psychological drivers of this subgroup divergence are formally evaluated in Chapter Five (Section 5.5.1).

The Spearman-Brown prediction formula pre-specified in Section 3.6.4 was applied to estimate projected reliability. If the two-item scale were hypothetically lengthened to match the five items of the KAFA supervision subscale while maintaining the observed inter-item correlation, the projected reliability would be ρ_5 = [5 x .639] / [1 + (5 - 1) x .639] = .898. This projected value is highly comparable to the empirically observed reliability of the 5-item KAFA supervision subscale (.915), confirming that the per-item measurement quality of the researcher-developed composite is strong.

4.2.4 Assumption Testing for Multivariate Analysis

To ensure the validity of the correlation and regression analyses, the dataset was evaluated against the assumptions of multivariate parametric statistics pre-specified in Section 3.7.4.

Multivariate Outliers: Mahalanobis distances (D^2) were calculated. The maximum observed D^2 value (9.336) fell well below the critical threshold of 16.266 pre-specified in Section 3.7.4, confirming the absence of severe multivariate outliers.

Normality: With the exception of exploratory demographic controls (e.g., weekly working hours), skewness and kurtosis values for all primary continuous variables fell between -1.214 and +0.735, well within the ±2.0 threshold pre-specified in Section 3.7.4. The dependent variables satisfied the assumption of univariate normality. The non-normal distributional properties of the independent variable are examined separately in Section 4.5.

Linearity and Homoscedasticity: Visual inspection of bivariate scatterplots confirmed linear relationships between the independent and dependent variables. Standardised residual plots (ZRESID vs. ZPRED) and normal *P-P* plots showed random dispersion with no funnel or fan patterns, confirming homoscedasticity and the normality of residuals for both the foundational predictive model and the role-based moderation model (see Figures E1 through E4 in Appendix E). Both assumptions were assessed following the graphical protocols specified in Section 3.7.4.

Multicollinearity: For hierarchical and moderated regression models, the absence of multicollinearity among predictors was evaluated at every block step. Across all primary hypothesis tests (H2, H3, and H4a-c), Variance Inflation Factor (VIF) scores for all main effects and interaction terms ranged from 1.000 to 1.992. Corresponding Tolerance values ranged from .502 to 1.000. The maximum VIF of 1.992 occurred for the mean-centred skill predictor in the H3 moderation model. This moderate elevation is a predictable mathematical consequence of including a product term derived from the same predictor (Aiken & West, 1991). The value remains well below the pre-specified conservative VIF cut-off of 3.0 (Section 3.7.4). These diagnostics confirm that the a priori mean-centring protocol (Section 3.7.5) successfully prevented non-essential structural multicollinearity across all confirmatory models.

During the exploratory sensitivity analyses (Section 4.4.3.1), VIF scores exceeded the pre-specified 3.0 cut-off, peaking at VIF = 10.454 at the > 0% threshold and reaching 3.001 at the ≥ 20% threshold. This numerical peak is a known mathematical artefact of computing an interaction term from a near-constant dummy variable (see Section 6.4.1). This configuration forces mathematical collinearity without compromising the validity of the primary confirmatory models. Detailed step-by-step collinearity diagnostics for all models are provided in Table E2, and the specific multicollinearity artefact at extreme classification thresholds is documented in Table E3 (Appendix E).

Common Method Bias (CMB): Harman's single-factor test, pre-specified as a post-hoc diagnostic in Section 3.7.3, was conducted (see Table E4 in Appendix E). The single largest unrotated component accounted for 37.79% of total variance; no single factor captured a majority of the shared variance. Consistent with the interpretive

boundaries established in Section 3.7.3, this result is reported as a preliminary indicator only; the substantive CMB defence is evaluated in Section 6.4.1.

4.2.4.1 Common Latent Factor Analysis

To complement Harman's single-factor test, an unmeasured latent method construct analysis (Podsakoff et al., 2003; Williams et al., 2010) was conducted in IBM SPSS Amos 32. A confirmatory factor analysis specified seven correlated trait factors - the six KAFA facets (Haarhaus, 2016) and the two-item perceived managerial programming skill measure - over 32 indicators. To retain access to residual-based fit statistics and to match the listwise basis of Harman's test, the analysis used the N = 307 cases with complete responses on all 32 items (see Section 4.5.1).

The two-item skill factor was identified by constraining its loadings to equality and fixing its variance to unity. The baseline model showed acceptable fit, $\chi^2(444) = 892.022$, $p < 0.001$, CMIN/df = 2.009, CFI = .933, TLI = .926, RMSEA = .057, 90% CI [.052, .063], SRMR = .0521 (see Table E5 in Appendix E for the fit statistics of all estimated models). A common latent factor was then added, loading on all 32 indicators with unstandardised loadings constrained to equality and its variance fixed to unity; it was specified as orthogonal to all substantive factors (Podsakoff et al., 2003). The largest change in any standardised trait loading upon introducing the common factor was .182 (see Table E6 in Appendix E for the full item-level comparison); as no difference exceeded the conventional 0.20 threshold, common method variance did not substantively distort the measurement model. The squared mean standardised method loading was 14.6% (mean squared method loading 14.9%, range 7.8–26.8%), below the average method variance of 26.3% reported across construct validation studies by Cote and Buckley (1987) and consistent with the 37.79% obtained in Harman's test. A chi-square difference test against a model with the common loadings constrained to zero was significant, $\Delta\chi^2(1) = 7.829$, p = .005. Taken together with the procedural remedies described in Section 3.7.3, these results indicate that, although common method bias can never be excluded entirely in a single-source, cross-sectional design, it is unlikely to have substantively distorted the reported relationships.

4.2.5 Post-Hoc Power Sensitivity Analysis

Once the final sample size was set and the multivariate statistical assumptions were verified, a post-hoc sensitivity analysis was run with the parameters pre-specified in Section 3.5.4. The Cohen's f^2 thresholds reported in this section represent the minimum effects detectable at conventional power (1 - β = .80); the corresponding observed empirical f^2 values are reported alongside their ΔR^2 statistics in Sections 4.4.2 to 4.4.4.

The study's hierarchical and moderated multiple regression models each evaluated a single focal predictor or interaction term ($df_1 = 1$) within models containing three total predictors. The resulting denominator degrees of freedom ranged from $df_2 = 265$ (H4b) to $df_2 = 303$ (H3), depending on the specific analysis and the available-case sample size (see Section 4.4). At the most conservative denominator ($df_2 = 265$), the study achieved .80 statistical power (1 - β = .80) to detect a focal effect of $f^2 \approx 0.030$; at the typical denominator ($df_2 \approx 289$ to 304), this threshold improved to $f^2 \approx 0.026$. Contextualised against Cohen's (1988) benchmarks (Section 3.7.5), the sensitivity profile is as follows: statistical power exceeds .99 for medium-sized effects ($f^2 = 0.15$), reaches approximately .82-.87 for effects at $f^2 = 0.03$, and stands at approximately .65 to .71 for small effects ($f^2 = 0.02$).

This profile confirms that the dataset possesses adequate inferential power for detecting medium and larger focal effects in the study's regression analyses, while acknowledging a reduced, though not negligible, sensitivity for detecting very small interaction effects in the moderation models (H4). The interpretive implications of this sensitivity boundary for the moderation findings are evaluated in Section 6.4.1.

4.3 Descriptive Statistics, Sample Characteristics, and Preliminary Comparisons

The final validated sample comprises 335 respondents, spanning a wide demographic, occupational, and organisational range. Table 4.1 details the categorical characteristics structuring this sample, the representativeness of which is evaluated in Section 6.4.1. Following the descriptive profile, a preliminary baseline comparison (Section 4.3.6) examines whether the two professional cohorts differ in

their initial evaluations of the independent variable, establishing the analytical context for the subsequent hypothesis tests.

4.3.1 Demographic Profile

The respondents were predominantly male (85.1%; see Table 4.1), a gender distribution broadly consistent with the 18% female proportion reported for IT-specific occupational roles in Germany (Bundesagentur für Arbeit, 2025). Regarding national background, a minority of respondents identified as migrants, defined as professionals residing and working in Germany but originating from another country (see Table 4.1). The respondents had a mean age of 40.47 years (Table 4.2), with ages ranging from the early twenties to near retirement age. This mature profile is congruent with the broader national demographic: 61.1% of German ICT specialists were aged 35 to 74 years in 2024 (Eurostat, 2025). The resulting variance affords the distributional range required for the age-related moderation analysis in Hypothesis 4a.

Table 4.1

Demographic and Organisational Profile of the Sample

Variable / Category	*n*	%
Gender (*N* = 335)		
Male	285	85.1
Female	38	11.3
Other / non-binary	3	0.9
Not answered	9	2.7
Migrant status (*N* = 335)		
Native (Germany)	287	85.7
Migrant	48	14.3
Professional role (*N* = 335)		
Core Software Developer	123	36.7
Other IT expert	212	63.3
Manager's formal education (*N* = 335)		
University degree	243	72.5
Vocational training / apprenticeship	33	9.9
No professional qualification	2	0.6
Unknown / not answered	57	17.0
Primary industry (*N* = 335)		
Core IT / IT services	91	27.2

Variable / Category	*n*	%
Banking & financial services	34	10.1
Public administration	25	7.5
Chemical industry	21	6.3
Insurance	20	6.0
Other non-IT industries combined	137	40.9
Not answered	7	2.1

Note. Core Software Developers are defined behaviourally as those spending ≥ 50% of their typical working time actively programming. Percentages may not total 100% exactly due to rounding. "University Degree" aggregates Bachelor's, Master's, Doctorates, and equivalent legacy higher degrees.

4.3.2 Professional Context and Industry Dispersion

The survey captured respondents' primary industry of employment. While the largest single cohort operated within the Core IT and IT Services sector, the clear majority of the sample were embedded as technical experts within non-IT primary industries (see Table 4.1). The most prominently represented external sectors included Banking and Financial Services, Public Administration, the Chemical Industry, and the Insurance sector.

The respondents reported extensive professional experience within the IT sector (Table 4.2). Self-reported weekly working hours ranged from part-time schedules to 80-hour weeks, with a central mode of 40 hours per week, consistent with the standard full-time employment contract in Germany.

4.3.3 The Managerial and Educational Context

The survey also captured data regarding the managers being evaluated. A clear majority of the evaluated supervisors possessed a formal academic university degree, encompassing Bachelor's, Master's, equivalent higher degrees such as the traditional German *Diplom* or *Magister*, and Doctorates (see Table 4.1). The relationship between this formal education and perceived technical competence is examined in the exploratory analysis in Section 4.5.

4.3.4 Task Allocation and Subgroup Classification

The exact percentage of typical working time respondents spent programming exhibited wide dispersion across the sample (Table 4.2).

The predefined 50% behavioural threshold (Section 3.6.5) dichotomised the sample into Core Software Developers (*n* = 123; 36.7%) and other IT experts (*n* = 212; 63.3%; see Table 4.1). The sample distribution closely matches official labour market statistics. Software development and programming roles account for approximately 30.4% of the socially insured IT workforce in Germany, representing 341,000 out of 1.12 million workers (Bundesagentur für Arbeit, 2025).

4.3.5 Central Tendencies of the Primary Constructs

Table 4.2 presents the central tendencies and measures of dispersion for the study's primary continuous variables. The variables were measured on a 5-point Likert-type scale, where 1 represents the lowest possible score (e.g., highly dissatisfied or very weak skill) and 5 represents the highest.

The sample exhibited a moderately positive baseline for Overall Job Satisfaction (KAFA_Overall, *M* = 3.75; Table 4.2), with the specific facet measuring Satisfaction with Supervision (KAFA_Manager) returning a slightly higher mean (*M* = 3.89) and wider dispersion. The primary independent variable, Perceived Managerial Programming Skill (Mgr_Prog_Skill_2Item), generated a moderate overall mean (*M* = 3.19) but exhibited the highest standard deviation among all primary constructs (*SD* = 1.30), confirming wide variation in respondents' assessments of their managers' technical capabilities.

Table 4.2

Descriptive Statistics for Primary Study Variables and Covariates

Variable	*N*	Min	Max	*M*	*SD*	Skewness	Kurtosis
Overall Job Satisfaction (KAFA_Overall)	335	1.00	4.93	3.75	0.65	-0.88	0.74
Satisfaction with Supervision (KAFA_Manager)	335	1.00	5.00	3.89	0.96	-0.86	-0.12

Variable	*N*	Min	Max	*M*	*SD*	Skewness	Kurtosis
Perceived Mgr. Programming Skill (Composite)	307	1.00	5.00	3.19	1.30	-0.30	-1.14
Absolute Mgr. Programming Skill	312	1.00	5.00	2.77	1.38	0.14	-1.21
Perceived Sufficiency of Prog. Skill	314	1.00	5.00	3.62	1.50	-0.61	-1.15
Time Spent Programming (%)	335	0	100	34.13	32.20	0.54	-1.21
Age (Years)	320	20	66	40.47	10.11	0.29	-0.72
Total Professional Experience (Years)	322	1	44	16.65	10.27	0.14	-0.78
IT Professional Experience (Years)	322	1	42	14.32	9.76	0.56	-0.73
Weekly Working Hours	335	10	80	40.52	6.46	0.50	7.95

Note. Job satisfaction and perceived skill variables were measured on a continuous 5-point scale (1 = lowest, 5 = highest). The composite sample size (N = 307) is lower than its individual constituents (absolute: n = 312; sufficiency: n = 314) because its computation required valid responses on both items. Reduced sample sizes for demographic covariates (e.g., Age, Total Professional Experience) reflect item-level non-response on non-mandatory survey questions (see Section 4.2.1). The severe negative kurtosis (< -1.0) for Perceived Managerial Programming Skill variables and programming time indicates highly platykurtic, bifurcated distributions.

4.3.6 Preliminary Subgroup Comparison: Baseline Differences in Perceived Skill

To examine the wide variance in the independent variable, an initial independent-samples *t* test was conducted. Before the formal hypothesis tests (H1 to H4), this baseline comparison established whether Core Software Developers and other IT experts differed in their initial evaluations of managerial programming skill.

Levene's Test for Equality of Variances was highly significant, $F(1, 305) = 10.75$, $p = .001$. The Welch-Satterthwaite-adjusted *t* test statistics (equal variances not assumed) were interpreted. The analysis found a statistically significant difference between the two professional cohorts, $t(225.44) = -2.37$, $p = .018$, Hedges' $g = -0.29$. Core Software Developers rated their direct managers' programming skill significantly higher (M = 3.42) than did other IT experts (M = 3.05). Interpreted against the *g* benchmarks in Table 3.4, the effect size is small.

The statistically significant difference in baseline evaluations indicates that, within this sample, Core Software Developers report to managers who are perceived as

more technically proficient than those managing other IT experts. The theoretical implications of this pattern are examined in Section 5.3.3.

4.4 Hypothesis Testing

Formal hypothesis testing followed the progressive analytical sequence specified in Section 3.7, advancing from bivariate correlation (H1) through hierarchical regression (H2) to moderated regression (H3, H4a-c). All statistical analyses were conducted with the alpha level set a priori at .05.

The functional sample size fluctuated slightly across specific hypothesis tests (ranging from $N = 269$ to $N = 307$). The fluctuation resulted from applying available-case analysis on an analysis-by-analysis basis, which maximised statistical power. For instance, including the Age covariate in Hypothesis 2 restricted the hierarchical regression to respondents who disclosed their age ($n = 320$) and provided a valid composite skill rating. This pattern of non-response directly produced the lower $N = 293$ for that model.

4.4.1 Establishing the Foundational Relationship (H1)

A Pearson product-moment correlation analysis tested whether a positive correlation exists between Perceived Managerial Programming Skill and overall job satisfaction (H1).

The bivariate correlation analysis (see Table 4.3; for the comprehensive correlation matrix including all covariates, see Table E7 in Appendix E) showed a strong, highly significant positive correlation between Perceived Managerial Programming Skill and overall job satisfaction ($r = .528$, $n = 307$, $p < .001$).

The observed correlation of .528 exceeds the threshold for a large effect size under Cohen's (1988) conventions (Section 3.7.5). Hypothesis 1 was therefore supported.

The foundational relationship was triangulated against the confirmatory robustness check, as pre-specified (Section 3.6.4). The robustness check addresses the construct overlap risk associated with the composite's "adequacy" facet (Q14). Using the uncontaminated absolute capability item alone (Q13), the bivariate correlation

with overall job satisfaction remained positive, large, and highly significant (r = .395, p < .001; see Section 4.4.3.2). This establishes a lower bound for the H1 effect and shows that the association is not driven by item overlap alone.

Table 4.3

Pearson Correlation Matrix for Primary Variables

Variable	1	2	3
1. Overall Job Satisfaction (KAFA)	-		
2. Satisfaction with Supervision	.740***	-	
3. Perceived Managerial Programming Skill	.528***	.516***	-

Note. N ranges from 307 to 335 due to pairwise deletion for missing data.

*** p < .001 (two-tailed).

4.4.2 Isolating Unique Predictive Variance (H2)

A two-stage hierarchical multiple linear regression isolated the unique predictive variance (ΔR^2) contributed by managerial programming skill, controlling for employee age and programming time (H2).

4.4.2.1 Block 1: Demographic and Occupational Controls

In Block 1, the employee's age and the percentage of their working time spent programming were entered simultaneously. This step isolated variance attributable to individual demographic trajectories and baseline task design before evaluating the focal leadership effects.

This baseline model was statistically significant, $F(2, 290) = 3.05$, p = .049. The model, however, accounted for only a negligible 2.1% of the variance in overall job satisfaction (R^2 = .021).

4.4.2.2 Block 2: Introduction of the Independent Variable

In Block 2, the primary predictor, Perceived Managerial Programming Skill, was introduced into the model while retaining the controls from Block 1. Adding the manager's technical competence increased the model's predictive power. The full

model (Block 2) was highly significant, $F(3, 289) = 40.55$, $p < .001$. The model's explanatory power also increased, accounting for 29.6% of the total variance in job satisfaction (Total $R^2 = .296$). The inclusion of managerial skill produced a statistically significant increase in the unique variance explained, $\Delta R^2 = .276$, $\Delta F(1, 289) = 113.18$, $p < .001$, corresponding to an observed empirical effect size of $f^2 = 0.392$ (see Table 4.4). Evaluated against Cohen's (1988) benchmarks (Section 3.7.5), the coefficient represents a large effect size.

In the final model, perceived managerial skill was the strongest positive predictor of job satisfaction (β = .537, $t = 10.64$, $p < .001$). The employee's programming time, however, remained a non-significant predictor (β = -.061, $p = .235$). The employee's age remained a weakly significant positive predictor (β = .110, $p = .029$). Its standardised beta coefficient was substantially smaller than that of Perceived Managerial Programming Skill.

Table 4.4

Hierarchical Multiple Regression Predicting Overall Job Satisfaction

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.331*** (0.171)		2.640*** (0.159)	
Age	0.009* (0.004)	.143	0.007* (0.003)	.110
Programming Time (%)	0.001 (0.001)	.053	-0.001 (0.001)	-.061
Perceived Mgr. Prog. Skill			0.271*** (0.025)	.537
R^2	.021		.296	
Adjusted R^2	.014		.289	
ΔR^2	.021		.276***	
F for change in R^2	3.05*		113.18***	

Note. $N = 293$. Dependent variable is Overall Job Satisfaction. *B* represents unstandardised coefficients; *SE* represents standard error; β represents standardised coefficients. The apparent arithmetic discrepancy between the sum of the block-level R^2 values (.021 + .276 = .297) and the reported total R^2 (.296) is a rounding artefact arising from the independent rounding of exact SPSS outputs to three decimal places.

* $p < .05$. *** $p < .001$.

4.4.2.3 Conclusion for Hypothesis 2

The results of the hierarchical multiple linear regression supported Hypothesis 2.

Perceived Managerial Programming Skill remained a statistically significant independent predictor of overall job satisfaction even after controlling for the tested demographic and occupational factors, uniquely accounting for 27.6% of the variance in overall job satisfaction ($\Delta R^2 = .276$). Hypothesis 2 was therefore strongly supported.

Consistent with the bivariate findings, the pre-planned Q13-only robustness analysis (Section 4.4.3.2) confirmed that the absolute capability metric alone retains a highly significant predictive effect ($p < .001$) independently of any criterion contamination from the adequacy facet. This establishes that the unique predictive variance attributed to managerial technical credibility in H2 is not driven by semantic overlap.

4.4.3 Testing Role-Based Boundary Conditions (H3)

A hierarchical moderated multiple regression tested whether the relationship between Perceived Managerial Programming Skill and satisfaction with supervision is significantly stronger for Core Software Developers than for other IT experts (H3). The test was conducted on the Satisfaction with Supervision facet (KAFA_Manager), with the continuous independent variable mean-centred prior to calculating the interaction term.

In Block 1, the main effects (the mean-centred managerial skill and the binary *Is_Developer* grouping variable) were entered. The initial model was highly significant, $F(2, 304) = 58.03$, $p < .001$, explaining 27.6% of the variance in satisfaction with supervision ($R^2 = .276$)[1].

[1] By pure statistical coincidence, the total variance explained ($R^2 = .276$) for this Block 1 main-effects model predicting satisfaction with supervision is numerically identical to the unique variance change ($\Delta R^2 = .276$) reported in Hypothesis 2 for overall job satisfaction (Section 4.4.2.2). These represent mathematically distinct statistics derived from separate regression models, as confirmed by the raw statistical outputs.

In Block 2, the interaction term (Centred Skill × Developer Role) was introduced (see Table 4.5). Including this term accounted for an additional 0.6% of the variance in satisfaction with supervision.

The standard *F*-test for this specific block change did not achieve statistical significance, $\Delta R^2 = .006$, $\Delta F(1, 303) = 2.58$, $p = .109$, with an observed $f^2 = 0.008$. This observed interaction effect fell below the study's minimum detectable threshold of $f^2 \approx 0.026$ established in Section 4.2.5, indicating that the categorical interaction at the 50% boundary is below the minimum effect the achieved sample can detect.

The unstandardised interaction coefficient was correspondingly non-significant ($B = 0.118$, $t = 1.61$, $p = .109$). Because the categorical interaction term did not reach the predefined alpha threshold, the unstandardised slopes for the two groups at this specific 50% binary cut-off could not be formally differentiated within this initial regression model (Aiken & West, 1991).

Table 4.5

Hierarchical Moderated Regression Testing Role-Based Differences on Satisfaction with Supervision

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.941*** (0.061)		3.932*** (0.061)	
Managerial Skill (Mean-Centred)	0.395*** (0.037)	.530	0.337*** (0.051)	.453
Role (Is_Developer)	-0.198* (0.098)	-.100	-0.203* (0.097)	-.102
Skill × Role Interaction			0.118 (0.073)	.110
R^2	.276		.282	
Adjusted R^2	.272		.275	
ΔR^2	.276***		.006	
F for change in R^2	58.03***		2.58	

Note. N = 307. The dependent variable is Satisfaction with Supervision. The independent variable (Managerial Skill) was mean-centred prior to calculating the interaction term. Role is a binary variable (0 = other IT expert, 1 = Core Software

Developer). The numerical equivalence of the Block 1 R^2 value (.276) in this model to the ΔR^2 value reported for H2 in Table 4.4 is a statistical coincidence; they represent distinct metrics predicting different dependent variables.

* $p < .05$ (two-tailed). *** $p < .001$ (two-tailed).

A rigid 50% categorical threshold using the composite metric provides an incomplete statistical picture of the boundary conditions for Hypothesis 3. Dichotomising continuous variables incurs a well-documented loss of statistical information and variance (MacCallum et al., 2002). Using the two-dimensional composite across subgroups with divergent evaluative criteria introduces additional measurement noise. To determine whether the initial non-significance was a methodological artefact, the regression findings were extended through the continuous moderation sensitivity analysis (Section 4.4.3.1) and the single-item robustness check (Section 4.4.3.2).

4.4.3.1 Sensitivity Analysis and Analytical Robustness Checks

A sensitivity analysis and methodological triangulation were conducted to further investigate the boundary conditions proposed in H3. These analytical steps confirmed whether the initial non-significant categorical interaction was an artefact of the 50% threshold used to define a developer.

First, to test whether the moderation effect was contingent on the classification method (task-based vs. title-based), participants were re-classified using their self-reported, free-text job titles. Based on a qualitative semantic review and binary dummy-coding (as detailed in Section 4.2.2), this classification procedure identified nominal "software developers" (n = 156) and nominal "other IT experts" (n = 179).

A hierarchical moderation regression using this identity-based grouping produced a non-significant interaction effect (B = 0.054, p = .465; see Table E10 in Appendix E). The lack of a significant identity-based interaction indicates that holding the formal job title of software developer does not independently moderate the statistical relationship between managerial skill and satisfaction.

When analysing actual task behaviour (the precise percentage of time spent programming), however, the moderation effect achieved statistical significance. A fully continuous moderation model utilising the mean-centred programming time percentage showed a significant linear interaction (B = 0.002, p = .048; see Table E8 in Appendix E). The significant linear interaction confirms that the managerial skill-satisfaction relationship strengthens as programming time increases.

Finally, to contextualise the 50% boundary, a categorical sensitivity analysis examined various programming time thresholds (> 0%, ≥ 20%, ≥ 30%, ≥ 40%, ≥ 60%, ≥ 70%, ≥ 80%). The analysis showed a fluctuating pattern of significance across the distribution (summarised in Table E9 in Appendix E), exposing the statistical instability of intermediate categorical thresholds when evaluating the two-dimensional composite. The highly inclusive > 0% threshold was non-significant (B = 0.111, p = .372). The > 0% model exhibited severe multicollinearity (VIF = 10.454; Section 4.2.4), which inflates standard errors and mechanically suppresses statistical significance. The artefact confounds the non-significant result at the threshold. The effect reached significance at the 20% threshold (B = 0.154, p = .047). It fell below statistical significance across the intermediate thresholds spanning 30% to 60% (with the 60% threshold returning B = 0.127, p = .093). The moderation effect then regained formal statistical significance and strengthened at the highly restrictive programming thresholds of 70% (B = 0.192, p = .020) and 80% (B = 0.219, p = .044).

Although the predefined 50% categorical threshold fell into a statistically non-significant transitional zone when using the composite metric, the continuous model yielded a statistically significant linear interaction (B = 0.002, p = .048). This indicates that the moderation is a continuous linear function of programming time, setting the stage for the single-item robustness check (Section 4.4.3.2) to isolate whether the categorical failure was an artefact of the boundary itself or the composite metric.

4.4.3.2 Independent-Variable Robustness Check: Single-Item (Q13) Operationalisation

The inter-item correlation between Q13 and Q14 was substantially stronger for Core Software Developers (r = .820) than for other IT experts (r = .539; Section 4.2.3). Following the methodological protocol established in Section 3.6.4, the key analyses were therefore re-estimated using exclusively the absolute managerial programming

skill rating (Q13) as the independent variable. The re-estimation isolated the focal relationship from the criterion contamination identified in Section 4.2.3.

Before evaluating the subgroup differences specified in Hypothesis 3, the foundational full-sample relationships underpinning H1 and H2 were re-estimated on this single-item basis. Across the full sample, the absolute skill rating (Q13) demonstrated highly significant positive correlations with both overall job satisfaction (KAFA_Overall, $r = .395$, $n = 312$, $p < .001$) and satisfaction with supervision (KAFA_Manager, $r = .401$, $n = 312$, $p < .001$). These estimates confirm that the large composite-based relationships reported in Sections 4.4.1 and 4.4.2 are not artefacts of the bi-item operationalisation.

The H3 categorical moderated regression was then re-estimated by replacing the composite with Q13 (mean-centred). In Block 1 (main effects), the absolute skill rating positively predicted supervision satisfaction ($B = 0.310$, $SE = 0.038$, $\beta = .441$, $p < .001$). Professional role retained a significant negative baseline effect ($B = -0.287$, $SE = 0.106$, $\beta = -.145$, $p = .007$). The block explained 18.0% of the variance, $F(2, 309) = 33.89$, $p < .001$. In Block 2, the interaction term (Absolute Skill x Developer Role) returned a highly significant positive coefficient ($B = 0.207$, $SE = 0.075$, $\beta = .199$, $p = .006$), uniquely explaining 2.0% of the variance, $\Delta R^2 = .020$, $\Delta F(1, 308) = 7.66$, $p = .006$ (see Table E11 in Appendix E for the full block-by-block model). All variance inflation factors remained well within acceptable limits (maximum VIF = 2.016).

Hypothesis 3 received partial support from two converging analyses that addressed the limitations of the binary composite. First, the fully continuous moderation model demonstrated a significant linear interaction ($B = 0.002$, $p = .048$), suggesting that the psychological importance of managerial skill increases progressively with daily programming intensity. Second, when the measurement artefact (criterion contamination via Q14) was removed, the categorical moderation achieved high statistical significance ($B = 0.207$, $p = .006$). The formal qualification "partial" acknowledges the initial non-significance of the predefined 50% categorical interaction on the composite metric ($p = .109$). A plausible interpretation is that the initial non-significance partly reflects construct overlap within the two-item composite (Section 4.2.3), although this reading rests on supplementary analyses and is

therefore advanced with caution. The implications of this divergence are evaluated in Sections 5.5.1 and 6.4.1.

4.4.4 Testing Contextual and Demographic Boundary Conditions (H4)

The final set of hierarchical moderated multiple regression analyses examined whether the relationship between Perceived Managerial Programming Skill and job satisfaction was moderated by career seniority (H4a), educational background (H4b), and company size (H4c). These analyses were conducted against both overall job satisfaction and the Satisfaction with Supervision facet, with continuous predictors mean-centred prior to the computation of interaction terms.

4.4.4.1 Moderation Analysis: Career Seniority, Age and Professional Experience (H4a)

Two separate moderation models tested whether greater career seniority strengthens the relationship between Perceived Managerial Programming Skill and job satisfaction (H4a), using the subordinate's absolute age and total years of professional experience as independent proxies.

When testing absolute age as a continuous moderator for overall job satisfaction, adding the interaction term (Age × Skill) did not significantly improve the explanatory power of the model, $\Delta R^2 = .004$, $\Delta F(1, 289) = 1.75$, $p = .187$. The unstandardised interaction coefficient was correspondingly non-significant ($B = -0.003$, $t = -1.32$, $p = .187$). A parallel test assessing the impact on the satisfaction with supervision facet returned similarly non-significant results ($B = 0.002$, $t = 0.50$, $p = .615$).

When testing total professional experience as the moderator, the interaction term did not reach statistical significance for overall job satisfaction at the conventional .05 alpha level, $\Delta R^2 = .009$, $\Delta F(1, 291) = 3.77$, $p = .053$. The corresponding unstandardised interaction coefficient was $B = -0.005$ ($t = -1.94$, $p = .053$). Because H4a is a directional hypothesis predicting a positive strengthening effect, empirical support required a positive interaction coefficient. The observed negative coefficient indicates a trend running directly counter to the hypothesised direction. Even if this interaction had achieved a p-value below .05, H4a would remain unsupported on grounds of directionality alone. When tested exclusively against the satisfaction with

supervision facet, the interaction of experience was non-significant (B = 0.000, t = -0.004, p = .997).

A subsequent exploratory moderation model used only domain-specific IT experience. This model tested whether the non-significant result was a mathematical artefact caused by diluting the metric with non-IT professional experience. Greater IT experience was a significant independent predictor of higher baseline satisfaction with supervision (β = .130, p = .009). The interaction term measuring its moderating effect on managerial skill remained non-significant (B = 0.002, p = .520).

Neither proxy demonstrated a statistically significant moderation effect at the α = .05 threshold. Both interaction coefficients for the primary dependent variable trended in the negative direction (Age: B = -0.003; Professional Experience: B = -0.005), counter to the positive interaction coefficient predicted by H4a. Hypothesis 4a was therefore not supported.

4.4.4.2 Moderation Analysis: Educational Background (H4b)

To test whether the positive relationship between Perceived Managerial Programming Skill and job satisfaction is stronger for subordinates with a formal computer science degree (H4b), the binary dummy variable denoting a formal academic degree in a CS or closely related discipline (as computed in Section 4.2.2) was entered as the moderator.

The moderation analysis indicated that an employee's educational background has no significant interacting effect on the positive relationship between Perceived Managerial Programming Skill and job satisfaction. Including the interaction term failed to explain any significant additional variance in overall job satisfaction, ΔR^2 = .002, $\Delta F(1, 265) = 0.71$, p = .399. The unstandardised interaction coefficient was non-significant (B = 0.043, t = 0.84, p = .399). The parallel test against the satisfaction with supervision facet was equally non-significant, ΔR^2 = .005, $\Delta F(1, 265) = 1.88$, p = .171 (B = 0.107, t = 1.37, p = .171). Hypothesis 4b was therefore not supported.

The absence of a statistical moderation effect indicates that the predictive power of the independent variable is consistent across divergent educational cohorts.

4.4.4.3 Moderation Analysis: Company Size (H4c)

To test whether the positive relationship between Perceived Managerial Programming Skill and job satisfaction is stronger for subordinates working in smaller companies (H4c), company size was entered as a continuous moderator across the five ordinal brackets established in Section 3.6.5.

The hierarchical regression indicated that company size does not moderate the relationship between Perceived Managerial Programming Skill and overall job satisfaction. Adding the interaction term produced no significant change in the variance explained, $\Delta R^2 = .006$, $\Delta F(1, 299) = 2.45$, $p = .119$, with a corresponding non-significant interaction coefficient ($B = -0.035$, $t = -1.56$, $p = .119$). Tests targeted strictly against the satisfaction with supervision facet confirmed this clear null finding, $\Delta R^2 = .001$, $\Delta F(1, 299) = 0.20$, $p = .654$ ($B = -0.015$, $t = -0.45$, $p = .654$). Hypothesis 4c was therefore not supported. A consolidated statistical summary of the hierarchical moderated regressions evaluating sub-hypotheses H4a, H4b, and H4c is provided in Table 4.6. The complete, block-by-block hierarchical regression outputs demonstrating the main effects prior to the introduction of the interaction terms are documented in Tables E12 through E15 in Appendix E.

Career seniority, educational background, and company size all produced non-significant interactions. Perceived Managerial Programming Skill was a main effect within this sample, without amplification by the tested boundary conditions.

Table 4.6

Consolidated Summary of H4 Moderation Analyses

H	Moderator	DV	*N*	Interaction *B*	*SE*	*t*	*p*	ΔR^2	Observed f^2
H4a	Age	KAFA_Overall	293	-0.003	0.002	-1.32	.187	.004	0.006
H4a	Age	KAFA_Manager	293	0.002	0.004	0.50	.615	.001	0.001
H4a	Prof. Experience	KAFA_Overall	295	-0.005	0.002	-1.94	.053	.009	0.013
H4a	Prof. Experience	KAFA_Manager	295	0.000	0.004	-0.004	.997	.000	0.000
H4b	CS Degree	KAFA_Overall	269	0.043	0.051	0.84	.399	.002	0.003
H4b	CS Degree	KAFA_Manager	269	0.107	0.078	1.37	.171	.005	0.007
H4c	Company Size	KAFA_Overall	303	-0.035	0.022	-1.56	.119	.006	0.008
H4c	Company Size	KAFA_Manager	303	-0.015	0.034	-0.45	.654	.001	0.001

Note. All models are hierarchical moderated multiple regressions with the mean-centred Perceived Managerial Programming Skill and the respective moderator entered in Block 1, and the interaction term entered in Block 2. ΔR^2 represents the unique variance explained by the interaction term. Observed f^2 values are computed as detailed in Section 3.7.5 (Cohen, 1988, p. 410; Selya et al., 2012). KAFA_Overall = Overall Job Satisfaction; KAFA_Manager = Satisfaction with Supervision. No interaction term reached statistical significance at the $p < .05$ threshold. DV = Dependent Variable, CS = Computer Science.

4.4.4.4 Summary of Demographic and Contextual Moderation Findings

None of the interactions in H4a, H4b, or H4c reached significance. Because this null pattern qualifies the interpretation of the H1 and H2 main effect, it is documented in detail below.

Across the moderation tests for career seniority, educational background, and company size, the variance contributions fell below the statistical sensitivity thresholds established in Section 4.2.5 (ΔR^2 ranging from .000 to .009, corresponding to observed empirical f^2 values between approximately 0.000 and 0.013). The interaction for professional experience showed a near-significant trend (p = .053, f^2 = 0.013). Its negative direction explicitly refutes the hypothesised strengthening of the relationship. For the remaining moderators, the uniformly low effect sizes provide quantitative confirmation that those null findings reflect negligible interaction effects. This quantitative evidence renders insufficient statistical power an unlikely primary explanation for the failure to detect the theorised positive boundary conditions.

These consistent null findings indicate that no statistically significant interaction was detected between Perceived Managerial Programming Skill and the subordinate's age, educational background, or company size.

To ensure that the observed stability was not an artefact of unmeasured environmental subgroups, a supplementary suite of exploratory moderated regressions was pre-specified (Section 3.7.6). The supplementary tests used the remaining contextual variables classified as exploratory controls in Table 3.2 and are reported alongside the other exploratory findings in Section 4.5.4. The results of these supplementary tests are congruent with the pattern observed here, providing supplementary empirical evidence that the main predictive effect is not significantly attenuated by any of the contextual or demographic conditions examined in this study. The implications of this null pattern are discussed in Section 5.4.

4.5 Exploratory Analyses

A series of pre-planned exploratory analyses examined additional distributional and attitudinal properties of the data (Section 3.7.6). These analyses encompass the

distributional non-normality of the independent variable (Section 4.5.1), explicit agreement with the Szczepanski Proposition (Section 4.5.2), formal academic education as a competing predictor (Section 4.5.3), and moderation checks for secondary contextual variables (Section 4.5.4).

4.5.1 Distributional Analysis of the Independent Variable

To determine whether the contested bimodal distributional pattern reviewed in Section 2.8.7.1, previously observed in objective student performance, also applies to the professional evaluation of managerial competence, the distributional patterns of the raw survey items were mathematically and visually analysed.

4.5.1.1 Non-Normality and Platykurtic Distributions

An initial evaluation of the sample's raw responses immediately indicated marked deviations from a normal distribution. The absolute rating of a manager's programming skill, measured on a 1 to 5 scale, demonstrated a mean of 2.77 (*SD* = 1.38, *n* = 312). The reduction in sample size from the total *N* = 335 reflects respondents who opted not to provide an absolute skill rating for their supervisor. Among those who did provide a valid rating, the single most frequent response, the mode, was 1.00 ("very weak"), indicating a heavy clustering at the lowest end of the scale. Formal tests for normality confirmed that the distributions for both the absolute skill rating and the perceived sufficiency rating violate the assumption of normality across the professional subgroups (Shapiro-Wilk $p < .001$; see Table E16 in Appendix E for full descriptive statistics and normality tests).

The kurtosis values for all programming skill variables were strongly negative (Absolute Skill Kurtosis = -1.21, *SE* = 0.28; Sufficiency Kurtosis = -1.15, *SE* = 0.27; Composite Skill Kurtosis = -1.14, *SE* = 0.28). Extending well below the conventional -1.0 threshold, these values indicate a clearly platykurtic, non-normal distributional pattern characterised by a lack of a central peak. In the context of 5-point Likert data, the negative kurtosis indicates that respondents dispersed towards the opposing ends of the scale.

4.5.1.2 Evidence of Bimodal Tendencies and the "Hollow Middle"

Examining the frequency tables and histograms clarified these bimodal tendencies. When respondents evaluated their manager's absolute programming skill, as noted, the most frequent response was the lowest possible rating, "1 - very weak" (25.6%). In addition to the initial right-skew tendency, a substantial secondary concentration appeared at the higher end of the scale, with nearly a third of respondents (32.7%) rating their managers highly at a 4 or 5.

Because these opposing concentrations are roughly balanced in magnitude, the aggregate skewness for this variable remains near zero (0.14; see Table 4.2). Like the mean, this aggregate value obscures the highly polarised nature of the underlying distribution. Instead, the severe negative kurtosis (-1.21) reported in Section 4.5.1.1 captures this polarisation.

This bifurcation becomes particularly evident when examining the sufficiency of the manager's skill, which captures the respondent's assessment of whether their manager's programming skill is adequate for the managerial role. The responses formed a distinct U-shape. A substantial 43.6% of valid respondents rated their manager's skill as "5 - completely adequate". A notable cohort of 28.3% rated the same capability as either "1 - completely inadequate" or "2 - rather inadequate". The neutral midpoint of the scale (a score of 3) formed a visual and statistical valley, capturing only 10.5% of responses. The resulting U-shaped distribution, hereafter termed the "hollow middle", indicates a polarised response pattern. Respondent scores concentrated heavily towards the scale extremes (scores of 1-2 and 4-5), with few respondents selecting the neutral midpoint.

4.5.1.3 Divergent Perceptions: Core Software Developers vs. Other IT Experts

To examine whether the platykurtic distributional patterns differed between the two professional cohorts, the data were segmented using the behavioural subgroups defined in Chapter Three. To accurately map the distributions of both individual survey items, specifically the absolute programming skill rating (Q13) and the perceived sufficiency rating (Q14), only respondents who provided valid responses on both variables were retained. This restriction ensured a strictly consistent analytical sample. This casewise restriction reduced the overall sample from $N = 335$

to N = 307. The software developer cohort decreased marginally from n = 123 to n = 122 (one omitted response). The other IT experts cohort decreased from n = 212 to n = 185, owing to 27 respondents omitting valid responses on one or both component items. The higher item non-response rate among other IT experts (27 of 212; 12.7%) compared with Core Software Developers (1 of 123; 0.8%) is documented here; the theoretical implications are evaluated in the Discussion. These composite sample sizes are consistent with those reported in Table 4.2.

Visual inspection of the response distributions shows a clear contrast between the two cohorts, exposing the non-normal distributional patterns that are obscured when examining aggregate summary statistics alone. Among the other IT experts, the absolute skill of the manager (Q13) was heavily right-skewed. This pattern within the subgroup diverges from the near-symmetrical aggregate skewness of 0.14 reported in Table 4.2. The low ratings concentrated in this cohort are arithmetically offset by the higher ratings contributed by Core Software Developers, producing the near-zero aggregate value. The largest cluster of these respondents rated their manager's programming skill as "1 - very weak", with this subgroup's distribution heavily weighted toward the lower half of the scale. Despite this perceived lack of absolute technical skill, however, this identical group rated the sufficiency of that skill (Q14) with a marked concentration at "5 - completely sufficient", as visualised in the top panel of Figure 4.1.

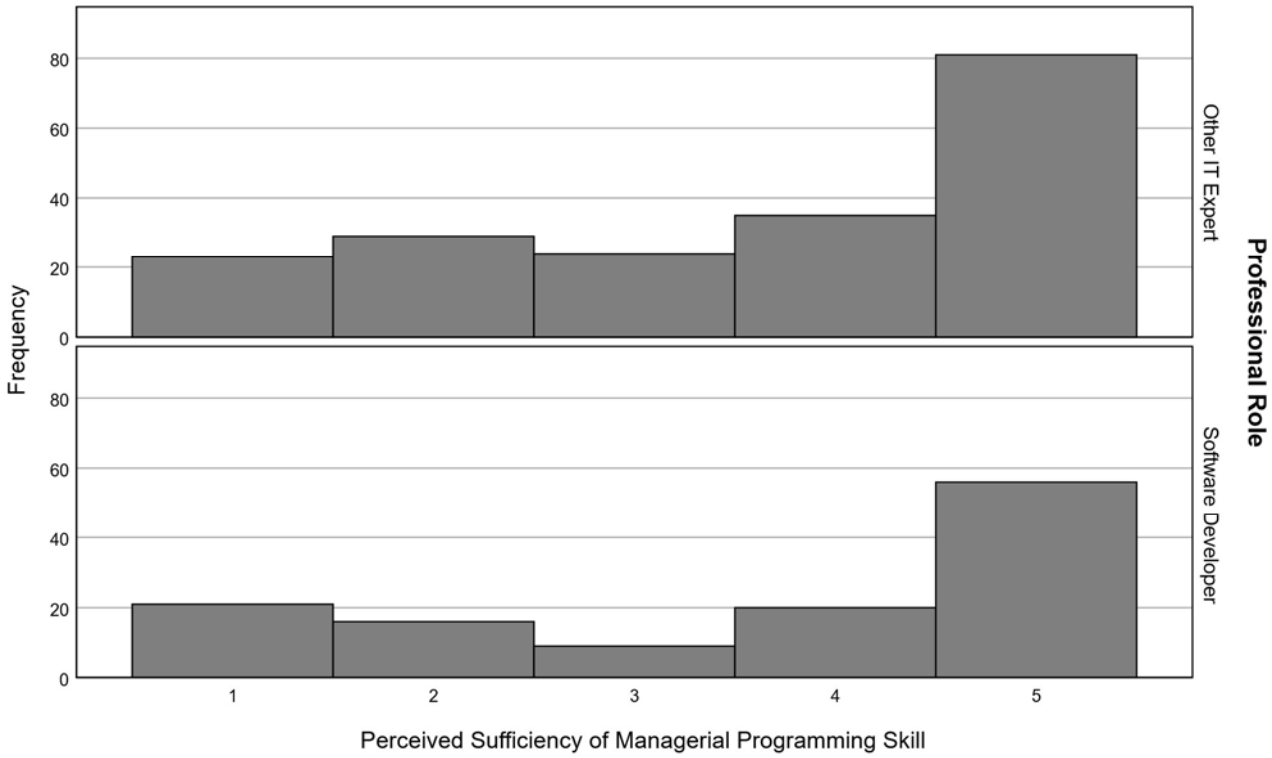
For the other IT experts subgroup, low absolute programming skill ratings (Q13) frequently co-occurred with high sufficiency ratings (Q14); Core Software Developers rarely exhibited this pattern. The inter-item correlations within each subgroup quantify this divergence: developers exhibited near-synonymous evaluative judgements (r = .820), whereas other IT experts demonstrated substantially weaker alignment (r = .539). The associated measurement implications are examined in the robustness check reported earlier in this chapter.

The Core Software Developers' evaluations of skill sufficiency formed a sharp, polarised bimodal distribution. Core Software Developers exhibited the "hollow middle" pattern defined in Section 4.5.1.2 in its most pronounced form: as illustrated in the bottom panel of Figure 4.1, their responses polarised sharply towards the extremes of sufficiency and insufficiency, with only a small minority selecting the

neutral midpoint. The cohort-specific polarisation is the substantive finding developed in Section 5.5.1.

Figure 4.1

Comparative Frequency Distributions of Perceived Skill Sufficiency by Professional Role



Note. The charts display the distribution of responses evaluating the perceived sufficiency of the manager's programming skill (Q14; 1 = completely inadequate, 5 = completely adequate). The top panel illustrates other IT experts (*n* = 185), showing a left-skewed distribution. The bottom panel illustrates Core Software Developers (*n* = 122), demonstrating a distinctly polarised, bimodal U-shape (the "hollow middle"), with minimal responses at the neutral midpoint. The total *n* of 307 reflects the subset of respondents who provided valid responses on both individual skill items (Q13 and Q14), as detailed in Section 4.5.1.3. Descriptive statistics for the individual skill items are reported in Table 4.2.

A methodological alternative to the substantive reading of this distribution deserves brief attention. Polarised response distributions can, in principle, arise from extreme response style - the content-independent tendency of some respondents to favour the endpoints of rating scales (Baumgartner & Steenkamp, 2001). Three features of the present data argue against this artefactual account. First, extreme response style is a person-level disposition that should polarise responses across items and subgroups alike, whereas the U-shaped pattern observed here is concentrated in the sufficiency item (Q14) and in the Core Software Developer cohort; other IT experts, completing the identical instrument, produced a distribution clustered at the positive extreme rather than at both poles (Section 4.5.1.3). Second, a stylistic account offers no explanation for the marked asymmetry in item non-response between the two cohorts (12.7% versus 0.8%), which tracks the identity relevance of the item rather than habitual scale usage. Third, the near-synonymous correlation between the skill and sufficiency ratings among Core Software Developers (r = .820), set against the markedly weaker association among other IT experts (r = .539), indicates that the polarisation is anchored in the substantive judgement being made, not in how respondents use response scales. The distributional pattern is therefore interpreted as substantive; its psychological interpretation is developed in Section 5.5.1.

4.5.2 Exploratory Analysis: Explicit Industry Beliefs

To supplement the primary hypothesis testing, an exploratory analysis delivered a qualitative-to-quantitative triangulation of the Szczepanski Proposition (see Section 1.5.2) by assessing participants' explicit agreement with its core claim (Q18).

Across the valid responses for this specific item (n = 331), respondents demonstrated general agreement with the Szczepanski Proposition (M = 3.30, SD = 1.09). An independent-samples t test, where equal variances were not assumed due to a significant Levene's test (F[1, 329] = 9.94, p = .002), detected a highly significant divergence between the subgroups. Core Software Developers expressed significantly stronger explicit agreement (M = 3.53, SD = 1.20) than other IT experts (M = 3.16, SD = 0.99) with the Szczepanski Proposition, t(216.28) = -2.92, p = .004, representing a small-to-medium effect size (Hedges' g = 0.35).

4.5.3 Exploratory Analysis: Formal Education versus Perceived Skill as Predictors

A final exploratory hierarchical regression analysis evaluated a manager's formal academic credentials and their perceived programming skill as competing predictors of a subordinate's satisfaction with supervision.

A binary variable indicating whether the manager possessed a formal university degree (Bachelor's, Master's, equivalent higher degree, or Doctorate) was entered in Block 1.

The baseline model was non-significant, $R^2 = .007$, $F(1, 261) = 1.77$, $p = .185$ (see Table 4.7). Introducing the manager's perceived programming skill in Block 2 significantly increased the model's explanatory power, $\Delta R^2 = .309$, $\Delta F(1, 260) = 117.43$, $p < .001$. The final model explained 31.6% of the total variance in satisfaction with supervision ($R^2 = .316$).

Within this final model, a clear difference in predictive power became apparent. Perceived programming skill was the primary positive predictor ($\beta = .570$, $t = 10.84$, $p < .001$). The manager's formal academic degree, however, remained statistically non-significant and exhibited a negligible negative coefficient ($\beta = -.043$, $t = -0.82$, $p = .412$).

Table 4.7

Hierarchical Multiple Regression Predicting Satisfaction with Supervision from Formal Education and Perceived Skill

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.619*** (0.176)		2.651*** (0.171)	
Manager's Formal Degree	0.249 (0.187)	.082	-0.131 (0.159)	-.043
Perceived Mgr. Prog. Skill			0.417*** (0.038)	.570
R^2	.007		.316	
Adjusted R^2	.003		.310	
ΔR^2	.007		.309***	
F for change in R^2	1.77		117.43***	

Note. N = 263. The dependent variable is Satisfaction with Supervision. Manager's Formal Degree is a binary dummy variable (1 = possesses a university degree, 0 = no university degree/vocational training). *B* represents unstandardised coefficients; *SE* represents standard error; β represents standardised coefficients.

*** $p < .001$.

The theoretical implications of this asymmetry, in particular regarding the distinction between Expert Power and Legitimate Power (French & Raven, 1959), are interpreted in the Discussion.

4.5.4 Exploratory Moderation: Secondary Contextual Variables

A supplementary suite of pre-planned exploratory hierarchical moderated regressions (Section 3.7.6) thoroughly assessed the generalisability of the H4 moderation findings and ensured the main effect was not an artefact of unmeasured environmental subgroups. These tests used the remaining contextual variables classified as exploratory controls in Table 3.2 as additional interaction terms. These variables included employment within the core IT sector versus industries outside of IT, gender, migrant status, and weekly working hours. The analytical protocol mirrored the mean-centring and hierarchical block structure specified for H4a-c in Section 3.7.5.

The interaction terms were non-significant across all models tested. The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision was not moderated by employment within the core IT sector (p = .302), gender (p = .122), migrant status (p = .445), or contractual workload (p = .800; see Table E17 in Appendix E for the complete regression outputs).

The baseline models within these exploratory analyses showed that identifying as a migrant (β = -.127, p = .010) and reporting increased weekly working hours (β = -.107, p = .029) were both significant negative independent predictors of baseline satisfaction with supervision. Even when controlling for these variables, however, the

manager's technical competence maintained its positive predictive power ($p < .001$) without any significant interaction effects.

The exploratory moderation tests mirror the null findings reported in Section 4.4.4. Across both sets of analyses, none of the tested demographic or contextual variables weakens the main predictive effect.

4.6 Chapter Summary

The quantitative survey of 335 IT professionals working in Germany generated the empirical findings reported in this chapter regarding managerial technical competence. The data preparation, reliability testing, and assumption checks confirmed the suitability of the dataset for advanced multivariate analysis. The hypothesis tests produced statistically significant results directly addressing the research hypotheses specified in Section 1.4. In particular, a large positive correlation ($r = .528$) and a substantial unique variance contribution ($\Delta R^2 = .276$) were observed for perceived managerial programming competence as a predictor of job satisfaction (H1, H2). The role-based moderation hypothesis received partial statistical support: The predefined categorical interaction did not reach significance at the .05 threshold. The observed effect fell below the study's minimum detectable threshold documented in Section 4.2.5, and the methodological implications of this constraint are evaluated in Section 6.4.1. Nevertheless, the continuous programming-time interaction and the single-item categorical robustness check both produced statistically significant results favouring Core Software Developers (H3). Because both supportive results derive from supplementary analyses rather than from the pre-specified composite test, they are treated as convergent but secondary evidence. No statistically significant interaction effects were detected for career seniority, educational background, or company size (H4a, H4b, H4c). The exploratory analyses (Section 4.5) identified distinct platykurtic, bimodal distributional properties in the independent variable and reported statistically significant subgroup differences regarding explicit industry beliefs. The exploratory regressions also showed that formal academic degrees provided no statistically significant predictive variance when entered alongside perceived skill. Supplementary moderation tests returned non-significant interaction terms across additional contextual subgroups,

including gender, migrant status, core IT sector membership, and weekly working hours.

A final interpretive boundary concerns the transferability of these findings beyond the sampled context. The statistical results reported in this chapter are bound to the achieved sample: IT professionals working predominantly in Germany, evaluated with an instrument anchored in the programming domain. No statistical generalisation to other sectors or industries is therefore claimed. The findings instead support analytical transferability; the conditions under which comparable relationships may be expected in other high-expertise fields, such as medicine, engineering, or applied science, are specified in Sections 5.7.2 and 5.7.3 through two scope conditions: the subordinate's professional identity must derive from a specialised technical craft, and the manager's capacity to provide credible need support must be contingent on domain-specific content knowledge. The cultural boundary of the German baseline and the corresponding replication agenda are addressed in Sections 6.4.1 and 6.5.

Table 4.8 summarises the hypothesis testing outcomes. Chapter Five presents the theoretical interpretation and maps each outcome to its discussion section in Table 5.2.

Table 4.8

Summary of Hypothesis Testing Outcomes

Hypothesis	Description	Statistical Test	Outcome
H1	A positive correlation exists between Perceived Managerial Programming Skill and job satisfaction.	Pearson Correlation	Supported (r = .528, p < .001)
H2	Perceived Managerial Programming Skill can significantly predict job satisfaction, even when controlling for employee age and programming time.	Hierarchical Multiple Regression	Supported (ΔR^2 = .276, p < .001)

Hypothesis	Description	Statistical Test	Outcome
H3	The positive relationship between Perceived Managerial Programming Skill and satisfaction with supervision is significantly stronger for Core Software Developers than for other IT experts.	Moderated Multiple Regression	Partially Supported[a] (Categorical composite interaction: n.s., p = .109; Continuous interaction: p = .048; Q13-only categorical robustness check: p = .006)
H4a	The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by career seniority, such that the positive relationship is stronger for subordinates with greater career seniority, operationalised independently through two proxies: the subordinate's absolute age and their total professional experience.	Moderated Multiple Regression	Not Supported (Age p = .187; Experience p = .053)[b]
H4b	The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by educational background, such that the positive relationship is stronger for subordinates with a formal computer science degree compared to those with other educational backgrounds.	Moderated Multiple Regression	Not Supported (p = .399)
H4c	The relationship between Perceived Managerial Programming Skill and job satisfaction is moderated by company size, such that the positive relationship is stronger for subordinates working in smaller companies compared to those in larger enterprises.	Moderated Multiple Regression	Not Supported (p = .119)

[a] The observed categorical interaction effect on the composite variable (p = .109) was non-significant. However, converging significant results from the continuous programming-intensity specification (p = .048) and the single-item robustness check (p = .006, Section 4.4.3.2) indicate that the moderation operates consistently along a continuous programming-intensity gradient. These results are consistent with a distinct categorical boundary at the 50% mark when measurement overlap is removed.

The methodological interpretation of this convergence is provided in Section 6.4.1.

[b] Although total professional experience yielded a near-significant *p*-value (*p* = .053) against overall job satisfaction, the negative interaction coefficient (*B* = -0.005) ran in the opposite direction to the predicted strengthening effect. It was non-significant (*p* = .997) against satisfaction with supervision, fully supporting the overall null conclusion for this hypothesis (see Section 4.4.4.1).

5 Discussion

5.1 Introduction

Chapter Four established perceived managerial programming competence as a primary statistical predictor of subordinate job satisfaction. The SDT-LMX-SIT framework from Chapter Two supplies the interpretive context for these results. The data show two distinct patterns: a sector-wide, demographically stable relational foundation linked to cognition-based trust, and a role-specific amplification for Core Software Developers. Exploratory analyses isolated the binary cognitive thresholds that govern how subordinates judge their managers' technical adequacy. The findings feed a revised conceptual model and frame the broader theoretical implications. Chapter Six then sets out the contributions to knowledge, the implications for professional practice, and the future research agenda.

The methodology fixed the terminological convention used here: predictive language in this chapter denotes statistical association rather than temporal causality.

5.2 Interpretation of Key Findings: The Predictive Dominance of Skill (H1 and H2)

5.2.1 The Foundational Link

The data show a strong, statistically significant positive correlation between an IT professional's perception of their manager's programming skill and their overall job satisfaction. Evaluated against Cohen's (1988) conventions for the behavioural sciences, this correlation exceeds the threshold for a large effect size and identifies managerial technical competence as a strong correlate of a positive work attitude in the German IT sector. Hypothesis 1 was fully supported and anchors the subsequent analysis empirically.

The variation in how IT professionals perceive their manager's programming competence accounted for approximately 28% of the variance in their overall job

satisfaction. Because job satisfaction is a multi-factorial construct shaped by remuneration, developmental opportunities, and collegial relationships, the predictive weight of this single relational perception requires theoretical explanation.

The hierarchical multiple regression analysis conducted for Hypothesis 2 tested whether this correlational pattern held as a predictive relationship after controlling for demographic covariates. Demographic and occupational controls (the respondent's age and percentage of time spent programming) were entered before the independent variable. The sequence allowed the analysis to isolate and quantify the unique predictive contribution of the manager's technical competence. The hierarchical regression isolated this contribution; adding Perceived Managerial Programming Skill produced a unique variance contribution in overall job satisfaction exceeding 27%, well above the limited explanatory power of the demographic and occupational controls. Its status as the strongest predictor in the model was confirmed, substantially exceeding the residual contributions of the respondent's age and their own programming time. Hypothesis 2 was therefore strongly supported.

The predictive strength of managerial technical competence yields specific theoretical and practical implications. An IT professional's demographic characteristics (e.g., their age, or the proportion of their working time dedicated to programming) are negligible predictors of whether they are satisfied in their job. The manager's technical credibility, by contrast, is a primary and independent statistical predictor of that satisfaction, operating through a mechanism independent of simple demographic categorisation.

5.2.2 Theoretical Mechanism: Tracing the Predictive Pathway

Three processes account for the predictive weight of perceived technical competence: cognition-based trust (McAllister, 1995), LMX role-making (Graen & Uhl-Bien, 1995), and in-group prototypicality (Hogg, 2001). Even after allowing for the cross-sectional constraints noted in Section 3.4.3, the variance explained provides strong empirical support for this sequence of psychological processes.

The survey explicitly measured the independent variable, perceived technical skill, and the dependent variable, job satisfaction. It did not explicitly measure the

intermediate psychological states of trust, LMX quality, and SDT need satisfaction. The mediational sequence remains empirically untested. The interpretations that follow do not claim the cross-sectional data prove this specific serial mediation; rather, they demonstrate that the strong predictive relationship observed is highly theoretically consistent with the SDT-LMX-SIT pathway.

A construct-clarity caveat applies here: the "Satisfaction with Supervision" facet measured in this study captures an individual attitudinal outcome, not LMX quality as such. While theoretically downstream of a high-quality leader-member exchange, it is not an empirical measure of LMX quality itself, which remains a theoretically inferred relational vehicle in this study.

The large correlation reported for H1 lends considerable empirical weight to McAllister's (1995) trust model within this population. For German IT professionals, a rational assessment of the supervisor's competence appears to be the primary correlate of downstream satisfaction with supervision. Subordinates in this sample appeared to use the manager's technical proficiency directly as a concrete indicator of role reliability, taking precedence over affect-based evaluations of the supervisor. The correlational evidence accordingly aligns with theoretical models that treat technical competence as the functional basis on which cognition-based trust is built in a technical hierarchy.

Trust alone, however, does not fully account for the explanatory pathway. Distinguishing trust and LMX as empirically distinct mediating constructs constitutes an important refinement (Legood et al., 2021). Rather than a singular sequence, the substantial main effect operates as the joint product of two parallel processes. The data are consistent with a two-stage trust process.

Within this theoretical framework, a manager's demonstrated programming competence first provides the primary theoretical antecedent for cognition-based trust, that is, the rational assessment of ability and reliability. This cognitive foundation is theorised to enable the development of affect-based trust (McAllister, 1995). The affective layer of trust reflects the subordinate's belief that the manager genuinely understands and advocates for their professional challenges. Affect-based

trust is theoretically the route most directly associated with the satisfaction outcomes.

In-group prototypicality offers a theoretical mechanism through which trust may develop rapidly among IT professionals. When developers perceive a manager as a prototypical technical peer, the shared identity accelerates trust formation far more effectively than formal authority (Hogg, 2001). The large main effect documented in H1 indicates that prototype-accelerated trust operates reliably within the German IT sector.

The clear predictive strength documented in H2 substantiates the premise that technical credibility functions as the necessary relational currency for high-quality LMX partnerships. The well-established association between LMX quality and job satisfaction is meta-analytically confirmed (Gerstner & Day, 1997; Martin et al., 2016). The findings strongly suggest that perceived programming competence affords the manager entry into the reciprocal obligation dynamic (Graen & Uhl-Bien, 1995), theoretically forming a necessary prerequisite for a high-quality exchange relationship.

The two-dimensional LMX framework (Andersen et al., 2020) adds a cost dimension to this pathway. These results yield IT-specific empirical evidence that parallels the adverse transactional consequences of economic LMX. In the surveyed IT context, a manager who cannot engage with the core technical work theoretically lacks the foundation for trust required for social LMX. The deficiency conceptually relegates the relationship to the economic exchange mode. Andersen et al. (2020) documented the adverse attitudinal consequences of this economic exchange mode. The unique variance captured by H2 strongly supports the proposition that perceived programming skill is a primary predictor of attitudinal outcomes. These outcomes map onto whether the exchange relationship is experienced as socially enriching or transactionally detrimental. The distinction bears directly on the intrinsic motivation and organisational attachment that drive retention.

In the German IT sector, a manager's technical skill is closely linked to the satisfaction of all three basic psychological needs simultaneously. The domain-specific route through which technical competence maps onto autonomy,

competence, and relatedness support was established in Section 2.9.3.2; the present data, specifically the large unique variance contribution that exceeds all demographic controls, are consistent with this mechanism and indicate that it operates with considerable empirical force within the target population. Without domain-specific skill, a manager cannot deliver this need-satisfying support.

The contemporary IT environment makes this need satisfaction even more essential. The rapid pace of technological change can actively threaten a developer's need for competence (Wong et al., 2025). Providing interpersonal fairness, which recent research identifies as the largest single driver of software practitioner satisfaction (Sesari et al., 2026), also relies heavily on a manager's ability to understand the technical realities of their subordinates' workload. A technically credible manager is well positioned to address both threats simultaneously.

The unique predictive variance reported for Hypothesis 2 supports the integrated SDT-LMX-SIT pathway derived earlier. Within this theoretical framework, technical competence is argued to act as the initial SIT prototypicality signal, correlating with the cognition-based trust necessary for high-quality LMX. High-quality LMX subsequently predicts the autonomy support and competence affirmation required for intrinsic motivation, with Graves and Luciano (2013) supplying the key theoretical bridge connecting LMX to SDT. Consistent with the Szczepanski Proposition, the data empirically support managerial programming skill as a strong predictive construct. The implications of this pathway for the core theory are consolidated in Section 5.7.2, where the domain-contingent enabling condition it implies is stated as this study's primary theoretical contribution.

5.2.3 Linking to Observable Business Outcomes

The predictive strength of this relationship connects the psychological framework to the tangible organisational outcomes documented in the existing literature. The meta-analytic and personnel economics evidence reviewed in Sections 2.8.3.1 and 2.9.8 established three key findings. First, intrinsic motivation is a consistent predictor of performance quality in cognitively demanding work (Cerasoli et al., 2014). Second, supervisory quality is substantially associated with team output

(Lazear et al., 2015). Third, a supervisor's domain-specific expertise is the dominant empirical predictor of subordinate job satisfaction (Artz et al., 2017).

This study's empirical findings supply the domain-specific bridge linking these established general relationships to the IT context. A technically credible manager possesses the requisite domain expertise to provide the substantive, useful feedback that developers require to maintain productivity (Murphy-Hill et al., 2021). A manager lacking this domain-specific knowledge cannot reliably differentiate between elegant architectural decisions and accumulating technical debt, a deficit associated with the collapse of the feedback mechanism, one of SDT's primary tools for fulfilling the competence need.

In theoretical terms, the unique variance explained by managerial technical skill (H2) corresponds to the reduction of a large share of the friction cost reported in Section 2.8.3.1 (Atlassian, 2025).

In addition to need satisfaction, technically credible managers reduce the cognitive load that impedes developer productivity and flow. A manager who cannot comprehend the technical realities of their subordinates' daily work is unable to identify and resolve these sources of cognitive friction.

The association with retention is equally close. Because job satisfaction is the primary internal driver of turnover intention (Agada, 2013; Oosthuizen et al., 2019), and because the German IT sector faces the severe structural skills shortage established in the preceding chapters, this study's finding that a manager's programming competence is a dominant statistical predictor of job satisfaction establishes an evidence-based association between the quality of technical leadership and the retention crisis facing the German digital economy.

5.3 The Software Developer Identity and Role-Based Moderation (H3)

5.3.1 SIT and the Identity Threat

Hypothesis 3 proposes a boundary condition for the main-effect relationship: whether the psychological impact of a manager's technical competence is significantly stronger for software developers whose core professional activity is programming, compared to other IT experts.

The partial support obtained for Hypothesis 3 (see Section 4.4.3) carries a specific theoretical implication. The continuous programming-intensity gradient provides this insight directly. Because the continuous interaction captures the scaling intensity of the relationship, it reflects the central premise of Social Identity Theory. For a software developer, the manager's technical credibility represents a defining correlate of their psychological work environment, a pattern reflected in the progressively steeper predictive slope observed as daily immersion in programming increases.

Social Identity Theory and Role Theory (Biddle, 1986) jointly explain this differential impact. For a Core Software Developer who spends the majority of their working day writing code, the activity of programming forms a defining element of their social identity and self-concept, transcending its functional role as a professional skill. Because developers possess a programming-centric occupational identity (Section 2.8.6; Marks & Scholarios, 2007), the identity threat posed by a technically non-credible manager was expected to be stronger for this cohort. The manager of such a team is assessed primarily in terms of in-group membership, rather than through formal authority.

When a manager lacks programming competence, the consequence for a Core Software Developer is far more severe than reduced helpfulness. Under the Generalist Assumption, subordinates categorise the manager as an out-group member. That categorisation is theoretically linked to professional-identity consequences and to inferred LMX trust deficits. It poses an active identity threat,

introducing cognitive dissonance between the developer's self-concept as a technical expert and the reality of reporting to someone outside their professional community. The transition to AI-assisted software development now sharply magnifies this identity threat and the resulting trust deficit.

Independent, large-scale evidence supports the SIT identity-threat process. Pervasive, seniority-independent AI skill threats independently validate the phenomenon across the broader developer population (Hicks et al., 2025). The present study's H3 results are consistent with this pathway. The AI Skill Threat's sensitivity to organisational culture aligns with the role of the technically credible manager as a buffer against identity threat. Such identity threats act as independent predictors of voluntary turnover intention, representing disturbances in standard retention patterns that are frequently overlooked in HR analyses focused on compensation and career progression (Chang et al., 2012).

When a manager is perceived as technically proficient, the dynamic reverses entirely. Programming skill operates as an in-group membership signal, a credential that facilitates the manager's access to the developer's most primary source of professional self-esteem. The manager who can credibly engage with technical trade-offs, understand the cognitive demands of programming, and meaningfully appreciate the craftsperson's effort provides strong validation of the developer's professional identity. Because prototypical leaders are granted psychological authority beyond formal hierarchy (Hogg, 2001), the manager's perceived programming skill validates the developer's professional identity, a dynamic quantified by the steeper predictive slope and continuous programming-intensity gradient observed for Core Software Developers.

Section 5.7.3 develops this identity-based amplification, together with the distributional evidence of Section 5.5.1, into a formal refinement of the LMX role-making account.

5.3.2 Cognitive Reality Versus Corporate Titles

The sensitivity analysis (Section 4.4.3.1) clarifies an important theoretical point regarding what underlies this amplification pattern. The disappearance of the

moderation effect when testing nominal job titles, contrasted with the stable linear programming-intensity gradient, demonstrates that self-reported programming time strongly correlates with professional identity salience, independent of corporate labels.

The pattern observed across task allocations clarifies why intermediate categories occupied a transitional zone: the professional identity dynamics of Core Software Developers intensify progressively with the task content of their daily work. Identity salience scales directly with programming intensity (Section 5.3.1), which carries substantial theoretical implications. When assessed through the two-dimensional composite, the primary categorical threshold initially appeared to fall within a transitional zone, suggesting that an intermediate cut-off captures a heterogeneous mixture of professionals.

However, as the single-item robustness check (Section 4.4.3.2) demonstrated, the initial non-significance at the 50% mark was primarily a measurement artefact. It reflected criterion contamination from the sufficiency rating (Q14) within the non-developer cohort. When evaluated using exclusively the absolute skill measure (Q13), the 50% categorical threshold produced a highly significant interaction (p = .006), suggesting that the 50% boundary retains psychological meaning when the absolute skill item is analysed alone. The empirically established continuous programming-intensity gradient, alongside the consistent effects observed at higher behavioural thresholds (≥ 70%), supplies convergent, though secondary, evidence consistent with a genuine psychological phenomenon. This convergence reduces the plausibility of a statistical artefact but cannot eliminate it.

In practical terms, this continuous gradient directly informs organisational design, as is explored in Section 5.8. The sensitivity analysis provides supportive empirical evidence for the rationale for operationalising the role by task established in Section 3.6.5: The proportion of daily working time spent programming, independent of nominal corporate titles, strongly predicts the strength of the association between managerial technical credibility and subordinate satisfaction.

Under the falsificationist framework adopted for this study, the primary categorical test carries the formal verdict. The converging continuous and single-item results

increase confidence in the underlying mechanism, but they cannot stand in for a significant categorical interaction. Hypothesis 3 was therefore recorded as partially supported.

5.3.3 A Survivorship Hypothesis for the Developer Skill-Rating Deviation

An anomaly in the baseline sample data requires a distinct theoretical explanation. Core Software Developers rated their managers' composite programming skill significantly higher than did other IT experts, representing a small effect size (Section 4.3.6; Cohen, 1988). This significant gap in the composite metric exists despite an artificial upward bias. Other IT experts inflated the sufficiency item (Q14) based on general affective satisfaction, reflecting the measurement artefact detailed in Section 5.5.1. The true divergence in absolute programming skill (Q13) between the two cohorts' managers is likely even wider. The elevated mean score appears theoretically incongruous: Core Software Developers are precisely the subgroup for whom managerial programming competence carries the greatest psychological salience, and one might therefore expect them to apply the most demanding evaluative standards, resulting in lower, not higher, absolute skill ratings.

While unmeasured pre-survey attrition cannot be formally tested within this study's post-positivist framework (Section 3.2.2), differential survivorship offers a plausible post-hoc explanation for the anomaly. If the identity-threat pathway modelled in Section 5.3.1 holds, the pathway predicts that Core Software Developers paired with technically non-credible managers experience a strong dissatisfaction signal alongside an acute identity threat. This identity threat is known to be an independent predictor of voluntary turnover (Chang et al., 2012). This logic implies that these developers would have been more likely to exercise their exit option before the data collection period opened. The Core Software Developers who remained employed and completed the survey are theorised to represent a positively self-selected group: those whose managers were, by their own assessment, sufficiently technically credible to have retained them. The elevated mean score is theorised to reflect the residual effect of a pre-survey attrition process that had already systematically removed the most dissatisfied developer-manager dyads from the survey-reachable

population. For other IT experts, the SDT-LMX-SIT pathway operates with lower identity-based intensity, as confirmed by the predictive slope attenuating at lower programming intensities reported in Chapter Four. These professionals face a weaker dissatisfaction signal and therefore exhibit a lower differential attrition rate.

The self-selection process fits the sector-wide normative framework detailed in Section 5.4: organic, satisfaction-driven exits remove the most severe mismatches between leadership and professional identity before the survey window opens. The cross-sectional data reflect a workforce already filtered by these exits, a survivorship bias that inherently yields conservative effect-size estimates.

5.4 A Statistically Stable Baseline (Reinterpreting H4)

5.4.1 Theoretical Implications of the Null Findings

The overarching moderation hypothesis (H4) predicts that the predictive relationship would strengthen under specific boundary conditions: greater career seniority (H4a), a formal computer science degree (H4b), and smaller company size (H4c). As detailed in Chapter Four, none of these interactions achieved statistical significance, and the interaction variance changes for all tested demographic and organisational variables were consistently negligible (Section 4.4.4). The corresponding tests against the theoretically central satisfaction-with-supervision facet were likewise non-significant, which supports the overall null conclusion.

Within this study's post-positivist framework, null results do not establish the absence of an effect. The logic of Popperian falsification acknowledges this asymmetry. Nevertheless, moderation analysis is specifically designed to test the boundary conditions of a theoretical model, to identify the boundaries within which a relationship holds and beyond which the relationship attenuates (Aiken & West, 1991).

Because the study's inferential power was adequate, the consistent absence of significant interactions across the tested demographic and organisational variables establishes a boundary for the moderation model. The formal G*Power sensitivity

analysis in Section 4.2.5 confirms that the achieved sample sizes provide this requisite power. The empirically observed interaction effect sizes for the H4 moderators fell consistently below the study's statistical sensitivity thresholds for reliable detection (Section 4.2.5). For the career seniority proxies specifically, both interaction coefficients against overall job satisfaction were negative in direction (see Table 4.6), running counter to the positive strengthening effect predicted by Status Incongruence Theory. The consistent failure to detect the hypothesised strengthening effect indicates that any existing moderation is either non-existent or too small to be reliably detected given the current sample's statistical sensitivity.

Exploratory null findings across core IT sector membership, gender, migrant status, and weekly working hours (Section 4.5.4) corroborate the stability of the main effect. However, within a falsificationist framework, failing to reject the null hypothesis does not prove the absolute absence of an effect. Rather, across the sampled German IT workforce, the positive link between perceived managerial programming competence and subordinate job satisfaction operates as a broadly stable baseline; none of the demographic or contextual conditions tested moderated it to a statistically significant degree.

5.4.2 Sector-Wide Stability

The stable baseline effect challenges several predictions drawn from the literature. Status Incongruence Theory (Kunze & Menges, 2017; see Section 2.10.1) underpins Hypothesis 4a, which predicts that older, more experienced subordinates should be more sensitive to their manager's technical credibility, since such competence provides an alternative, meritocratic source of authority capable of offsetting status friction. The moderation analyses, however, produced no significant interaction terms in the predicted positive direction. The negative interaction coefficients indicate that if any marginal trend exists, the trend runs directly counter to the intensification predicted by Status Incongruence Theory: the relationship between perceived managerial skill and satisfaction does not strengthen as seniority increases but, if anything, attenuates slightly. The lack of an intensification effect diverges from the mild evidence reported by Artz et al. (2017), who suggested the marginal effect of supervisor competence might be larger for older employees.

A tentative post-hoc explanation can be advanced for this marginal counter-directional trend. Highly experienced IT professionals have, by definition, accumulated prolonged exposure to diverse managerial configurations. This exposure may cultivate coping strategies, including reliance on broader professional networks, peer-based technical mentoring, and autonomous problem-solving strategies. These strategies partially decouple their job satisfaction from the technical competence of any single immediate supervisor. From a Self-Determination Theory (SDT) perspective, this accumulated expertise may allow senior professionals to self-generate the competence and autonomy support that junior staff rely more heavily on their managers to provide. In this reading, accumulated experience does not diminish the desirability of technically credible leadership. Such experience may, however, reduce the subordinate's strict psychological dependence on their immediate supervisor's technical competence. Such reduced dependence would marginally attenuate the predictive slope. Because neither interaction coefficient achieved statistical significance, however, this explanation must remain speculative and is offered solely as a direction for future inquiry.

The main effect nevertheless remains statistically stable and operates in the same positive direction regardless of whether the subordinate is in their twenties or approaching retirement, and regardless of whether they have two years of IT experience or forty-two.

Two theoretically coherent explanations are plausible for the absence of age-based moderation. First, this lack of moderation may suggest that the theoretical mechanism proposed in Chapter Two operates at a deeper level than Status Incongruence Theory suggests. The need for a technically credible manager may be a defining feature of the IT professional's work identity across all career stages, operating at a deeper psychological level than Status Incongruence Theory predicts. Recent research into the digital workforce (e.g., Cerqueira et al., 2025; McAnally & Hagger, 2024) confirms that while contextual factors influence the broader developer experience, the core psychological drivers of engagement depend on need satisfaction and do not vary with age. A junior developer and a senior architect both require a manager who can meaningfully engage with their work, albeit at different levels of depth. The technical threshold that must be crossed to establish in-group

prototypicality may vary with expertise level, but the basic requirement for crossing that threshold appears universal.

Second, and complementarily, the non-significant interaction for age against the satisfaction with supervision facet provides direct evidence of this stability. The attitudinal outcomes associated with the LMX dyad are closely captured by the satisfaction with supervision measure, and this downstream attitudinal level is precisely where Status Incongruence Theory predicts the strongest SIT effects. The null result in this most sensitive test suggests that the identity-based need for technical leadership is not contingent on age-based status differences.

A complementary cultural explanation follows from Germany's established profile as a horizontal-individualist (HI) culture (see Section 2.10.2), within which HI contexts facilitate significantly stronger LMX agreement than vertical-collectivist contexts (Yuan et al., 2023). In such HI cultures, leader-follower interactions are governed by egalitarian norms that encourage open feedback and calibrated role expectations. These norms make personal demographic attributes, such as age, educational background, or company size, less relevant to the formation of relational judgements. Germany's horizontal-individualist profile supplies a macro-level explanation for the consistent non-significance of H4a, H4b, and H4c. Where egalitarian exchanges are the cultural norm, demographic attributes appear to play little part in the link between technical credibility and job satisfaction.

Similarly, the non-significant moderation by CS degree (H4b) challenges the SIT-based prediction that a formal computer science background would make programming skill a more prominent in-group identity marker. The non-significant interaction indicates that this particular academic credential does not reliably differentiate the degree to which respondents require a technically competent manager. The irrelevance of formal credentials mirrors contemporary German institutional realities: nearly three-quarters of newly hired IT professionals in 2025 entered the field via non-university pathways (Bitkom e.V., 2026). In an environment where self-taught professionals, *Fachinformatiker* who completed an *Ausbildung*, and lateral *Quereinsteiger* (see Section 1.5.2) sit alongside computer science graduates in the same teams, daily skill and practice supersede academic credentials to clearly define the technical in-group identity. A formal CS degree did

not operate as a moderating boundary in these data. The daily technical environment exerts substantially greater influence than any historical credentials.

Finally, the non-significant moderation by company size (H4c) invites a structural interpretation. Hypothesis 4c assumed that smaller organisations would place subordinates in closer working proximity to their managers, making the manager's technical credibility more salient to daily experience. The null result suggests that firm-level headcount is a coarse proxy for this proximity mechanism. The organisational unit within which IT professionals actually experience leadership is the immediate team, and contemporary software work is organised into small delivery teams in organisations of every size. A developer in a large enterprise typically reports to an immediate manager within a small unit whose dyadic dynamics resemble those in a small firm. If the proximity mechanism operates at the level of the team rather than the firm, company size would show no moderation even where proximity matters, which is the pattern observed here. This reading is advanced as the researcher's own post-hoc interpretation of the null finding rather than as an evidenced conclusion. It generates a testable question for future research: a replication that directly measures team size, the manager's span of control, and the frequency of technically substantive manager-subordinate interaction would test the proximity mechanism at its theoretically correct level of analysis (Section 6.5).

5.4.3 Summary of Moderation Findings

Across the German IT workforce, the regression models confirm a strong, statistically stable main predictive effect: a technically credible manager remains a consistent, stable predictor of job satisfaction, not significantly diminished by any demographic or organisational boundary tested. This main effect is complemented by partial support for a stronger effect among Core Software Developers, as the continuous programming-intensity gradient and the single-item robustness check both returned a significant interaction (H3; Section 5.3). The core relationship does not intensify for older subordinates, for those with CS degrees, or for those in small companies (H4), nor for those in any of the additional subgroups explored in Section 4.5.4. The relationship is, in the language of moderation analysis, highly stable across contextual and demographic boundary conditions.

A main effect without demographic moderation, combined with a role-specific steepening of the predictive slope, can be read as a sector-wide baseline plus a role-specific amplification. The baseline reflects the sector-wide operation of the SDT-LMX-SIT predictive pathway detailed in Section 5.2.2: a manager's technical credibility provides the foundation for the trust and relational dynamics that theoretically satisfy basic psychological needs across the entire IT workforce. The partially supported amplification layer reflects how the combined forces of role expectations and professional identity make this need especially acute for individuals whose entire professional daily experience is programming. Both layers are theoretically consistent and empirically distinct.

5.5 Decoding the Exploratory Findings: The Perceptual Reality of Programming Skill

5.5.1 The Platykurtic "Hollow Middle"

IT professionals evaluate their manager's programming competence in a binary, threshold-based fashion. This evaluative pattern relocates the contested bimodality debate (Section 2.8.7.1) from the objective grading of learners to the subordinate's real-time appraisal of leadership credibility, with the formal disciplinary implications consolidated in Section 5.7.1.

The distributional evidence supports an affirmative answer. As established in Section 4.5.1.2, the sufficiency ratings formed the U-shaped "hollow middle" distribution visualised in Figure 4.1. Interpreted psychologically, this pattern indicates that IT professionals rarely hold ambivalent or indeterminate views about their manager's programming adequacy; rather, they evaluate managerial competence as a binary, pass-or-fail threshold. The threshold-based pattern fits the in-group boundary logic of Social Identity Theory (Hogg, 2001; Tajfel & Turner, 1979) discussed in Chapter Two. The near-absence of midpoint responses among Core Software Developers indicates that this cohort evaluates managerial programming competence categorically.

The categorical structure of this judgement has ample precedent in social cognition research. First, categorical thinking is the default mode of person perception: perceivers routinely simplify a complex social world by assigning others to categories and reasoning from category membership rather than from effortful, individuated evidence (Macrae & Bodenhausen, 2000). Competence, moreover, is one of the two universal dimensions along which such judgements are organised, and targets classified as high or low on this dimension elicit predictably distinct affective and behavioural reactions (Fiske et al., 2007). Such judgements are also formed rapidly and from remarkably thin behavioural evidence: meta-analytic work demonstrates that observers reach consequential interpersonal judgements from brief excerpts of expressive behaviour with accuracy well above chance (Ambady & Rosenthal, 1992). Software developers, who observe their manager daily in code reviews, architectural discussions, and technical problem-solving, possess far richer diagnostic evidence than the thin slices examined in that literature; so the rapid, confident categorical verdicts observed here are what these accounts would predict.

Two further mechanisms explain why respondents appear to avoid the midpoint of the scale altogether. Ambivalence research shows that holding conflicting evaluations of an attitude object is experienced as aversive - particularly when the object is personally consequential and a behavioural stance is required - and that perceivers are therefore motivated to resolve ambivalence towards one pole (van Harreveld et al., 2009). For a Core Software Developer, a manager's technical adequacy is exactly such an object, since it is encountered daily and bears directly on the subordinate's identity and work. In parallel, the trust literature documents a pronounced asymmetry: trust is hard to build and easy to destroy, because trust-destroying events are more diagnostic and more heavily weighted than trust-building events (Slovic, 1993). Cognition-based trust in a manager's competence (McAllister, 1995; Section 5.2.2) inherits this asymmetry. A single conspicuous technical failure may suffice for a categorical fail verdict, while sustained demonstrated competence is required for a pass, leaving little psychological territory between the two.

Finally, the leadership literature offers direct corroboration at the meta-analytic level. Leader group prototypicality exerts a moderate-to-large effect on follower evaluations across 128 studies, and the effect is strongest when prototypicality is conceptualised

as the group's ideal-type member and among strongly identified followers (Steffens et al., 2021). Both qualifications fit the present data: the technically credible manager is the ideal-type prototype of a programming-centred occupational community, and the polarisation was concentrated in the cohort with the strongest occupational identification. On this reading, the hollow middle is the distributional form taken by a prototypicality judgement against an ideal-type standard when it is rendered by highly identified perceivers who are averse to ambivalence and weight trust-destroying evidence more heavily than trust-building evidence.

The divergent distributional shapes observed for other IT experts (detailed in Section 4.5.1.3) directly illustrate the boundary conditions of this credibility judgement. For non-developers, a manager's lack of programming skill does not violate core role expectations or elicit a professional identity threat. Because programming is peripheral to their daily tasks, the absence of this skill in their manager is deemed acceptable; their sufficiency ratings clustered heavily at the positive extreme despite low absolute skill ratings.

The highly asymmetrical item non-response rate documented in Section 4.5.1.3 also shows the peripheral relevance of programming skill to non-developers. Other IT experts were over fifteen times more likely than Core Software Developers to omit the managerial skill evaluation entirely. The omission rates were 12.7% and 0.8%, respectively. Such a discrepancy provides an unobtrusive behavioural measure of identity relevance. When a skill is not central to the professional identity of an employee, they are significantly less likely to possess the informational basis or the psychological motivation required to evaluate that skill in their manager. The resulting subgroup contrast confirms that the polarised, threshold-based evaluation is identity-driven: the alignment between the subordinate's core professional activity and the manager's demonstrated competence is strongly associated with activating the categorical judgement.

A second, independent quantitative indicator supports this identity-driven interpretation. The psychometric patterns reported in Section 4.2.3 show a marked identity-driven divergence: Core Software Developers evaluated a manager's programming competence and its contextual sufficiency as near-synonymous

constructs (r = .820), whereas other IT experts actively decoupled these two evaluative dimensions (r = .539).

According to Social Identity Theory, this divergence constitutes the quantitative signature of the in-group boundary. For a professional whose core professional identity centres on programming, a manager's inability to code is inherently insufficient; absolute capability is the criterion of role adequacy, producing near-perfect evaluative alignment. For a professional whose identity is anchored in infrastructure, project governance, or systems administration, the manager's inability to program does not violate in-group norms; absolute capability and role sufficiency are logically separable, and the evaluative dimensions diverge. The divergence produces a measurement consequence, visible in the item-level correlations (Section 4.2.3).

Because non-developers do not consider absolute programming skill essential for role adequacy, they appear to substitute their general affective satisfaction with the manager when evaluating the contextual sufficiency of that skill (Q14). This affective substitution operates as a theoretically informative quantitative signature of the Social Identity in-group boundary, rather than as a measurement failure. For respondents outside the programming in-group, the distinction between "how good is my manager at coding?" and "is my manager's coding good enough for the role?" collapses because the latter judgement is not identity-relevant. For Core Software Developers, the two facets remain empirically separable, behaving exactly as French and Raven's (1959) dual conception of Expert Power predicts.

Because the pre-planned Q13-only robustness analysis (Section 4.4.3.2) confirms that the focal predictive relationships persist when the adequacy facet is removed entirely, the contamination concern is strictly bounded. The substitution accurately reflects the psychological reality of how Expert Power is granted by out-group subordinates while suggesting that the relationships primarily reflect perceptions of genuine technical credibility.

The polarised perceptual structure documented in Section 4.5.1.2 maps directly onto the two-dimensional LMX framework reviewed in Section 2.9.7.1 (Andersen et al., 2020). Managers perceived as falling below this threshold are treated as qualitatively

different, specifically, as out-group members with whom a social LMX relationship cannot be sustained. The "hollow middle" maps onto a specific relational threshold: the point at which the dual penalty of economic LMX (Andersen et al., 2020; see Section 2.9.7.1) is inferred to come into effect. The practical implications of this boundary are examined in Section 5.8, and its theoretical implications are consolidated in Section 5.7.3, where the categorical threshold is formalised as a prototypicality gate on LMX role-making.

5.5.2 Implicit Behaviour and Explicit Belief: Triangulating the Szczepanski Proposition

The regression analyses and the respondents' explicit agreement with Q18 point to the same conclusion: technical competence in management is a psychologically real, explicitly recognised expectation across the German IT workforce. The survey included a dedicated attitudinal item (Q18; Appendix B) directly assessing conscious agreement with the Szczepanski Proposition.

Across the entire valid sample, respondents demonstrated general agreement with this proposition. The subgroup analysis confirmed that Core Software Developers expressed significantly stronger explicit agreement with this statement than other IT experts, representing a small-to-medium effect size.

The convergence of regression-based and attitudinal evidence matters for two reasons. First, the overall positive agreement across the broader IT workforce is consistent with the sector-wide baseline effect established in H1 and H2 and interpreted in Section 5.4; the preference for technically credible management extends across the broader IT workforce, though it is strongest among software developers. Second, the finding that Core Software Developers explicitly and consciously endorsed the preference for technically proficient management confirms that the psychological dynamic observed in the multivariate regressions reflects a genuine, consciously recognised phenomenon, ruling out both subconscious response bias and artefactual statistical patterning. Core Software Developers are more sensitive to their managers' technical competence and openly state this preference. The convergence of the confirmatory results (H1 to H3) and the

exploratory attitudinal triangulation constitutes, to the author's knowledge, the first empirical test of the Szczepanski Proposition.

The tight alignment between implicit behavioural patterns (the predictive regression results) and explicit conscious beliefs (the Szczepanski item analysis) amounts to a form of construct validation. This alignment demonstrates that the survey instrument successfully captured a genuine, psychologically real phenomenon, ruling out a measurement artefact. The manager's technical competence is a consciously valued attribute that IT professionals actively consider when evaluating the quality of their working relationship with their supervisor.

5.5.3 The Primacy of Expert Power over Legitimate Power: Formal Credentials as Predictors

The exploratory regression (Section 4.5.3) directly challenges the Generalist Assumption empirically. The results indicate that while perceived programming skill predicted a substantial and highly significant proportion of variance, accounting for nearly a third of the total variance in satisfaction with supervision, a manager's formal university degree possessed no significant independent predictive power.

The failure of formal academic credentials to predict satisfaction maps onto the distinction between Expert Power and Legitimate Power (French & Raven, 1959; see Section 2.8.2). In the German IT context, the exploratory regression indicated that Legitimate Power, here manifested as a formal academic degree, was an insufficient statistical predictor of subordinate job satisfaction.

Instead, Expert Power, operationalised in this study as perceived programming skill, appears to be the primary base of influence in this population. Within this high-specialisation domain, Expert Power is a precondition for Legitimate Power; without the Expert foundation, the Legitimate credential shows no statistical association with relational influence or subordinate satisfaction.

The dominance of demonstrated capability over formal credentials shapes how leadership credibility is built in technical settings. Formal academic credentials are ineffective credibility signals in the eyes of IT professionals, even when held by nearly three-quarters of the sampled supervisors. A degree certifies historical

academic attainment within an institutional framework, which may not indicate an ability to meaningfully engage with current technical challenges.

The superiority of perceived competence over academic credentials is theoretically coherent within the Social Identity Theory framework. The in-group membership signal that accelerates cognition-based trust and enables prototypical leadership resides in demonstrated capability instead of formal credentials. Academic qualifications are, by nature, retrospective and context-free; these credentials reflect historical achievements in a learning environment, which may not indicate current capabilities. Domain-specific programming skill is instead a current, dynamic, and unambiguous signal. Managerial programming skill cannot be credibly simulated in routine professional interactions. A technically proficient manager reveals this competence naturally in the course of code reviews, architectural discussions, and technical problem-solving sessions; a technically deficient one reveals their limitations just as readily. The professional culture within a community of experts is deeply meritocratic. Demonstrated competence determines whether a manager is accepted into the technical in-group.

The observed irrelevance of credentials receives strong corroboration from the alternative hiring patterns detailed in Section 1.2.2. The qualification profiles of *Quereinsteiger* navigating these pathways affirm the dominance of demonstrated competence over formal credentials, providing direct empirical confirmation of this compositional workforce divergence (Bitkom e.V., 2026). The industry recognises demonstrated competence acquired outside formal academic pathways as a legitimate basis for professional entry. This pattern reflects the divergence of the German ICT workforce from the European norm in its persistently high proportion of non-tertiary practitioners (Eurostat, 2025). Continued reliance on formal academic credentials as a proxy for technical leadership credibility sits awkwardly beside the sector's current demographic composition.

This misalignment becomes evident when this study's managerial sample is set against these macroeconomic indicators. While nearly three-quarters (72.5%) of the evaluated managers possessed a university degree (see Table 4.1), the workforce they supervise is drawn from a far less uniformly credentialed talent pool. Theoretically, the expectation that historical academic credentials serve as an

effective proxy for technical leadership credibility indicates a fundamental disconnect with both the psychological realities of IT workforce evaluation and the evolving demographic makeup of the sector. The implications of this disconnect for organisational design and Human Resources policy are examined in Section 5.8.

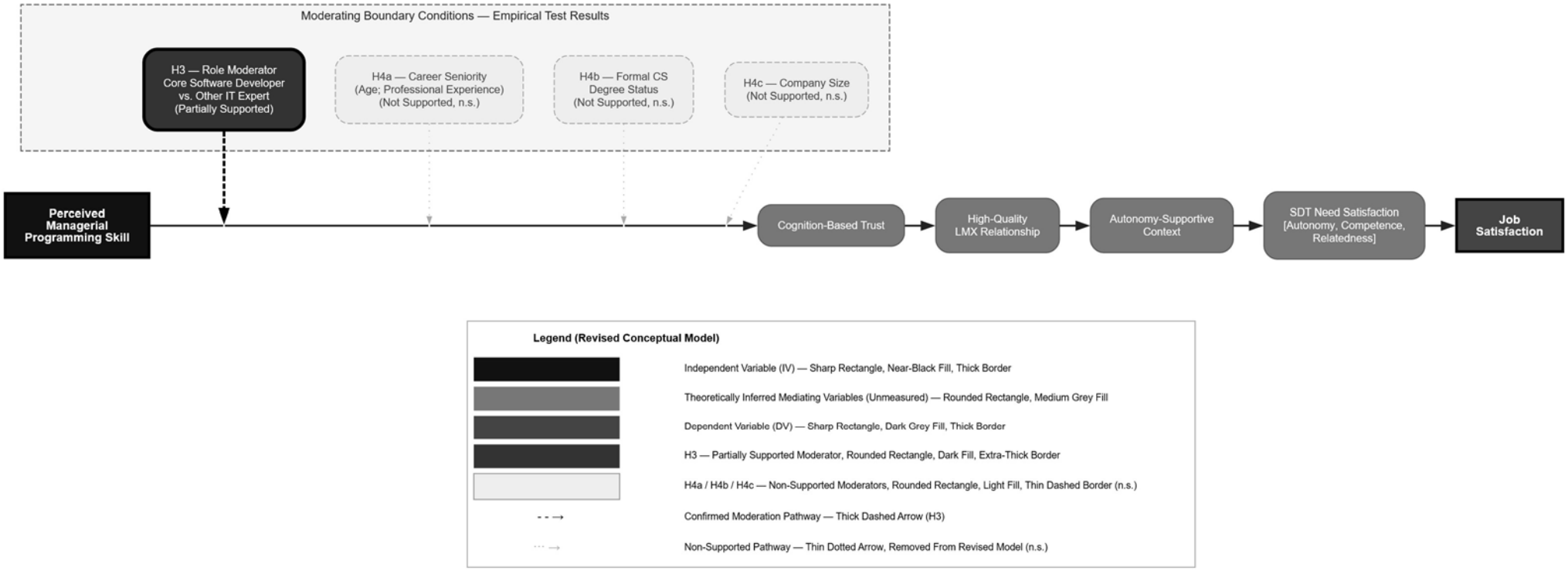
Although motivated by the distinction between Expert Power and Legitimate Power (French & Raven, 1959) and pre-specified as an exploratory test (Section 3.7.6), this observation was not subjected to confirmatory hypothesis testing. The observation opens an empirical basis for future deductive research, but the observation does not represent a confirmed theoretical proposition equivalent to the outcomes of hypotheses H1 to H4. Section 5.7.4 accordingly treats the credential finding as corroborating, rather than load-bearing, evidence when comparing this study's account with that of previous researchers.

5.6 The Revised Conceptual Model

Sections 5.2 to 5.5 call for a revision to the model established in Chapter Two (Figure 2.1). That model proposed a positive predictive relationship between Perceived Managerial Programming Skill and job satisfaction (H1-H2), qualified by four moderators: role (H3), career seniority (H4a), educational background (H4b), and company size (H4c). The empirical data confirmed the main effect and provided partial support for the role-based moderation, while failing to find statistically significant support for the demographic and organisational moderators. Figure 5.1 presents the revised conceptual model, visually mapping the empirically tested endpoints and boundary conditions against the theoretically inferred mediational mechanisms established in this chapter.

Figure 5.1

Revised Conceptual Model: Confirmed and Unsupported Moderation of the SDT-LMX-SIT Predictive Pathway



Note. The main predictive pathway illustrates the statistically supported direct association between the independent and dependent variables. The intermediate mediating steps remain theoretically inferred and were not empirically tested. H1 was strongly supported (r = .528, p < .001); H2 was strongly supported (ΔR^2 = .276, p < .001). Hypothesis 3 achieved partial support (see Table 4.5 and Section 4.4.3 for the non-significant primary categorical baseline, and Sections 4.4.3.1 and 4.4.3.2 for the statistically significant continuous and single-item robustness models that constitute this support). Non-supported moderation pathways (H4a, H4b, H4c) are retained in the figure for transparency and to facilitate direct comparison with the original theoretical model. SDT = Self-Determination Theory (Deci & Ryan, 1985); LMX = Leader-Member Exchange Theory (Graen & Uhl-Bien, 1995); SIT = Social

Identity Theory (Tajfel & Turner, 1979); CS = Computer Science; IV = independent variable; DV = dependent variable; n.s. = non-significant. This figure is a conceptual update of the original theoretical model presented in Figure 2.1. Figure represents the author's own empirical synthesis.

5.7 Theoretical Contributions to Knowledge

The preceding sections have assembled the evidential basis for this study's contributions; this section consolidates those contributions directly after the evidence for them has been presented. The contributions are advanced as theoretically grounded refinements that are consistent with the observed predictive patterns, not as demonstrated causal mechanisms: as Section 5.2.2 records, the intermediate psychological states - cognition-based trust, LMX quality, and SDT need satisfaction - were not directly measured, and the mediational sequence remains empirically untested. Within that boundary, the study proposes theoretical changes in two specific places. It adds a boundary condition to the core theory, Self-Determination Theory (Section 5.7.2), and it inserts a threshold precondition into the role-making sequence at the interface of the two supporting theories, LMX and SIT (Section 5.7.3). Section 5.7.1 first states the study's unique contributions; Section 5.7.4 then compares this account with those of previous researchers.

5.7.1 Statement of Unique Contributions

The study contributes jointly to IT workforce management, organisational psychology, and leadership theory. The five contributions are:

- **Empirical Validation of the "Manager" Factor:** The study presents the first empirically tested, large-scale quantitative examination of the Szczepanski Proposition (i.e., the hypothesised relationship between a manager's perceived programming competence and the job satisfaction of IT professionals in Germany). This examination directly addresses the literature gap identified in contemporary developer experience research (Storey et al., 2021).
- **Theoretical Integration:** It applies an integrated SDT-LMX-SIT theoretical framework to explain the predictive relationship between technical leadership credibility and job satisfaction in a knowledge-work context, supporting the theory's plausibility and establishing a basis for future mediational modelling. The updated conceptual framework (Figure 5.1, Section 5.6), which formally codifies the supported and unsupported pathways of this framework, is the visual embodiment of this contribution and directly addresses Research Objective 4.

- **Reframing Bimodality:** It resolves the bimodal distribution debate in programming by shifting the domain of inquiry from objective student grades to the perceptual psychology of managerial competence evaluation, identifying a categorical cognitive threshold, now grounded in the social-cognition literature in Section 5.5.1.
- **The Stable Baseline:** It establishes that the demand for technical leadership credibility operates as a broadly consistent norm, demonstrating statistical stability across the tested demographic, educational, and organisational boundary conditions (Section 5.4).
- **Credential Irrelevance (exploratory):** Although derived from a pre-planned exploratory analysis (Section 4.5.3), not a confirmatory hypothesis test, the study provides solid empirical evidence that formal academic credentials were not a statistically significant predictor of managerial credibility in technical environments. The irrelevance of formal credentials directly challenges prevailing HR policies and provides a foundation for future confirmatory inquiry.

The second and third of these contributions are developed into explicit theory refinements in Sections 5.7.2 and 5.7.3, and the third is compared with the prior bimodality literature in Section 5.7.4.

5.7.2 Extending the Core Theory: A Domain-Contingent Enabling Condition for SDT Need Support

This study's primary theoretical contribution is to the core theory of the thesis. It extends Self-Determination Theory by proposing a domain-contingent enabling condition for need-supportive leadership: in knowledge-intensive domains, the efficacy of a manager's need-supportive behaviours is conditional on the manager's perceived domain-specific competence. SDT research has focused predominantly on a manager's behavioural style, specifically autonomy-supportive versus controlling approaches, as the primary variable shaping the social context (Deci & Ryan, 1985).

By empirically bridging the documented SDT-LMX gap (Premru et al., 2022; see Section 2.9.1), this thesis advances the theory by demonstrating that in expert-driven environments, behavioural style alone is an insufficient explanatory variable.

The study's theoretical contribution lies in empirically linking domain-specific technical competence to the attitudinal outcomes theoretically associated with effective autonomy support. A manager lacking domain expertise is unable to provide the substantive, utility-driven feedback that the competence need requires (Murphy-Hill et al., 2021). Such a manager also cannot calibrate appropriate AI reliance across team members, as addressed in Section 5.8.2, or differentiate elegant architectural decisions from accumulating technical debt. Identifying a domain-contingent enabling condition directly refines SDT's established autonomy-support framework. When operating within cognitively complex and rapidly changing knowledge-work environments, the agent's content expertise shapes whether subordinates psychologically receive support as credible facilitation or uninformed interference.

Positioning domain-specific competence as a structural prerequisite for autonomy support is particularly relevant in the modern digital workplace. The relentless pace of digitisation and the normalisation of remote telework compound this challenge. Digitisation threatens the need for competence; at the same time, remote work can promote isolation. The supervisor's supportive actions become essential for maintaining relatedness and well-being (Wong et al., 2025).

Generative AI is reshaping software development, and that shift amplifies the strategic importance of this SDT extension. As the practitioner evidence reviewed in Chapter Two confirms (de Campos et al., 2024), the irreducibly human dimensions of software engineering remain resistant to automation. These dimensions include architectural judgement, quality assurance, and the mentoring of less experienced developers. SDT need satisfaction is most directly enacted within these domains. Yet generative AI adoption simultaneously introduces cognitive frictions and complacency risks that are theorised to pose a direct threat to the subordinate's need for competence. In this cognitively demanding context, interpersonal skills alone are insufficient. Because a manager lacking domain-specific programming literacy can neither diagnose AI-induced threats nor deliver the substantive autonomy support required to address them, technical competence becomes the primary enabler for the entire behavioural repertoire of SDT need satisfaction.

The SDT extension addresses the theoretical gap identified by Premru et al. (2022). The study provides a domain-specific theoretical contribution with direct applicability to other high-expertise professions, including medicine, engineering, and applied science. This applicability holds wherever two conditions are met: the subordinate's professional identity derives from a specialised technical craft, and the manager's capacity to provide credible autonomy support is contingent on domain-specific content knowledge.

Formally, where SDT's standard account treats the leader's behavioural style as the primary contextual determinant of need satisfaction, this study's evidence - the large unique variance contributed by perceived programming competence over and above all demographic controls (Section 4.4.2) - is consistent with a model in which behavioural style operates jointly with domain credibility. The same autonomy-supportive act is theorised to be received as credible facilitation when enacted by a domain-competent manager and as uninformed interference when enacted by a domain-incompetent one. The adjustment leaves the taxonomy of basic psychological needs and the definition of need-supportive behaviour untouched. What changes is the specification of who can effectively enact such behaviour: the leader-behaviour to need-satisfaction link acquires a domain-contingent enabling condition. Because the mediating need-satisfaction states were not directly measured, this extension is advanced as a falsifiable proposition for the mediational research agenda set out in Section 6.5, not as a demonstrated mechanism.

5.7.3 Refining LMX through SIT: The Prototypicality Gate

This study advances LMX theory by formally integrating the LMX framework with Social Identity Theory to resolve a documented gap regarding the theoretical antecedents of high-quality relational dyads. LMX scholarship thoroughly documents the consequences of high-quality relationships. The body of literature has, however, left the precise initial conditions for relational role-making largely uncharacterised (Graen & Uhl-Bien, 1995; see Section 2.9.4). Section 5.2.2 established a dual-channel architecture where trust and LMX operate as distinct mediating pathways (Legood et al., 2021). The present study builds on this architecture and empirically establishes the predictive power of domain-specific technical competence, theorised

here as a signal of in-group prototypicality. These findings support its theoretical position as a cognitive antecedent for LMX formation in IT environments.

The continuous amplification gradient observed in Hypothesis 3 provides direct empirical evidence supporting the plausibility of this mechanism. For individuals whose professional identity is most deeply anchored in programming, the manager's prototypicality in that craft acts as a significantly stronger driver for transitioning the dyad from economic exchange to social partnership. This divergence refines LMX theory by demonstrating that in knowledge-work contexts, satisfaction with supervision, a key downstream attitudinal outcome of relational quality, depends heavily on the leader sharing the subordinate's professional identity. The contribution is also relevant to other highly specialised domains. LMX scholarship has long called for research specifying the antecedent conditions under which high-quality exchanges form (Dulebohn et al., 2012). By demonstrating that a single, observable, and trainable leader attribute predicts job satisfaction, an outcome strongly associated with LMX quality, within a specific professional context, this study supplies a methodological template for domain-specific LMX antecedent research in other high-expertise settings.

The distributional evidence adds a structural specification that goes beyond a conventional moderation claim, and it allows the refinement to LMX theory to be stated in exact terms. Traditional LMX theory models exchange quality as accruing incrementally, through iterated cycles of offer and reciprocation between leader and member (Graen & Uhl-Bien, 1995). The hollow-middle pattern documented in Section 5.5.1 is consistent with a different architecture: subordinates in this population rendered a categorical, pass-or-fail judgement of managerial technical adequacy, with intermediate verdicts rare. Read through Social Identity Theory, the refinement proposed here is that LMX role-making is gated. Perceived domain competence operates as a prototypicality signal whose threshold must be crossed before the dyad can progress from economic to social exchange (Andersen et al., 2020), and the psychological weight of this gate scales continuously with the subordinate's occupational identity salience, as the programming-intensity gradient in Hypothesis 3 documents. Meta-analytic evidence on leader group prototypicality supports both halves of this proposal: across 128 studies, prototypicality exerts a moderate-to-large effect on evaluative and behavioural outcomes, the effect is

strongest when prototypicality is conceptualised as the group's ideal-type rather than its average member, and it is amplified by follower group identification (Steffens et al., 2021). The technically excellent manager corresponds to the ideal-type prototype of a programming-centred occupational community, and the developer cohort's steeper gradient mirrors the identification moderator. The refinement is specific and open to refutation. On this account, exchange quality is not built through accumulated reciprocity alone, as the traditional role-making description assumes; it is pre-conditioned by a threshold judgement of the leader's in-group prototypicality, and below that threshold iterated exchange is theorised to remain locked in the economic mode regardless of the manager's interpersonal effort.

The SIT-LMX contribution is positioned at the individual perceptual level. The claim is that the subordinate's perception of in-group prototypicality is the cognitive entry point predicting subordinate satisfaction outcomes. The study does not claim that technical competence creates a shared dyadic LMX quality measurable from both parties (Gooty et al., 2012; Krasikova & LeBreton, 2012). Future research employing multi-source dyadic designs (see Section 6.5) could test whether managers perceived as technically credible by their subordinates also report higher-quality relationships themselves, a convergence finding that would elevate this perceptual-level contribution to a genuinely relational one.

More broadly, this SIT-LMX refinement suggests that in any highly specialised knowledge-work field where practitioners hold a strong, domain-specific professional identity, the leader's domain expertise may be a primary antecedent for high-quality LMX formation. This process would operate prior to and independently of the iterative exchange processes that traditional LMX theory emphasises.

5.7.4 Comparison with Prior Research: Resolving Academic Tensions

An important academic tension exists in the IT management literature between studies that emphasise the importance of managerial technical competence and those that emphasise the central role of non-technical, interpersonal, and social skills. This tension is most sharply articulated by Murphy-Hill et al.'s (2021) large-scale study, which found that feedback quality, goal clarity, and autonomy provision

were the most statistically significant predictors of developer productivity, seemingly overshadowing technical managerial skills.

These results build upon the established importance of interpersonal managerial behaviours by identifying their underlying condition. Murphy-Hill et al. (2021) measured the content of managerial behaviour, what managers do, while the present study measured the precondition for that behaviour to be psychologically meaningful. The interpersonal fairness factor reviewed in Section 2.7.2 provides additional support for this mechanism. A technically incompetent manager who attempts to provide feedback, allocate tasks fairly, or set clear goals will find their efforts received with scepticism, because the cognitive trust necessary for those interactions to carry weight has not been established (Sesari et al., 2026). A manager cannot effectively execute interpersonal fairness if they do not understand the technical nature of the work they are evaluating.

Technical and interpersonal managerial dimensions operate sequentially, with the former enabling the latter. A technically credible manager who provides clear goals combines basic competence-based trust with the interpersonal behaviours SDT identifies as need-satisfying. Technical competence is the enabling foundation; interpersonal leadership behaviour is the application layer. Both are essential, but only one is a logical prerequisite for the other. The complementarity of technical credibility and interpersonal leadership receives further support from the AI adoption dynamics reviewed in Section 2.9.5. Positive outcomes in learning cultures are attributable to team-level cultural context rather than individual characteristics such as experience or self-efficacy (Hicks et al., 2025). The finding is consistent with the present study's argument: interpersonal leadership behaviours become effective only after technical competence is established. A technically credible manager is highly suited to model and sustain a learning culture. Their domain expertise permits them to create psychologically safe spaces for technical experimentation. They can also demonstrate that learning and adaptation are valued as professional activities in their own right, free from any connotation of inadequacy.

Across the two refinements, the exact role of the manager's technical competence in this study's contribution to knowledge can now be stated. A single observable attribute does three kinds of theoretical work at once. Within Social Identity Theory it

operates as the prototypicality signal that marks the manager as an in-group member of the occupational community. Seen through Leader-Member Exchange Theory, the same attribute is the antecedent that opens the gate from economic to social exchange. For Self-Determination Theory, finally, it supplies the enabling condition under which need-supportive behaviour is received as credible rather than intrusive. Because all three functions converge in one leader attribute that is both observable and trainable, the practice implications in Section 5.8 can concentrate on a single lever; this convergence is the integrative contribution of the thesis.

Table 5.1 compares this study's account with those of previous researchers, making explicit where the present findings replicate, qualify, or extend the prior literature.

Table 5.1

Comparison of This Study's Account with Prior Research

Prior account	Prior finding or claim	This study's finding	How this thesis extends the account
Artz et al. (2017)	Supervisor technical competence is a dominant predictor of job satisfaction in the general workforce	Replicated in the German IT sector: perceived programming competence showed a large bivariate association with satisfaction with supervision and contributed substantial unique variance beyond demographic controls	Supplies the psychological mechanism (the SDT-LMX-SIT pathway), an identity-based amplification gradient (H3), and a new national and sectoral context
Murphy-Hill et al. (2021)	Interpersonal managerial behaviours (feedback quality, goal clarity, autonomy provision) are the strongest predictors of developer productivity	Technical credibility was the strongest predictor of satisfaction with supervision	Resolves the apparent tension: interpersonal behaviours are the content of effective management, while technical credibility is the precondition for that content to be received as credible (Sesari et al., 2026)
Graen and Uhl-Bien (1995); Dulebohn et al. (2012)	LMX consequences are well documented, but the antecedent conditions of high-quality exchange remain under-specified	A single observable leader attribute predicted the attitudinal outcomes associated with exchange quality	Supplies a domain-specific, observable, and trainable LMX antecedent, plus a methodological template for antecedent research in other high-expertise settings
Andersen et al. (2020)	Economic (transactional) LMX carries an attitudinal penalty relative to social LMX	The hollow-middle threshold marks the point at which the dyad is inferred to enter, or fail to enter, social exchange	Identifies a domain-specific gate that is proposed to determine which exchange mode the dyad enters
Hogg (2001); Steffens et al. (2021)	Leader prototypicality confers effectiveness; meta-analytically, the effect is graded, strongest for ideal-type conceptualisations and identified followers	Among Core Software Developers the prototypicality judgement was rendered categorically (pass or fail), with its weight scaling with identity salience	Specifies the form the prototypicality judgement takes in craft-identity populations: a categorical threshold, not a graded evaluation

Prior account	Prior finding or claim	This study's finding	How this thesis extends the account
Robins (2010); Patitsas et al. (2020)	Bimodality in programming ability grades is largely unsupported; multimodality appears in only a small minority of grade distributions	A U-shaped, bimodal-like distribution emerged in subordinates' perception of managerial programming adequacy	Relocates the bimodality debate from the objective grading of learners to the social perception of leadership credibility, where categorical structure is theoretically expected (Section 5.5.1)
Premru et al. (2022)	The SDT-LMX interface is under-researched	Evidence consistent with a domain-contingent enabling condition linking the two theories	Bridges the documented gap with a testable boundary condition on the leader-behaviour to need-satisfaction link

5.8 Implications for Professional Practice and Policy

5.8.1 Rethinking HR Promotion Pathways

The most direct and immediately actionable implication of this study concerns the Human Resources practices governing the promotion and recruitment of managers in IT environments. A manager's formal academic degree was a statistically irrelevant predictor of subordinate satisfaction, whereas perceived programming skill accounted for a large proportion of unique predictive variance (see Sections 4.5.3 and 5.5.3). The statistical strength of perceived skill empirically challenges the credential-centric promotion pathways critiqued in Section 2.8.1 and directly corroborates the Peter Principle risk identified therein (Peter & Hull, 1969).

Traditional HR promotion models frequently apply the Generalist Assumption by relying heavily on generic leadership capabilities or academic qualifications. A candidate holding a general postgraduate management degree is often presumed better equipped for leadership than a technical expert possessing decades of hands-on programming experience. The empirical data challenge such credential-based presumptions, identifying a systemic misalignment within current IT promotion strategies. IT professionals respond to technical credibility, which is established through demonstrated competence and cannot be replaced by certified attainment.

The practical implication is that organisations must restructure their promotion criteria for IT management roles, dismantling the Generalist Assumption at the policy level. The contemporary German IT workforce increasingly enters the field via alternative qualification routes, including dual vocational training, bootcamps, and independent study (see Section 1.2.2). HR departments must adapt their leadership evaluation criteria to match this heterogeneous reality.

The transition towards competence-based promotion criteria is made additionally urgent by the reported quality of the applicant pool: 34% of German companies reported that IT applicants were technically underqualified, and 22% struggled to find candidates meeting their highly specific requirements for the newest technologies (Bitkom e.V., 2026). In this context, the present study's finding that perceived technical competence is the strongest single predictor of subordinate satisfaction

carries a direct corollary for recruitment practice. Managers lacking domain-specific credibility may not be able to rigorously assess precise technical skill gaps during the hiring process. They may be poorly equipped to distinguish genuinely qualified candidates from superficially credentialled ones. This deficiency directly compounds the high costs of a failed hire documented in Section 1.1.

The foregoing analysis is not an argument against formal management education; the interpersonal, strategic, and organisational competencies developed through such programmes remain highly valuable. The present findings provide, however, a data-driven argument that these credentials must not be used as a substitute for technical proficiency. Organisations promoting managers who lack technical credibility into engineering leadership roles risk creating work environments associated with lower job satisfaction among the talent they most urgently need to retain. HR departments must integrate domain-specific technical competence assessments into IT management recruitment processes. This assessment should target the threshold of sufficiency for informed advisement; absolute programming mastery is not the goal.

The generative AI governance requirement detailed in Sections 2.8.3.1 and 5.8.2 lends additional urgency to this realignment. The Generalist Assumption, when left unchallenged, promotes managers into roles where they cannot evaluate AI-generated code. This deficit exposes the organisation to severe operational, architectural, and security risks. Practitioner consensus directly validates this concern (de Campos et al., 2024). A manager who cannot fulfil the verification functions that safeguard the architectural integrity demanded by AI-augmented workflows effectively institutionalises the pathway that erodes code quality, a risk the industry identifies as its greatest operational challenge.

The economic and attitudinal costs of misaligned promotion decisions follow directly from the relational and motivational costs of a transactional exchange dynamic (Andersen et al., 2020), aligning theoretically with the downstream attitudinal deficits confirmed empirically in this chapter. When this dynamic is read alongside this study's polarised credibility distribution documented in Section 5.5.1, a specific and counter-intuitive risk scenario arises. Managers perceived as possessing only intermediate programming skill received the lowest satisfaction ratings. This

response pattern suggests that partial technical exposure, sufficient to be evaluated but insufficient to command respect, may represent the most damaging managerial configuration. Such managers are likely to be perceived as attempting, yet failing, to participate credibly in technical discourse, pushing the relationship firmly into economic exchange territory. The practical implication for HR decision-makers is substantial. Promoting a candidate with superficial technical exposure into an IT leadership role may be associated with worse relational outcomes than appointing either a genuinely technically proficient manager or a transparently non-technical manager who explicitly delegates technical authority. The intermediate-competence risk zone creates a specific, identifiable recruitment hazard that current generalist promotion pathways neither recognise nor manage. The survey data regarding this "hollow middle" also supplies a cost-benefit argument for keeping dedicated technical career tracks open as part of an overall retention strategy.

5.8.2 Training the "Technical Enough" Hybrid Manager

For organisations with incumbent IT managers whose technical skills have eroded over time, a common consequence of career progression away from hands-on technical roles, this study provides evidence-based justification for targeted technical refresher programmes. The concept of the "technical enough" hybrid manager is empirically validated by this study's use of a "perceived sufficiency" metric.

Organisations investing in technical leadership development should orient these initiatives towards restoring the minimum level of technical engagement necessary to cross the cognitive threshold, bridging the technical credibility gap. The goal is maintaining credible technical participation. Achieving this goal involves active credibility maintenance, such as participating in code reviews, engaging with the team's current technical stack, or regularly participating in architecture discussions, ensuring the manager remains a legitimate participant in technical discourse and retains their in-group prototypicality. The technical-enough managerial archetype is already validated in the literature (Garvin, 2013; Kalliamvakou et al., 2019); Section 5.5.1 adds specific empirical parameters for the minimum technical-credibility standard. Management training should ensure leaders maintain sufficient technical depth to cross that threshold and advise their teams competently.

Generative AI coding assistants redefine the parameters of being "technical enough". Within the AI-augmented workflow analysed in Section 2.8.3.1, the managerial value proposition shifts decisively towards the architectural, security, and maintainability governance that unverified AI output makes indispensable. The converging cognitive and quality risks established in Section 2.8.3.1 (developer skill erosion, uncritical AI dependency, and the persistent absence of collaboration gains) cannot be resolved without a manager who possesses substantive programming literacy.

The heterogeneous productivity effects documented in Section 2.8.3.1 carry direct implications for this governance role: less experienced developers benefit disproportionately from AI coding assistants, yet the quality impact depends heavily on whether the developer maintains active evaluative attention to machine-generated code (Peng et al., 2023). A technically competent manager is able to recognise these differential effects, to identify which team members are productively augmented by AI assistance and which are at risk of the reduction in critical evaluation discussed in Section 5.7.2. Without this diagnostic capability, the manager cannot calibrate the appropriate level of AI reliance for individual team members. The inability creates a dual risk. First, it causes under-utilisation of AI among those who would benefit most. Second, it allows unchecked over-reliance among those whose critical evaluation skills are being eroded.

5.8.3 Strategic Organisational Design

The sensitivity analysis findings furnish a specific, data-driven instrument for strategic organisational design decisions concerning reporting line structures. The identification of a continuous programming-intensity gradient and consistent effects at higher programming-intensity thresholds provides organisations with a concrete, behavioural operational guideline.

The practical recommendation is a differentiated approach to management assignment. Teams composed predominantly of Core Software Developers, meaning those whose primary daily activity is writing code, must be assigned managers with demonstrated domain-specific technical competence in software development. The sensitivity analyses confirmed that the psychological urgency of this requirement scales continuously with programming intensity. For teams where programming is a

peripheral activity (e.g., infrastructure maintenance, PMO), the relationship, although still acting as a positive baseline predictor, is less pronounced. In these contexts, a manager with strong general IT literacy combined with excellent interpersonal competencies may serve the team effectively without requiring the same level of programming-specific credibility. The differentiated design principle empirically supports maintaining distinct technical leadership tracks alongside general management tracks, validating investment in "dual ladder" career progression models.

Complementing static reporting-line structures, strategic organisational design must formalise continuous feedback mechanisms that capture the daily cognitive realities of developers. Operationalising DevEx governance principles requires concrete bottom-up instruments that surface the extraneous cognitive load shown to substantially impact developer, team, and organisational outcomes (Forsgren et al., 2023). Friction logging (Bifulco & Gerard, 2022) gives engineering teams a systematic mechanism to document daily technical impediments, as reviewed in Section 2.7.2.1. Formally recognised Developer Experience teams or champions within organisations can then synthesise this feedback. Occupying a central bridging position between leadership and engineering (Atlassian, 2025), these developer representatives can efficiently help surface real pain points and prioritise solutions. The success of such bottom-up initiatives, however, relies entirely on the central premise of this thesis. For developer-generated friction logs to produce systemic improvements, they must be received by immediate supervisors who possess the technical credibility to understand the reported friction. These supervisors must also have the authority to champion the necessary architectural or process changes. A non-technical manager, confined to aggregated performance metrics and off-the-shelf tooling choices, cannot perform this bridging function.

5.8.4 Combating the *Engpassberufe* Crisis

The practical contributions of this study ultimately converge on the macroeconomic challenge facing the German IT sector: the structural *Engpassberufe* crisis and the escalating economic toll of the *Fachkräftemangel*.

Macroeconomic analyses (Section 2.10.1) identify the retention of older employees until and beyond the standard retirement age as a primary strategic mechanism to combat the national shortage (Gordo et al., 2022). This urgency is reflected in the strong majority employer endorsement of the planned *Aktiv-Rente* as a policy instrument to incentivise extended workforce participation (Bitkom e.V., 2026). The present study's empirical findings, however, introduce an important psychological caveat to this macroeconomic strategy. The demand for technical leadership operates as a universal baseline that does not attenuate with the age of the subordinate (Section 5.4). Providing technically credible management is a mandatory micro-level organisational prerequisite for capitalising on macro-level policy instruments. This credible management must be sustained throughout the entirety of the extended employment period. Without technically proficient leaders who can maintain high-quality LMX relationships with senior staff, the extended workforce participation that such instruments are designed to encourage risks producing nominal organisational presence without sustained professional engagement.

Automating routine tasks via AI amplifies the demand for human expertise rather than substituting for it. During periods of constrained hiring capacity, retaining incumbent IT professionals to manage and oversee these complex technical systems remains the organisation's primary strategic priority.

These findings provide cross-sectional empirical evidence consistent with a theoretically supported sequence: poor technical leadership is associated with the dissatisfaction consistently linked to voluntary turnover intention, thereby reinforcing the underlying talent deficit. *Engpassberufe* represent a systemic talent shortage that external recruitment alone cannot resolve. Identifying managerial technical credibility as a previously under-quantified retention correlate against the Generalist Assumption therefore demonstrates that a meaningful portion of Germany's macroeconomic IT talent retention challenge is strategically addressable through a fundamental improvement in the technical quality of IT management.

5.9 Chapter Summary

The SDT, LMX, and SIT framework links the statistical outputs of Chapter Four to their psychological and relational implications.

The interpretation establishes that a manager's perceived programming competence acts as a primary statistical predictor of subordinate job satisfaction (H1 and H2). The strong empirical relationship identified in Section 5.2.2 aligns with the SDT-LMX-SIT predictive pathway established in Section 2.9.8, suggesting that domain-specific technical credibility is an essential relational antecedent for subordinate need satisfaction.

The analysis of the study's boundary conditions demonstrated a dual dynamic. The consistent null findings across demographic, educational, and organisational moderators (H4) indicate that this predictive relationship is stable and not significantly moderated by any tested demographic variable within the sampled German IT workforce. Superimposed upon this baseline, however, is a role-specific intensification gradient for Core Software Developers (H3). The need for technical leadership is most intense among developers, intensifying with daily programming intensity, independent of corporate job titles. For this cohort, a non-technical manager represents an active threat to professional identity, whereas a technically capable manager provides clear in-group validation.

Finally, the exploratory analyses refined the perceptual mechanics of this phenomenon. The "hollow middle" distributional signature (Sections 4.5.1.2 and 5.5.1) demonstrates that IT professionals evaluate managerial technical competence as a binary cognitive threshold. The explicit endorsement of the Szczepanski Proposition, juxtaposed with the exploratory demonstration that formal academic qualifications lack predictive power, also confirmed that Expert Power (demonstrated programming skill) eclipses Legitimate Power (formal academic degrees) as a driver of subordinate satisfaction.

The confirmatory, partially supported, and null findings integrate into a single framework: an unmoderated foundational dynamic coupled with a role-specific intensification, formalised in the revised conceptual model (Figure 5.1). Table 5.2 maps each hypothesis outcome to its corresponding discussion section and principal theoretical contribution.

Table 5.2

Interpretive Mapping of Hypothesis Outcomes to Discussion Sections and Theoretical Contributions

Hypothesis	Outcome	Discussion Section	Principal Theoretical Contribution
H1	Supported	5.2.1	Foundational large-effect link (r = .528) supports the SDT-LMX-SIT predictive pathway
H2	Supported	5.2.2-5.2.3	Unique ΔR^2 = .276 establishes managerial programming skill as a primary, independent predictor eclipsing demographics
H3	Partially Supported	5.3.1-5.3.3, 5.5.1	SIT identity-threat mechanism; continuous programming-intensity gradient, independent of binary or title-based moderation; survivorship hypothesis explaining developer skill-rating anomaly; construct overlap via Q14 as a quantitative signature of the in-group boundary
H4a	Not Supported	5.4.1-5.4.2	Demographic stability: no evidence was detected that career seniority intensifies the need for technical credibility within the sampled boundaries; both interaction coefficients trended in the opposite (negative) direction, suggesting marginal attenuation, not intensification.
H4b	Not Supported	5.4.2	CS degree is not a meaningful identity boundary; skill and practice define the in-group
H4c	Not Supported	5.4.2-5.4.3	Organisational scale does not moderate the effect; baseline is sector-wide

Note. Full statistical details for each hypothesis test are reported in Table 4.8 (Section 4.6). The "Outcome" column summarises the inferential conclusion; the "Discussion Section" column directs the reader to the corresponding interpretive treatment within this chapter.

The revised conceptual model (Figure 5.1) now encodes the study's central finding: perceived programming skill provides a broadly consistent relational foundation,

amplified by programming intensity, with no evidence of substantial moderation by demographics, education, or organisational scale. Sections 5.7 and 5.8 have consolidated the study's contributions to SDT, LMX, and SIT scholarship and their implications for HR policy in the *Engpassberufe* context. Chapter Six concludes the thesis by auditing the Research Objectives, answering the Research Question, and setting out the study's interpretive boundaries, future research agenda, and dissemination strategy.

6 Conclusion

6.1 Introduction

A DBA thesis must deliver both a theoretical contribution and an applied outcome for professional practice. Chapter Five established that managerial programming competence predicts IT professional job satisfaction across the sampled German IT workforce, consolidated the study's original contributions to knowledge (Section 5.7), and set out their implications for professional practice and policy (Section 5.8). Section 6.2 audits the Research Objectives, Section 6.3 answers the central Research Question, Section 6.4 reviews the study's interpretive boundaries, Section 6.5 defines a targeted future research agenda, Section 6.6 offers a scholar-practitioner reflection, Section 6.7 sets out the dissemination strategy, and Section 6.8 closes the thesis.

6.2 Achievement of Research Objectives

Four Research Objectives (ROs) guided this study, operationalised through the methodology in Chapter Three. Table 6.1 is the formal audit trail.

Table 6.1

Mapping of Research Objectives to Empirical Outcomes

RO	Objective	Principal Outcome	Cross-Reference
RO1	To derive from existing theory a new factor influencing job satisfaction in the IT sector	Perceived Managerial Programming Skill derived as a novel antecedent via the integrated SDT-LMX-SIT "Core and Support" framework	Sections 2.9.6 - 2.9.8; 5.2.2
RO2	To establish a valid and reliable measure of employee perceptions of the new factor, suitable for the German IT context	Bilingual (German/English) survey instrument integrating the validated KAFA (Haarhaus, 2016) with researcher-developed items operationalising the new independent variable	Sections 3.6, 3.6.7
RO3	To generate a primary empirical evidence base on the new factor among IT professionals working in Germany	Validated sample of formally employed IT professionals in Germany, spanning 20+ industry sectors and enabling behavioural classification into Core Software Developer and other IT expert cohorts	Sections 3.7.1, 4.3
RO4	To refine existing theory within the field, based on a statistical analysis of the relationship between the new factor and job satisfaction	H1-H2 supported (large main effect); H3 partially supported (developer amplification gradient); H4a-c not supported (stable baseline). Refined theoretical model formally documented	Sections 4.4, 5.6, 6.4.1, 5.7.2, 5.7.3

All four Research Objectives were achieved (Table 6.1), providing the evidential foundation for the structured answer to the Research Question presented in Section 6.3.

6.3 Answering the Research Question

The overarching Research Question (RQ) that guided this empirical inquiry is:
To what extent does the perceived programming competence of an IT manager predict the job satisfaction of the IT professionals they supervise, and what are the boundary conditions of this relationship?

Chapter Four's evidence and Chapter Five's interpretations answer this question on three dimensions. First, on the "to what extent" clause, technical competence is a primary predictor that theoretically acts as the essential entry condition for a high-quality supervisor-subordinate relationship. Second, exploratory analysis identified the psychological mechanism: IT professionals evaluate this competence as a dichotomous cognitive threshold. The evaluation produces a platykurtic "hollow middle" in which subordinates abandon neutral judgements and classify managers as either distinctly technically capable or clearly insufficient. Third, on the boundary conditions, the predictive relationship operates as a broadly consistent empirical norm across the German IT workforce, with a continuous role-based intensification effect superimposed for Core Software Developers.

These three dimensions indicate that a manager's perceived programming competence is a core condition for effective IT leadership that sustains subordinate job satisfaction.

6.3.1 The Relational Baseline: Technical Competence as a Foundational Condition

Perceived managerial programming competence strongly and independently predicts an IT professional's job satisfaction. The manager's technical skill uniquely accounted for more than a quarter of the variance in job satisfaction, a predictive weight greater than that of the standard demographic covariates, occupational factors, and formal academic credentials combined.

The SDT-LMX-SIT pathway developed earlier in this thesis explains this predictive strength. Within the integrated SDT-LMX-SIT framework, technical competence aligns theoretically as the initial condition preceding trust, relational quality, and need satisfaction. In a highly specialised, cognitively demanding environment, standard interpersonal leadership interventions, such as providing autonomy, offering constructive feedback, or attempting to build relational trust, are severely limited if the manager lacks domain-specific credibility. Without this precondition, the subsequent relational and psychological benefits would, on theoretical grounds, be unlikely to materialise.

The correlation is empirically consistent with this prerequisite function operating with substantial empirical force. No other tested variable, neither the subordinate's age, nor their educational background, nor the size of their employing organisation, displaces or attenuates technical competence as the necessary relational precondition. These results reposition managerial technical competence within the broader organisational behaviour literature: It is a precondition for the effectiveness of all other supervisory behaviours.

An exploratory regression analysis illustrates this foundational function. When a manager's formal academic degree and their perceived programming skill were evaluated as competing predictors of satisfaction with supervision, the formal degree proved non-significant. Perceived programming skill, however, emerged as the primary predictor.

A manager who lacks domain-specific technical credibility is theoretically impeded from acting as an effective conduit for need satisfaction. The absence of technical credibility is associated with the adverse attitudinal consequences Andersen et al. (2020) attribute to economic-mode exchange (Section 5.2.2). The present data allow this theoretical proposition to be expressed in concrete organisational terms. Because a single observable managerial attribute, in particular perceived programming skill, is statistically positioned as the foundational correlate for the entire positive relational sequence, its practical importance exceeds its apparent simplicity. Technical credibility is empirically linked to the positive satisfaction outcomes predicted by the SDT-LMX-SIT pathway. Its absence is associated with the

attitudinal deficits that theoretically correspond to the adverse transactional alternative.

This cost structure is distinctly asymmetric. The cost of a technically non-credible appointment is an active liability that exceeds a simple opportunity cost. For organisations operating within the *Engpassberufe* context (Section 1.1), this asymmetry exacts a measurable financial toll. The severe cost of unfilled vacancies and the compounding liabilities of failed external hires documented in Chapter One (Geslin, 2025; Stepstone Group, 2022) directly alter the strategic cost-benefit equation: Appointing a technically non-credible manager is systematically associated with the attrition of high-value personnel underlying these costs. The inability to establish basic cognition-based trust transforms what appears to be a single dyadic failure into a measurable strategic penalty, directly undermining competitive viability in a market where six-figure replacement expenditures already strain hiring budgets.

6.3.2 Exploratory Findings on the Binary Cognitive Threshold

Evaluating how subordinates perceive and process this technical competence further refines the answer to the research question. The contested academic debate has centred on the bimodality of objective programming aptitude (Patitsas et al., 2020). The present findings redirect the phenomenon to the subordinate's evaluative judgement of managerial credibility, the formal contribution of which is stated in Section 5.7.1.

The "hollow middle" distribution established in Section 4.5.1.2 and interpreted psychologically in Section 5.5.1 weighs strongly in favour of the conclusion that IT professionals assess managerial technical credibility as a categorical, dichotomous judgement rather than on a continuous evaluative spectrum. A manager is perceived either as possessing the requisite technical literacy to lead credibly, or as falling decisively short and belonging to an out-group.

The observed bimodal evaluation maps directly onto the two-dimensional LMX framework (Andersen et al., 2020). The depletion of the neutral midpoint is a perceptual threshold that coincides with the psychological boundary separating an economic exchange relationship from a social exchange relationship characterised by high trust, identity validation, and intrinsic motivation. Managers evaluated as

possessing only intermediate programming skill received the lowest satisfaction ratings, suggesting that partial technical exposure, sufficient to be evaluated but insufficient to command respect, is the most damaging managerial configuration. Meeting the "technical enough" standard described by Garvin (2013) and Kalliamvakou et al. (2019) is therefore a condition for the social LMX interactions on which talent retention depends.

6.3.3 Broad Baseline Consistency vs. Role-Based Amplification

The boundary-conditions component of the research question required testing both the limits and the intensifications of the predictive relationship. The hierarchical moderation analyses yielded a consistent pattern that establishes a clear demarcation between demographic boundaries, which failed to moderate the effect, and behavioural boundaries, which substantially amplified the predictive relationship.

First, the requirement for a technically credible manager operates as a broadly consistent main effect across the sampled German IT workforce. The predictive relationship remains stable across the measured demographic boundaries, intensifying neither with the subordinate's formal educational background nor with the size of the employing organisation. The consistent null findings across H4a, H4b, and H4c confirm this stability. Regarding career seniority, both interaction coefficients trended in the negative direction, opposite to that predicted by Status Incongruence Theory (Section 4.4.4.1), suggesting that the relationship, if anything, marginally attenuates rather than intensifies as career seniority increases. In the egalitarian, horizontal-individualist cultural context of Germany, the expectation that authority must be grounded in demonstrable expertise appears as a stable sector-wide baseline, largely untethered from demographic categorisation or historical credentials. Exploratory tests confirmed this null pattern extended to gender, migrant status, and core IT sector employment.

Second, alongside this stable sector-wide foundation is a distinct role-based amplification for Core Software Developers. Through complementary analytical models, specifically the continuous interaction and the single-item robustness check, the study demonstrated that the predictive relationship between perceived managerial programming skill and satisfaction with supervision scales significantly

with programming intensity. This relationship exhibits a significantly steeper predictive slope for the developer cohort when measurement overlap is removed. Sensitivity analyses confirmed that this amplification is driven by a continuous programming-intensity gradient, scaling directly with the actual proportion of daily working time spent writing code, independent of nominal corporate job titles.

According to Social Identity Theory (Tajfel & Turner, 1979) and Role Theory (Biddle, 1986), this amplification occurs because programming forms the defining anchor of professional identity for this cohort. For a Core Software Developer, a manager who lacks programming competence poses an active identity threat (Chang et al., 2012; Hicks et al., 2025), generating cognitive dissonance by violating the meritocratic norms of the technical in-group. A manager who competently handles architectural complexities provides powerful identity validation. Because prototypical leaders are granted psychological authority beyond formal hierarchy (Hogg, 2001), this validation mechanism theoretically explains the steeper predictive slope and the continuous programming-intensity gradient observed for Core Software Developers. The thesis concludes that the need for technical management is a broadly consistent empirical norm across the sampled IT sector, while its psychological urgency scales directly with the cognitive reality of subordinates' daily immersion in code.

6.4 Limitations and Strengths of the Study

6.4.1 Impact of Methodological Limitations on Empirical Interpretation

Chapter Three set out several methodological constraints that were accepted when the study was designed. These constraints include the eleven limitations catalogued in Section 3.9, alongside specific analytical boundaries such as single-source data (Section 3.4.4) and threshold operationalisation (Section 3.6.5). The primary question is no longer which constraints exist, but how the primary unresolved boundaries specifically impact the interpretation and generalisability of the empirical results.

Statistical power, representativeness, and the interpretation of null findings (H4). The achieved sample of *N* = 335 fell slightly short of the representativeness target set in Section 3.5.4, marginally widening the confidence intervals around descriptive estimates. The formal post-hoc sensitivity analysis reported in Section 4.2.5 confirmed that the achieved functional sample sizes yielded adequate statistical power for detecting medium and larger focal effects in the study's hierarchical and moderated multiple regression models. Accordingly, this shortfall had no discernible impact on detecting the confirmatory effects (H1, H2, and the continuous interaction effect for H3). The principal interpretive consequence of this shortfall is a modest reduction in the statistical sensitivity available for detecting highly subtle, micro-level interaction effects in the H4 moderation models. Even at the most conservative sensitivity boundary (Section 4.2.5), the observed empirical interaction effect for educational background fell an order of magnitude below the study's detection floor, confirming that the null finding is consistent with a genuinely negligible effect. The consistently near-zero interaction variance changes across all demographic moderators support the interpretation of sector-wide demographic stability advanced in Section 5.4. However, within a Popperian falsification framework, an absence of evidence is not evidence of absence (Darmstadt, 1928). Because of the reliance on a non-probability snowball sample and the inherent statistical limits of detecting small interaction terms (Section 4.2.5), these null findings must be interpreted strictly as a failure to detect moderation within the sampled boundaries rather than proof of demographic invariance. Within these limits, the conclusion must be bounded: demographic variables show no practical moderation in the sampled population, not demographic invariance in principle.

Highly subtle or complex three-way interactions may have been masked by sample size constraints; a larger sample would have provided narrower confidence intervals around these coefficients, which would refine, or potentially qualify, the universality claim.

Directional inference and the reciprocal pathway constraint. Building upon the methodological boundaries detailed in Chapter Three, the interpretation of the unique predictive variance of managerial skill (H2) must consider the limits of cross-sectional evidence for the theorised predictive sequence (Podsakoff et al., 2003). The integrated SDT-LMX-SIT framework proposes a specific theoretical direction,

from perceived competence through trust and LMX quality to SDT need satisfaction and, ultimately, job satisfaction, but a reciprocal pathway cannot be excluded. Moreover, the intermediate psychological states were not directly measured. These states include trust, LMX quality, and SDT need satisfaction. As a result, the mediational pathway remains an empirical "black box". A reciprocal halo effect may operate, whereby broadly satisfied employees retrospectively inflate their ratings of their manager's technical skill. Two features of the present results alleviate this interpretive threat.

First, the observed ΔR^2 of .276 must be interpreted in the context of its empirical specificity. The observed R^2 of .276 lies within the baseline method-variance range reported by Cote and Buckley (1987), so magnitude alone cannot rule out a CMB artefact, a caveat set out at the design stage (Section 3.7.3). A generalised affective halo would produce a diffuse, normally distributed upward shift across all measured constructs. The observed effect is instead concentrated in a single, theoretically predicted predictor-criterion pathway and is accompanied by the selective moderation pattern evaluated earlier in this section. Second, the "hollow middle" distributional pattern (Section 4.5.1.2) is inconsistent with the reciprocal halo interpretation. A generalised affective halo typically produces a continuous, normally distributed upward shift. The sharp, threshold-based categorical judgement observed here points to a discrete evaluative process distinct from diffuse affective spillover. This pattern reinforces the plausibility of the SDT-LMX-SIT predictive pathway proposed in Section 5.2.2.

Threshold operationalisation and the H3 boundary. The non-significance of the primary categorical interaction for H3 (p = .109) demonstrates the methodological cost of dichotomising continuous behavioural data. The post-hoc power analysis (Section 4.2.5) confirmed that the observed categorical interaction effect fell below the study's detectability floor for focal effects. While the information loss involved in dichotomising continuous behavioural data (MacCallum et al., 2002; see Section 3.7.7) played a secondary role, the subsequent robustness check (Section 4.4.3.2) showed the primary suppressor of the effect was the Q14 measurement artefact (construct overlap). When this criterion contamination was removed, the exact same dichotomised 50% threshold yielded a highly significant interaction (p = .006). The significant continuous model (Section 4.4.3.1), which avoids dichotomisation

variance loss entirely, provides additional convergent support. As a result, the partial support verdict plausibly reflects, at least in part, the composite metric's vulnerability. The available evidence cannot, however, establish the categorical phenomenon with the confidence that a significant pre-specified test would have provided.

Measurement constraints of the two-item independent variable. The central predictor was measured with a researcher-developed two-item composite, and this brevity limits the confidence the findings can support. Although the composite met conventional reliability standards (α = .778; inter-item *r* = .639; Section 4.2.3), a two-item scale cannot provide the internal consistency and dimensionality evidence available to validated multi-item instruments, samples the construct domain of technical credibility narrowly, and leaves the findings dependent on the psychometric behaviour of two individual items. This dependence proved consequential: the H3 verdict shifted materially across operationalisations of the same construct (composite categorical interaction, *p* = .109; single-item, *p* = .006; Section 4.4.3.2). Accordingly, the convergent evidence supporting H3 from the continuous and single-item analyses is treated as suggestive rather than confirmatory, and the reported H1 and H2 effect sizes are interpreted subject to the attenuation caveat set out in Section 3.9. The development and validation of a multi-item measure of perceived managerial technical competence is identified as a necessary condition for stronger inference in future research (Section 6.5).

Construct overlap and theoretical dual-operationalisation. The two-dimensional composite was purposefully specified to integrate two theoretically distinct facets of Expert Power: absolute capability (Q13) and role adequacy (Q14) (French & Raven, 1959). The adequacy facet inevitably shares conceptual surface with the supervisory-satisfaction outcome, introducing a bounded risk of criterion contamination ("satisfaction predicting satisfaction"), particularly among non-developers for whom the adequacy judgement collapses onto global affect (Section 5.5.1). Rather than viewing this tautology risk as an uncontrolled design flaw, the study owned this overlap by systematically isolating it through a pre-planned confirmatory robustness test. The Q13-only analysis indicates that the focal predictive relationships are unlikely to be wholly attributable to statistical artefacts. The single-item robustness check confirmed that this overlap operated as a conservative bias on the moderation model: removing Q14 strengthened the

categorical H3 interaction from non-significance (p = .109) to high statistical significance (p = .006). The overlap inevitably contributed to the magnitude of the full-sample composite correlations reported for H1 (r = .528) and H2 (ΔR^2 = .276). Even so, the Q13-only estimates (r = .395 and r = .401, both p < .001) establish the uncontaminated lower bounds of these effects.

The composite provides a theoretically principled dual-operationalisation with an embedded, uncontaminated empirical baseline, rather than as a compromised measure rescued post-hoc. Additionally, the post-hoc Harman's single-factor variance (37.79%; Section 4.2.4) falls within the empirical range reported by Cote and Buckley (1987) for attitude measures, further corroborating that method variance does not invalidate the core effects. Future replications should nonetheless evaluate both operationalisations to formally disentangle reliability gains from predictor-criterion overlap.

Sampling bias and the generalisability of the baseline. The reliance on convenience and non-probability snowball sampling undoubtedly shaped the specific sample composition observed in Chapter Four, and two consequences follow. First, the findings possess low statistical generalisability: they strictly describe the population reachable through the sampling networks set out in Section 3.5.4 and cannot be statistically generalised to the German IT workforce as a whole, still less to other national contexts (Section 4.6). Second, referral-based recruitment introduces a selection bias whose direction cannot be estimated, because referred participants tend to resemble their recruiters, and attitudes correlated with membership of these professional networks may therefore be over-represented. Within these boundaries, the sample's occupational composition offers partial post-hoc reassurance. Core Software Developers account for 36.7% of the achieved sample, a proportion that mirrors the compositional reality of the German labour market, where software development and programming account for approximately 30.4% of all socially insured IT professionals (Bundesagentur für Arbeit, 2025). The broad cross-industry dispersion (nearly 73% of respondents embedded within non-IT primary industries) and the wide age range (M = 40.47, SD = 10.11) provide further reassurance against extreme demographic homogeneity. Nevertheless, the sample's relatively high mean age and seniority, combined with the high proportion of managers holding university degrees (72.5%), may reflect my own career stage and

network characteristics, potentially underrepresenting early-career IT professionals and less academically credentialed management tiers.

Stringent moderator gatekeeping on major IT community forums restricted broader access to professionals outside traditional corporate networking platforms, exacerbating the reliance on established networks (Section 3.9). The explicit failure of total professional experience to positively moderate the main effect (the second proxy tested under H4a), however, provides an internal safeguard against this limitation. The psychological requirement for technical leadership did not increase with the subordinate's own tenure; the requirement in fact exhibited a marginal trend towards attenuation. One can therefore be confident that the sampling bias towards highly experienced professionals did not artificially inflate the core predictive relationship. If anything, this bias likely resulted in a conservative underestimation of the main effect. The finding that formal academic credentials possessed no independent predictive power over satisfaction with supervision (Section 4.5.3) further reduces the concern that the high managerial education level in the sample distorted the primary results. Nevertheless, caution is necessary when extrapolating these findings to entry-level developers or to highly traditional, non-digitised corporate environments less accessible to the sampling strategy.

Because the survey instrument did not differentiate between remote, hybrid, and on-site respondents, the study cannot empirically assess whether work location moderates the observed relationships. This omission is noted as a contextual design boundary, as the study's theoretical framework does not model work arrangement as a moderating variable.

Self-report measurement and common method variance. As a preliminary diagnostic, Harman's single-factor test (Section 4.2.4) showed that no single factor captured a majority of the total item-level variance. This conclusion is further supported by the common latent factor analysis (Section 4.2.4.1), in which no standardised trait loading changed by more than .20 upon introducing an orthogonal method factor and the estimated common variance remained below the benchmarks reported by Cote and Buckley (1987). Because such statistical diagnostics remain indirect - and Harman's technique in particular is acknowledged as insensitive (detailed in Section 3.7.3) - the more substantive defence against a pervasive CMB

artefact rests on two distinct, corroborating lines of evidence. First, the moderation results demonstrated differential sensitivity, with H3 partially supported and H4a through H4c uniformly unsupported. The pattern of selective, theoretically coherent moderation observed in H3 does not match the uniform common method artefact pattern (Siemsen et al., 2010), providing strong internal evidence (as stated before analysis in Section 3.7.3) that the detected moderation reflects substantive psychological dynamics. Second, pre-planned procedural safeguards, including logical separation of predictor and criterion variables within the survey instrument and guaranteed respondent anonymity (Section 3.7.3), directly targeted the two most common sources of method bias identified by Podsakoff et al. (2003): item proximity effects and social desirability.

Single-source measurement and pseudo-unilaterality. The measurement boundaries set in Section 3.4.4 mean the study explicitly measures satisfaction with supervision rather than attempting to unilaterally operationalise LMX itself, effectively avoiding the strict pseudo-unilaterality trap (Duncan et al., 1984). Nevertheless, theorising about inherently dyadic phenomena while relying on data from only one dyad member invites scrutiny under the levels-of-analysis framework that has shaped LMX research for over two decades. Measuring the dyad's outcomes from the perspective of the subordinate omits the variance contributed by the manager's own characteristics and reciprocal perceptions. The limitation is substantially offset by the strict delineation between the unmeasured dyadic theory and the measured individual outcomes (Sections 2.9.4.1 and 3.4.4): the research question empirically evaluates the subordinate's individual attitude (satisfaction with supervision), while leaving the dyadic LMX mechanism as a theoretically inferred black box. The study does not claim to capture an objectively verified, shared relational consensus (Gooty et al., 2012). While this constraint corresponds directly to the intrapersonal focus of the theoretical framework, the unilateral design methodologically prevents the empirical analysis of self-other agreement patterns. Therefore, managerial perception discrepancies (for instance, whether managers who overestimate their own technical competence produce more severe satisfaction deficits than those whose self-assessments are calibrated to their subordinates' evaluations) cannot be empirically examined.

This single-source constraint represents a genuine boundary on the conclusions that can be drawn and is addressed as a priority direction for future research in Section 6.5.

Interpretive ambiguity of the status incongruence proxy. Because the subordinate's absolute age proxied the relational age gap, the non-significant moderation finding for H4a must be interpreted conservatively. Specific high-incongruence configurations (e.g., a 55-year-old developer reporting to a 28-year-old manager) could not be tested. A more precise dyadic measure might have yielded a significant interaction that this coarser proxy obscured. The consistency of the null finding across both absolute age and total professional experience, and across both the overall satisfaction and the supervision-specific facet, however, substantially reduces the probability that the null result is a measurement artefact. Total professional experience acts as an independently operationalised measure of career seniority. The agreement of both proxies on a negative interaction direction accordingly provides partially independent evidence against the Status Incongruence prediction, even though neither coefficient individually reached statistical significance. The H4a finding is interpretable as, at minimum, a consistent absence of moderation at the level of the available operationalisation, while acknowledging that a dyadic age-difference design remains the definitive future test.

Survivorship bias in the sample structure. The cross-sectional design constrains what can be claimed here, so the theorised SIT-based attrition mechanism plausibly restricted variance at the lowest extremes of satisfaction and perceived skill before data collection commenced. The principal methodological consequence of this positively filtered sample concerns the interpretation of effect sizes. The large effect sizes reported for H1 and H2 were computed on a developer subsample already partially depleted of its most extreme low-skill, low-satisfaction dyads. This survivorship mechanism deflated the observed effects. The full population magnitude of these relationships is plausibly larger than any cross-sectional survey design can empirically recover. The reported H1 and H2 effect sizes represent conservative lower bounds on the true population magnitude, which any cross-sectional design is likely to under-recover. The same argument cannot be carried over to the partially supported H3 moderation without qualification, because the primary categorical interaction term fell short of conventional significance. The precise magnitude of this

attrition effect cannot be empirically recovered from a single-occasion survey. The longitudinal and experience-sampling designs recommended in Section 6.5 (Priority 2) would permit direct tracking of attitudinal change and exit behaviour over time, enabling future researchers to quantify this survivorship bias formally.

Mathematical limits of moderated regression at extreme thresholds. The data analysis also exposed a mathematical boundary condition intrinsic to the mechanics of moderated multiple regression (MMR) when applied to extreme professional classifications. While the a priori decision to mean-centre continuous variables successfully prevented problematic multicollinearity in all primary theoretical models (Aiken & West, 1991), the sensitivity analyses demonstrated the mathematical limits of this technique when subgroup imbalances become severe. At the highly inclusive > 0% programming threshold, multicollinearity rose to unacceptable levels (VIF = 10.454). This multicollinearity reveals a methodological limit: when a subgroup is near-constant, the interaction term becomes unstable, inflating standard errors and reducing sensitivity. While the mathematical instability did not compromise the primary findings, the instability demonstrates the necessity of defining professional identity boundaries using balanced behavioural metrics, such as the 50% task threshold.

Temporal boundary: measurement during the generative AI transition. The data were collected while generative AI was actively reshaping software development practice (Section 2.8.3.1), and this timing bounds the findings in two ways. First, the content of the focal construct is itself in transition. As the managerial value proposition shifts from syntactic production towards the governance of machine-generated code (Section 5.8.2), respondents may increasingly anchor their judgement of a manager's programming skill in evaluative and architectural capability rather than in hands-on coding fluency. The two-item measure therefore captured perceptions at a specific moment of this transition, and the findings are tied to the moment of data collection: the same items administered several years earlier or later might sample subtly different construct content. Second, no AI-related variable entered the statistical models. Team-level AI adoption intensity, individual reliance on coding assistants, and AI Skill Threat (Hicks et al., 2025) are plausible unmodelled influences on the focal association. The theoretical analysis in Sections 2.9.5 and 5.7.2 suggests that deepening AI adoption should, if anything, raise the salience of

managerial technical credibility and thereby strengthen rather than weaken the observed association, but a single-occasion survey cannot adjudicate this conjecture empirically. The direction and magnitude of any AI-related influence on the reported estimates consequently remain unknown, and Section 6.5 specifies the measurement additions required to resolve this boundary.

6.4.2 Strengths of the Research Design

Notwithstanding these limitations, the research design has several methodological strengths.

Distributional breadth of the independent variable. The study's most basic requirement, capturing sufficient variance in both the independent and dependent variables, was met. The primary independent variable, Perceived Managerial Programming Skill, exhibited the largest standard deviation (*SD* = 1.31) of all primary constructs, spanning the full range of the 5-point scale. This distributional breadth confirms that the sample captured managers across the entire competence spectrum, from those with entirely insufficient technical backgrounds to those assessed as highly proficient. Without this variance, the regression analyses could not have reliably detected the substantive predictive relationships documented throughout Chapter Four.

Culturally native and psychometrically validated instrumentation. The dependent variable was measured using the Kurzfragebogen zur Erfassung von allgemeiner und facettenspezifischer Arbeitszufriedenheit (KAFA; Haarhaus, 2016). The KAFA is a psychometrically validated instrument developed, normed, and validated within the German occupational context, thereby avoiding the well-documented threats to construct, method, and item validity that arise from applying instruments originally developed within Anglo-American contexts (He & van de Vijver, 2012; Van de Vijver & Hambleton, 1996). The subscale structure of the KAFA instrument permitted the analytical separation of the overall job satisfaction composite (KAFA_Overall) from the specific satisfaction with supervision facet (KAFA_Manager), enabling a precise, theoretically targeted test of dyadic LMX exchanges that would not have been possible with a global, single-item satisfaction measure. In this study's IT-specific sample, both scales demonstrated excellent

internal consistency (α = .944 and α = .915, respectively), confirming their reliable applicability in this context.

Behavioural triangulation via continuous task-based measurement. The developer role was operationalised using an objective behavioural criterion: the precise percentage of actual daily working time spent programming. By grounding classification in observable daily behaviour, the operationalisation avoids the unreliability of semantically ambiguous corporate job titles. Section 4.4.3.1 demonstrated that it was precisely the continuous measurement of programming time and subsequent threshold exploration that successfully detected the continuous moderation underpinning H3, whereas nominal corporate titles yielded a non-significant interaction. This triangulation confirms that the proportion of daily working time spent programming, not corporate job titles, strongly predicts the strength of the association between managerial technical credibility and subordinate satisfaction.

Novel operationalisation of the independent variable. The composite two-item independent variable, combining the absolute assessment of the manager's programming skill (Q13) with the perceived sufficiency of that skill for the managerial role (Q14), addresses a subtle but important construct validity consideration. Perceived sufficiency captures a relational, contextualised evaluation that has direct theoretical relevance to the SDT-LMX-SIT framework: an IT professional may fully acknowledge that a manager possesses some programming knowledge and simultaneously conclude that it falls below the threshold required for effective technical guidance, autonomy support, and credible feedback. The strong inter-item correlation and acceptable composite reliability reported in Chapter Four confirm that these two items reliably measure a single underlying construct of technical credibility. While Section 6.4.1 acknowledges the statistical trade-off of using this composite for subgroup moderation (where the single Q13 item proved more statistically sensitive), the two-dimensional composite captures a richer, more theoretically complete representation of "Expert Power" for the primary predictive models (H1 and H2) than any single item could achieve.

Conservative measurement bias and robustness verification. The risk of construct overlap in the composite independent variable was flagged in Section 3.6.4 and tested in Section 4.4.3.2. The overlap turned out to bias the composite-based

H3 results downwards, so those estimates should be read as a lower bound. Acknowledging and bounding this limitation openly accords with the post-positivist stance of the thesis.

6.5 Directions for Future Research

The interpretive boundaries in Section 6.4 call for a coherent, multi-method research programme. Five specific constraints define this agenda: the cross-sectional design, non-probability sampling, sample-level survivorship bias, the proxy operationalisation of status incongruence, and the single-country, single-sector scope. This agenda prominently features mediator modelling to formally test the mediation pathways inferred in Sections 5.2.2 and 6.4.1, and is structured by a clear scholar-practitioner prioritisation. The prioritisation reflects two criteria: first, how directly a given direction addresses a named interpretive boundary; and second, how far one direction's outputs serve as necessary design inputs for subsequent directions. Table 6.2 provides the formal mapping that underpins the sequencing rationale.

Table 6.2

Mapping of Future Research Directions to Study Limitations

Priority	Direction	Primary Limitation(s) Resolved	Limitation Reference
1	Mediator modelling (SEM)	Inferred but unmeasured mediation pathway	Sections 5.2.2, 6.4.1
2	Longitudinal and ESM designs	Cross-sectional causal ambiguity; survivorship bias	Sections 3.4.3, 6.4.1
3	Cross-cultural and cross-sectoral replication	Single-country scope; cultural boundary of the established baseline effect; single-sector scope	Sections 1.5.1, 5.4.2, 6.4.1
4	Dyadic matched designs	Unilateral perceptual operationalisation; proxy status incongruence	Section 6.4.1
5	Qualitative phenomenological inquiry	Inability to identify specific threshold behaviours	Section 5.5.1

Note. Priority reflects programmatic sequencing (outputs of earlier directions inform the design of later ones) and limitation-resolution specificity. Section references indicate where each limitation was identified and discussed.

Priority 1: Mediator Modelling. Limitation resolved: the reliance on inferred intermediate psychological processes that were not directly measured (Section 6.4.1). The highest-priority and methodologically accessible next step is the direct empirical testing of the mediated pathway theorised in Section 5.2.2. The substantial unique variance demonstrated by Hypothesis 2 currently remains an empirical black box. The integrated SDT-LMX-SIT framework offers a theoretically coherent explanation, but the intermediate mechanisms (cognition-based trust [McAllister, 1995], LMX quality [Graen & Uhl-Bien, 1995], and basic psychological need satisfaction [Deci & Ryan, 1985]) were inferred from the cross-sectional data and were not directly measured. Until structural equation modelling (SEM) formally decomposes this variance into its component mediated pathways, the theoretical architecture remains, strictly speaking, a plausible but untested explanatory model. This direction has first priority for two reasons. First, this approach requires the least methodological infrastructure of the five. SEM can be implemented within a conventional cross-sectional survey design. The expanded instrument would incorporate validated measures of cognition-based trust, affect-based trust, LMX quality, and basic need satisfaction alongside this study's independent and dependent variables. Alongside these mediator measures, the expanded instrument should replace the two-item predictor with a formally validated multi-item scale of perceived managerial technical competence, so that the measurement constraints identified in Section 6.4.1 no longer bound the interpretation of the estimated paths. The expanded instrument would permit a full structural equation model test of the serial mediation pathway theorised in Section 5.2.2: perceived programming skill → cognition-based trust → affect-based trust / LMX quality → SDT need satisfaction → job satisfaction. By modelling cognitive and affective trust in sequence, future researchers could overcome the statistical suppression effect identified by Legood et al. (2021, p. 13). This longitudinal extension would formally test McAllister's (1995) proposition that cognitive trust is the necessary gateway to deeper affective bonds.

The test would directly address the theoretical SDT-LMX gap (Premru et al., 2022; see Section 2.9.1), replacing theoretical inference with empirical path coefficients.

Second, this direction's outputs, validated path coefficients and confirmed or disconfirmed mediation stages, serve as necessary design inputs for the longitudinal and ESM designs that follow, because identifying which mediators are operative determines which variables must be tracked over time.

Priority 2: Longitudinal and ESM Designs. Limitations resolved: cross-sectional causal ambiguity and sample-level survivorship bias (Section 6.4.1). A cross-lagged panel study measuring Perceived Managerial Programming Skill and job satisfaction at multiple time-points would permit a more rigorous assessment of temporal precedence. In addition, tracking attitudinal change and exit behaviour within individuals over time would directly address the survivorship concern. Such an approach would recover the variance that the cross-sectional design of this study necessarily attenuated by only capturing intact dyads (Section 5.3.3). Experience Sampling Methodology (ESM), grounded in Weiss and Cropanzano's (1996) Affective Events Theory framework, and methodologically exemplified by Sonnentag and Zijlstra (2006), would add a complementary micro-level resolution. Researchers could administer brief diary prompts twice daily over a period of two to four weeks. This method would capture the specific daily affective events through which managerial technical credibility is psychologically experienced and accumulated. For example, a technically informed critique during a code review may affirm the developer's competence need. A credible diagnostic intervention during a production incident may signal genuine in-group understanding. An uninformed estimation decision during sprint planning may instead erode trust. These daily events are the discrete behavioural enactments of the theorised SDT-LMX-SIT predictive pathway. ESM would also capture the daily micro-frictions experienced by developers interacting with technically non-credible managers. As Weiss and Cropanzano (1996) theorised, these transient affective events cumulatively consolidate into the stable macro-level satisfaction judgements documented in this thesis. This longitudinal/ESM direction is sequenced after mediator modelling because ESM diary design requires prior knowledge of which mediators to sample at the daily level;

the path coefficients from Direction 1 would directly inform the ESM measurement protocol.

Priority 3: Cross-Cultural and Cross-Sectoral Replication. Limitation resolved: single-country geographic scope, the cultural boundary of the universal baseline (Section 5.4.2), and the single-sector occupational scope (Section 1.5.1). The cross-demographic stability established in Section 5.4 is consistent across demographic and organisational variables within Germany, but the cultural explanation advanced in Section 5.4.2, that Germany's horizontal-individualist (HI) profile amplifies LMX agreement and makes demographic moderators less relevant (Yuan et al., 2023), simultaneously delimits the finding's geographical generalisability. The cultural specificity of this baseline raises a precise, falsifiable question: does this invariant effect survive in high Power Distance IT sectors (India, South Korea, China) where hierarchical positional authority may independently confer sufficient psychological legitimacy to partially decouple LMX quality from demonstrated domain expertise? If the relationship is significantly attenuated in VC contexts, the present study's baseline represents a culturally bounded phenomenon, operative within egalitarian meritocracies but moderated by national Power Distance. If equally strong relationships appear in culturally distant IT sectors, conversely, this convergence would provide strong evidence that the demand for technical leadership credibility is a defining feature of IT professional work identity that holds across national cultures. The same replication logic extends beyond national culture to sector and industry. The mechanism established here is domain-contingent rather than domain-specific in its theoretical formulation (Section 5.7.2): SDT, LMX, and SIT make no reference to programming as such, only to the manager's credibility within the subordinate's own domain of expertise. The Theory of Expert Leadership makes the corresponding cross-sectoral prediction explicit (Goodall, 2012), and its evidence base already spans Formula One constructors (Goodall & Pogrebna, 2015), multi-sector panel data (Artz et al., 2017), research universities, whose subsequent research performance is associated with the scholarly distinction of their presidents (Goodall, 2009), and hospitals, where the quality ranking of leading US hospitals is strongly associated with the chief executive being a physician (Goodall, 2011). A comparative study across such expert-intensive sectors would test whether the present findings describe software work alone or a general property of expert-domain leadership. The

research divisions of large pharmaceutical companies offer a particularly promising first site, because the parallel to the German IT sector is close: the sector is economically significant and international, its work is R&D-intensive, and its predominantly highly qualified specialists anchor their professional identity in scientific expertise. Anecdotal practitioner accounts further suggest that physicians in particular prefer to be led by medically qualified managers, although no systematic evidence on this preference is known to the researcher. Whether satisfaction with supervision among R&D professionals shows the same dependence on the manager's perceived domain competence, and whether skill-sufficiency judgements reproduce an analogue of the hollow middle distribution documented in Section 4.5.1.2, remain open questions. A replication substituting perceived scientific or medical competence for programming competence, with a domain-appropriate behavioural boundary in place of the 50% programming-time criterion, would determine whether the domain-contingent enabling condition refined in Section 5.7.2 constitutes a general account of expert-domain leadership or a boundary condition of software work.

Priority 4: Dyadic Matched Designs. Limitations resolved: unilateral perceptual operationalisation and the proxy operationalisation of status incongruence (Section 6.4.1). This study operationalised the independent variable exclusively from the subordinate's perspective, theoretically appropriate given that job satisfaction is itself a subjective construct. This unilateral operationalisation, however, leaves unexamined the consequences of perception discrepancies between managers and subordinates, and this omission prevented a direct test of the status incongruence mechanism theorised for H4a because the survey did not capture the manager's age (as noted in Section 3.6.5). The marginal counter-directional trend observed for both career seniority proxies (Section 4.4.4.1), one of which approached but did not reach conventional significance, merits dedicated investigation. Future research employing dyadic designs could capture the actual age and experience gap between manager and subordinate, moving past the subordinate's absolute demographics used as proxies in the present study. Such designs could determine whether the observed attenuation represents a genuine psychological process, such as the adaptive coping repertoires theorised in Section 5.4.2, or an artefact of the indirect operationalisation. A matched dyadic design that simultaneously captures the

manager's self-assessed programming competence and demographic profile would resolve both limitations. Drawing on the self-other agreement framework introduced in Section 2.9.4.1 (Atwater & Yammarino, 1992), one would predict that overestimating managers generate the most acute identity threats. These managers rate their own technical competence substantially higher than their subordinates rate that competence. The confident but uninformed interventions of such a manager carry greater destructive potential than acknowledged technical ignorance. Yuan et al.'s (2023) operationalisation of LMX agreement supplies a ready-made methodological framework: computing the correlation between leader-reported and follower-reported LMX within matched dyads would directly test whether technical competence promotes both follower-perceived LMX quality and genuine role consensus. To overcome the pseudo-unilaterality acknowledged in Section 6.4.1, future studies should employ the advanced dyadic analytical frameworks detailed by Krasikova and LeBreton (2012). Examples include the Actor-Partner Interdependence Model (APIM) or reciprocal One-With-Many (OWM) designs. Researchers could decompose the observed main effect into its actor component and its partner component by applying an APIM framework to these constructs. The actor component captures how a participant's own characteristics predict their own outcomes, which is precisely the perspective measured here. The partner component captures how the manager's self-assessed technical competence predicts the subordinate's satisfaction. Evaluating both components would provide a far more precise test of the theoretical pathway. An OWM extension would additionally permit the modelling of variance attributable to the leader across multiple subordinates. The design directly addresses the levels-of-analysis misalignment that Gooty et al. (2012) identified as the most persistent methodological deficit in LMX scholarship. The relative competence comparison data captured by Q15 but excluded from the present analyses (Section 3.6.4) could be incorporated into such a dyadic design. Such a matched-dyad design would test whether the magnitude of the perceived skill gap between subordinate and supervisor independently predicts relational quality. It would thereby provide a direct operationalisation of the status incongruence mechanism that this study's age-based proxy could only approximate. Such dyadic designs should additionally record team size, span of control, and interaction frequency, permitting a direct test of the team-level proximity interpretation of the H4c null finding advanced in Section 5.4.2. The dyadic matched-

design direction is sequenced after cross-cultural replication because knowing whether the baseline is culturally universal determines whether the dyadic design must itself be culturally stratified.

Priority 5: Qualitative Phenomenological Inquiry. Limitation resolved: quantitative data alone cannot identify the specific managerial behaviours that respondents use to decide whether a manager is "technical enough" (Section 5.5.1). Semi-structured interviews or focus groups conducted with IT professionals, stratified by the developer/non-developer behavioural boundary validated in this study, would permit a phenomenological exploration of the cognitive and evaluative processes underpinning the binary threshold judgement. What technical behaviours, interactions, or knowledge demonstrations define the minimum credibility threshold in the daily experience of software developers? The fifth direction is positioned last not because the qualitative inquiry is least important. Rather, the design of the phenomenological phase would be most productively informed by the accumulated outputs of the preceding four directions. Validated mediator pathways (Direction 1) would identify which psychological processes to probe. Concurrently, ESM behavioural catalogues (Direction 2) would supply concrete daily events as stimuli for participant reflection. Cross-cultural and cross-sectoral data (Direction 3) would indicate whether the threshold phenomenon varies across national cultures and expert domains. Finally, dyadic perception discrepancies (Direction 4) would provide a specific basis for exploring the phenomenology of managerial overestimation. Qualitative findings of this kind would inform the design of "technical enough" management training (Section 5.8.2). They would convert a distributional finding about the "hollow middle" into a list of concrete managerial behaviours that can be taught, observed, and assessed. This provides the practical outcome required of a DBA.

A transversal measurement requirement: the generative AI transition. One requirement cuts across all five directions. In the present study, the role of AI was contextual rather than measured: the generative AI transition motivated the research problem (Sections 1.1, 2.8.3.1) and informed the theoretical contributions (Sections 5.7.2, 5.8.2), but no AI-related variable entered the statistical models, a boundary recorded in Section 6.4.1. Future studies should bring these contextual influences

into the measurement model. The mediational survey design (Direction 1) should include team-level AI adoption intensity and the AI Skill Threat construct (Hicks et al., 2025) as covariates or moderators, permitting a direct test of a conjecture this thesis raises but cannot test: that a technically credible manager buffers subordinates against AI-related identity threat (Section 2.9.5), so that the competence-satisfaction association strengthens as AI adoption deepens. ESM diaries (Direction 2) should sample AI-specific affective events, such as a manager's credible correction of hallucinated code during review or an uninformed mandate to adopt an unvetted tool. Because generative AI is simultaneously redefining what counts as being technical enough (Section 5.8.2), every replication, including the cross-cultural and cross-sectoral studies of Direction 3, additionally functions as a temporal replication capable of tracking whether the content of perceived managerial technical competence shifts as AI-augmented development matures.

The five directions are ordered so that the outputs of each inform the design of the next. Pursuing this sequence will expand the cross-sectional, single-country foundation of the present thesis into longitudinal, cross-cultural, cross-sectoral, and mixed-methods evidence. Each stage also brings the SDT-LMX-SIT explanation closer to organisational interventions that can be tested outside Germany. Embedding the AI-related measures described above at every stage ensures that this programme remains valid as generative AI continues to reshape the profession it studies.

6.6 Scholar-Practitioner Reflection

A DBA sits at the boundary between academic inquiry and professional practice, so a scholar-practitioner reflection belongs in this concluding chapter. The reflection covers three aspects: the intellectual transformation the doctoral process has produced, the ethical complexities of researching one's own professional community, and the immediate, tangible application of these findings within my current organisational role.

6.6.1 Development of the Research Perspective

The biggest change the DBA produced in me was the habit of treating my professional instincts as hypotheses, not foregone conclusions. After more than thirty years as an IT consultant, I began this research already convinced that a manager's programming ability mattered to their team's satisfaction; I had seen enough dysfunctional reporting lines in the German IT sector to hold that view firmly. The doctoral training forced me to separate what I believed from what I could defend with data, and to accept that, in a post-positivist frame, only the second of those counts as knowledge.

Getting to empirical testing required methodological skills I did not have at the outset. My statistical literacy before the DBA was limited. To carry out this study I had to learn how to design a quantitative survey, evaluate psychometric instruments, run hierarchical moderated regressions in SPSS, and read a null finding without treating it as a failure.

That last point was the one that cost me most. I had expected age, educational background and company size to shape the core relationship. The data did not bear this out. Writing up the null results for H4a, H4b, and H4c, and presenting them as evidence of demographic invariance, rather than disappointment, marked the transition of the thesis from confirming preconceptions to conducting a genuine investigation.

With hindsight, two design choices should have been different. Capturing the manager's own age would have allowed a cleaner test of Status Incongruence Theory than the subordinate-age proxy I used. Including an explicit cognition-based trust item would have let me test the mediating mechanism directly instead of inferring it.

6.6.2 Ethical Reflection on the Research Process

My understanding of research ethics also shifted during the doctoral process. Early on I treated ethical compliance largely as an administrative task: securing UoG approval, drafting consent wording, meeting GDPR and BDSG requirements

(Section 3.8; Appendix D). Conducting insider research within my own professional network changed that view.

The survey asked participants to rate their current supervisors. Any breach of anonymity could have damaged a respondent's career. Guaranteeing anonymity evolved from a procedural requirement into a substantive ethical obligation, and the design choices followed from that: IP logging disabled, identifying cookies blocked, no personal data collected. The same design decisions also addressed a second concern. Because I distributed the survey through my own contacts, I was worried that former colleagues might feel pressured to take part; complete anonymity meant that I genuinely could not tell who had participated and who had declined, which protected the respondents and my professional relationships alike.

Restricting the instrument to the variables needed for the hypothesis tests required me to drop several items I was curious about but did not strictly need. That discipline is what turned *Datensparsamkeit*, for me, from a compliance heading into a working research principle.

6.6.3 Application at Mallia Aesthetics GmbH

In January 2026 I took on the role of Director of IT and Operations at Mallia Aesthetics GmbH in Bavaria. The position gave me an immediate opportunity to use what the research had produced. Before the DBA I would have designed the IT function largely on the basis of experience and intuition. The structural decisions I am now making are informed by the survey data.

The reporting lines in the department are being built around demonstrated technical competence rather than around formal academic credentials, on the basis that Section 4.5.3 found formal degrees to have no predictive power for satisfaction with supervision. Candidates for technical lead roles are assessed against the "technical enough" standard described in Section 5.8.2; the interview covers their handling of code reviews, architectural debate, and, increasingly, the governance of AI-generated code.

Applying these principles inside a single, recently founded company is a starting point rather than a definitive test. Whether the same logic holds in long-established

corporations is a separate empirical question, and I treat it as such. Recognising that boundary is, in my own view, the part of the DBA I am least likely to forget.

6.7 Dissemination Strategy

The DBA's dissemination requirement ensures the thesis has an impact wider than the document itself (Bourner et al., 2001). To maximise that impact, the strategy targets three audiences, academic, professional-vocational, and organisational, and sits within the future research agenda.

6.7.1 Academic Dissemination

Should this thesis be well-received, I intend to synthesise its key empirical findings into a substantially abridged research paper for submission to a peer-reviewed journal bridging information systems and organisational behaviour. The paper would focus on the core empirical results, specifically the predictive dominance of technical skill and its amplification for Core Software Developers, alongside the integrated SDT-LMX-SIT predictive pathway, and the categorical cognitive-threshold contribution, condensed to the conventions of the target outlet. Given the study's novel operationalisation of Perceived Managerial Programming Skill and its direct engagement with the developer experience literature (Storey et al., 2021), journals such as Information and Software Technology or Journal of Systems and Software represent appropriate target venues.

In addition to formal publication, I have been offered a part-time teaching position at a local German university of applied sciences (*Fachhochschule*). Should this opportunity materialise, this teaching role would provide a sustained channel for embedding the study's theoretical framework and methodological approach into postgraduate curricula in information systems or business administration, reaching future IT managers and organisational designers at a formative career stage. Teaching would also feed reciprocally back into the scholarship. Practitioner-students whose professional experience spans diverse organisational contexts may generate precisely the qualitative phenomenological insights identified as a key priority for future research. This interaction exposes the study's propositions to a critical, experience-grounded scrutiny that no purely quantitative design can deliver.

6.7.2 Professional and Vocational Dissemination

The strategic stakeholder recommendations derived from this research identify three institutional actors, HR departments, CIOs, and industry bodies, as the primary addressees of the study's practical contributions. Reaching these actors requires dissemination channels that reach directly into the professional and vocational ecosystems where IT leadership decisions are made daily.

At the professional level, I intend to explore presenting the study's practical findings, particularly the "technical enough" sufficiency construct and the task-intensity reporting-line criteria, at a practitioner-oriented conference addressing IT leadership. Such a venue would provide direct access to the CIOs and HR decision-makers who form the primary audience for the prescriptive and diagnostic recommendations.

At the vocational level, I intend to pursue appointment as a voluntary examiner at my regional Chamber of Commerce and Industry (*Industrie- und Handelskammer*, IHK) for IT training occupations. This role requires completion of the trainer qualification examination, the *Ausbilder-Eignungsverordnung* (AEVO), which I am prepared to undertake. The IHK's IT examinations evaluate precisely the technical competencies whose organisational significance this thesis has empirically demonstrated. Serving as an examiner would position the study's evidence base at the point where the next generation of IT professionals first encounters formal occupational assessment. This role would provide a direct channel for transferring practitioner knowledge into vocational training.

Applying the scholarly rigour gained through the doctoral process, I intend to focus my dissemination efforts on in-person knowledge transfer. Acting as a lecturer, examiner, or manager aligns closely with the study's practical contributions. Should Mallia Aesthetics GmbH continue its growth trajectory, I intend to establish a structured mentoring pipeline within my IT department by integrating academic interns and non-academic trainees whose supervision would provide a hands-on channel for applying and testing the study's leadership principles at the individual developmental level.

6.8 Final Conclusion

The thesis addressed a concrete economic problem: the persistent talent shortage in the German IT sector and the substantial cost of employee disengagement. The central question, which organisational factors most strongly predict whether an IT professional stays or leaves, now has an empirically validated answer: the perceived programming competence of the immediate supervisor.

The practitioner intuition underlying the Szczepanski Proposition is now a statistically validated, theoretically grounded empirical finding, supported by the predictive associations within the SDT-LMX-SIT framework and by the explicit attitudinal agreement of the surveyed professionals (Section 4.5.2). The predictive dominance of managerial technical competence remained stable across every demographic and organisational boundary tested (H4a, H4b, H4c), with a role-specific amplification along the continuous programming-intensity gradient for those whose daily work is defined by code (H3). The concurrent exploratory finding on the limited predictive utility of formal degrees (Section 4.5.3) exposes a systemic misalignment in prevailing HR practice. Credential-centric promotion practices governed by the Generalist Assumption are empirically associated with technically non-credible management, which in turn predicts the dissatisfaction that precedes high-value attrition.

Generative AI reinforces this conclusion. As the irreplaceable human contribution to software development shifts towards architectural governance and the evaluation of machine-generated outputs (Section 5.8.2), a manager who cannot engage credibly with that evaluative process is effectively excluded from the governance function on which software quality depends. Technical credibility remains a necessary human element of IT leadership, and its salience grows as generative AI reshapes development practice.

The route from an initial practitioner conviction, through three decades of industry practice, to an integrated theoretical framework and its empirical test fulfils the dual theoretical and applied requirement that defines the DBA award (Section 1.3).

In a labour market where IT vacancies remain officially classified as *Engpassberufe*, every employee departure compounds a systemic deficit. Within this context, the technical credibility of the immediate supervisor is among the strongest, most controllable, and most cost-effective retention levers available, yet it remains largely invisible to traditional human resources metrics.

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Appendix A

Abbreviations and Acronyms

Statistical symbols (e.g., *M*, *SD*, *N*, *p*, *r*, β, *F*, *t*, df) are not listed.

Abbreviation or Acronym	Meaning
ABB	*Arbeitsbeschreibungsbogen* [German Job Description Questionnaire]
AET	Affective Events Theory
AEVO	*Ausbilder-Eignungsverordnung* [Ordinance on Trainer Aptitude]
AG	*Aktiengesellschaft* [Stock Corporation]
ANOVA	Analysis of Variance
AI	Artificial Intelligence
APA	American Psychological Association
APIM	Actor-Partner Interdependence Model
BDSG	*Bundesdatenschutzgesetz* [German Federal Data Protection Act]
Bitkom	*Bundesverband Informationswirtschaft, Telekommunikation und neue Medien* [Federal Association for Information Technology, Telecommunications and New Media]
BTech	Bachelor of Technology
CFI	Comparative Fit Index
CI	Confidence Interval
CIO	Chief Information Officer
CLF	Common Latent Factor
CMB	Common Method Bias
CNA	Citation Network Analysis
COPSOQ	Copenhagen Psychosocial Questionnaire
CS	Computer Science
CSV	Comma-Separated Values
DACH	*Deutschland, Austria, Confoederatio Helvetica* [Germany, Austria, Switzerland]
DBA	Doctor of Business Administration
DevEx	Developer Experience
DIF	Differential Item Functioning
DRY	Don't Repeat Yourself
DSGVO	*Datenschutz-Grundverordnung* [German General Data Protection Regulation]
DV	Dependent Variable
e.V.	*eingetragener Verein* [Registered Association]
EBS	European Business School
ESM	Experience Sampling Methodology
EU	European Union

FIAE	*Fachinformatiker für Anwendungsentwicklung* [IT specialist for application development]
GDPR	General Data Protection Regulation
GenAI	Generative Artificial Intelligence
GJSS	German Job Satisfaction Survey
GLOBE	Global Leadership and Organisational Behaviour Effectiveness
GmbH	*Gesellschaft mit beschränkter Haftung* [Company with Limited Liability]
GNS	Growth Need Strength
H	Hypothesis
HI	Horizontal-Individualist
HR	Human Resources
IBM	International Business Machines
ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
IHK	*Industrie- und Handelskammer* [Chamber of Industry and Commerce]
IP	Internet Protocol
IQ	Intelligence Quotient
ISCO	International Standard Classification of Occupations
IT	Information Technology
IV	Independent Variable
IW	*Institut der deutschen Wirtschaft* [German Economic Institute]
JCM	Job Characteristics Model
JDI	Job Descriptive Index
JSS	Job Satisfaction Survey
KAFA	*Kurzfragebogen zur Erfassung von allgemeiner und facettenspezifischer Arbeitszufriedenheit* [Short Questionnaire for the Assessment of General and Facet-Specific Job Satisfaction]
KI	*Künstliche Intelligenz* [Artificial Intelligence]
KMU	*Kleine und mittlere Unternehmen* [Small and Medium-Sized Enterprises]
LLM	Large Language Model
LMX	Leader-Member Exchange
MAR	Missing at Random
MBA	Master of Business Administration
MCAR	Missing Completely at Random
MMR	Moderated Multiple Regression
MSQ	Minnesota Satisfaction Questionnaire
n.s.	Non-significant
NGO	Non-Governmental Organisation
OCB	Organisational Citizenship Behaviour
OECD	Organisation for Economic Co-operation and Development
OWM	One-With-Many
P-E	Person-Environment
PAF	Project Approval Form
PANAS	Positive and Negative Affect Schedule
PCA	Principal Component Analysis
PhD	Doctor of Philosophy

PII	Personally Identifiable Information
PMO	Project Management Office
PRC	People's Republic of China
Q	Question
RLPI	Rahim Leader Power Inventory
RMSEA	Root Mean Square Error of Approximation
RO	Research Objective
RQ	Research Question
SAZ	*Skala zur Erfassung der Arbeitszufriedenheit* [Job Satisfaction Scale]
SDLC	Software Development Life Cycle
SDM	Software Development Methodology
SDT	Self-Determination Theory
SEM	Structural Equation Modelling
SET	Social Exchange Theory
SIT	Social Identity Theory
SLR	Systematic Literature Review
SPACE	Satisfaction and well-being, Performance, Activity, Communication and collaboration, Efficiency and flow
SPSS	Statistical Package for the Social Sciences
SRMR	Standardized Root Mean Square Residual
STEM	Science, Technology, Engineering, and Mathematics
TEL	Theory of Expert Leadership
TLI	Tucker-Lewis Index
TOEFL	Test of English as a Foreign Language
UG	*Unternehmergesellschaft* [Entrepreneurial Company (Limited Liability)]
UK	United Kingdom
UoG	University of Gloucestershire
URL	Uniform Resource Locator
USA	United States of America
VC	Vertical-Collectivist
VDL	Vertical Dyad Linkage
VIF	Variance Inflation Factor

Appendix B Survey Instrument

This appendix contains the complete bilingual survey instrument used for primary data collection, including all original German formulations, the English translations, and the structural routing logic applied.

The flow of the questions was linear by default: after each question n was answered, the next question presented was n + 1. Any exceptions to this rule are explicitly listed in the respective question descriptions.

For all questions marked as "mandatory", the participant was technically required to provide an answer. If the participant attempted to proceed without entering an answer, a message appeared indicating that an answer was mandatory. Until the participant entered an answer, further completion of the questionnaire was prevented.

B.1 German Survey Instrument (Original)

Q1 Disclaimer

Arbeitszufriedenheit von IT-Experten

Umfrage

Dieser Fragebogen behandelt die Jobzufriedenheit von IT-Experten und den Zusammenhang mit den Kenntnissen der Vorgesetzten.

Die Teilnahme ist freiwillig. Sie können die Umfrage jederzeit ohne Konsequenzen abbrechen. Die Beantwortung der Fragen dauert ca. 5-10 Minuten.

Die erhobenen Daten dienen ausschließlich Forschungszwecken. Alle Daten werden vollständig anonym erhoben; es werden auch keinerlei IP-Adressen gespeichert.

Die Umfrage ist Bestandteil eines Promotionsprojekts von Victor Terber an der University of Gloucestershire. Der Autor ist erreichbar unter dissertation@terber.de.

English: For an English version, please switch the language in the top right corner

☐ Ich habe vorstehende Erläuterungen gelesen und bestätige, dass ich volljährig bin.

[Mandatory. Participants were required to check this box to proceed.]

Q2 Employment Status

Angestellte IT-Fachkraft?

IT-Fachkräfte sind Beschäftigte, für die IT die Haupttätigkeit darstellt (Definition des Statistischen Bundesamts).

Sind Sie oder waren Sie in den letzten sechs Monaten als angestellte IT-Fachkraft tätig?

○ Ja

○ Nein

[Mandatory. If the user answered "Ja" the survey skipped to Q5]

Q3 Self-Employment

Selbständige IT-Fachkraft?

Sind Sie oder waren Sie in den letzten sechs Monaten als selbständige IT-Fachkraft tätig, z.B. als Freiberufler, Freelancer, Gewerbetreibender, Geschäftsführer?

○ Ja

○ Nein

[Mandatory. If the user answered “Nein”, then the participant was disqualified and the survey was aborted.]

Q4 Self-Employment Form

In welcher Form waren Sie zuletzt selbständig als IT-Fachkraft tätig?

○ als Freiberufler

○ als selbständiger Gewerbetreibender

○ als Geschäftsführer oder Vorstand eines Unternehmens (z.B. UG, GmbH, AG)

○ in anderer Form

[Mandatory.]

Q4A Note for Self-Employed Individuals

Der folgende Fragebogen richtet sich primär an Angestellte.

Im weiteren Verlauf wird auf "Vorgesetzte" bzw. "Manager" Bezug genommen. Als Selbständiger beziehen Sie dies bitte auf den hauptverantwortlichen Kundenkontakt, mit dem Sie zuletzt zusammengearbeitet haben (z.B. Projektmanager, Abteilungsleiter, Teamleiter). Bitte denken Sie bei der Beantwortung der entsprechenden Fragen dabei an eine einzelne, konkrete Person.

Q5 General Job Satisfaction - Activities

[Note: Questions Q5 to Q10 reproduce the Kurzfragebogen zur Erfassung von allgemeiner und facettenspezifischer Arbeitszufriedenheit (KAFA; Haarhaus, 2016).]

Denken Sie bitte an die Tätigkeiten, die Sie bei Ihrer Arbeit tagtäglich ausführen. Wie gut beschreiben die folgenden Aussagen Ihre Tätigkeiten?

Meine Tätigkeiten…

sind ziemlich uninteressant.

sind spannend.

fordern mich.

langweilen mich.

gefallen mir.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q6 General Job Satisfaction - Colleagues

Denken Sie bitte an die Kolleginnen und Kollegen, mit denen Sie regelmäßig zusammenarbeiten. Wie gut beschreiben die folgenden Aussagen Ihre Arbeitskollegen/innen?

Meine Arbeitskollegen/innen sind...

zerstritten.

sympathisch.

kollegial.

angenehm.

frustrierend.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q7 General Job Satisfaction - Development Opportunities

Denken Sie bitte an Ihre aktuellen Möglichkeiten, sich im Job weiterzuentwickeln, aufzusteigen und verantwortungsvollere Aufgaben zu übernehmen. Wie gut beschreiben die folgenden Aussagen Ihre Entwicklungsmöglichkeiten?

Meine Entwicklungsmöglichkeiten...

sind gut.

sind ziemlich eingeschränkt.

sind angemessen.

existieren kaum.

sind leistungsgerecht.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q8 General Job Satisfaction - Pay

Denken Sie nun bitte an Ihre aktuelle Bezahlung inklusive aller Zuschläge und Zuschüsse. Wie gut beschreiben die folgenden Aussagen Ihre Bezahlung?

Meine Bezahlung...

ist fair.

ist ungerecht.

ist zufriedenstellend.

ist unangemessen.

ist schlecht.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q9 General Job Satisfaction - Supervisor

Denken Sie bitte an Ihre/n direkte/n Vorgesetzte/n (der/die Ihnen Anweisungen geben und Ihre Arbeit kontrollieren kann). Wie gut beschreiben die folgenden Aussagen Ihre/n Vorgesetzte/n?

Mein/e direkte/r Vorgesetzte/r...

ist rücksichtsvoll.

ist fair.

ist unbeliebt.

ist vertrauenswürdig.

ist ungerecht.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q10 General Job Satisfaction - General Facet

Die folgenden Aussagen beziehen sich auf Ihren aktuellen Job im Allgemeinen. Wie gut beschreiben die folgenden Aussagen Ihren Job?

Alles in allem ist mein Job...

gut.

zufriedenstellend.

dürftig.

angenehm.

niemandem zu wünschen.

[Answer options for each of the statements:]

(1) stimmt gar nicht

(2) stimmt wenig

(3) stimmt teilweise

(4) stimmt ziemlich

(5) stimmt völlig

[Mandatory.]

Q11 Job Title

Wie lautet Ihre Berufsbezeichnung?

[Mandatory. Answers could be provided as free text]

Q12 Share of Programming in Total Working Time

Wie viel Prozent Ihrer Arbeitszeit verbringen Sie mit Programmierung?

[Mandatory. Answers could be provided either as a whole number between 0 and 100 or by adjusting a horizontal slider to set the visible value within a range between 0 and 100]

Q13 IT Competence of the Supervisor - Absolute

IT-Kompetenz des Vorgesetzten

Nachfolgende Fragen beziehen sich auf Ihren persönlichen, subjektiven Eindruck der Kenntnisse Ihres Vorgesetzten bzw. Managers.

Wie beurteilen Sie die Kenntnisse Ihres Vorgesetzten in folgenden Bereichen?

IT allgemein

Softwareentwicklung

Programmierung

[Answer options for each of the three areas:]

(1) sehr schwach

(2) schwach

(3) mäßig

(4) gut

(5) sehr gut

Unbekannt

[Mandatory.]

Q14 IT Competence of the Supervisor - Sufficiency

Halten Sie die Kenntnisse Ihres Vorgesetzten in den folgenden Bereichen für ausreichend für seine Tätigkeit als Ihr Vorgesetzter?

IT allgemein

Softwareentwicklung

Programmierung

[Answer options for each of the three areas:]

(1) völlig unzureichend

(2) eher unzureichend

(3) unentschieden

(4) eher ausreichend

(5) völlig ausreichend

Unbekannt

[Mandatory.]

Q15 IT Competence of the Supervisor - Relative

Wie beurteilen Sie die Kenntnisse Ihres Vorgesetzten im Vergleich zu Ihren eigenen Kenntnissen in den folgenden Bereichen?

IT allgemein

Softwareentwicklung

Programmierung

[Answer options for each of the three areas:]

(1) meine sind deutlich schlechter

(2) meine sind etwas schlechter

(3) etwa gleichwertig

(4) meine sind etwas besser

(5) meine sind deutlich besser

Unbekannt

[Mandatory.]

Q16 Supervisor Qualification Level

Was ist der höchste Ausbildungsabschluss Ihres Vorgesetzten?

[Answer Options:]

○ Kein beruflicher Abschluss

○ Berufsausbildung/Lehre oder Vergleichbares

○ Bachelor (Universität, Fachhochschule oder vergleichbar)

○ Master (Universität, Fachhochschule oder vergleichbar)

○ Anderer Hochschulabschluss wie Staatsexamen, Magister, Lizenziat, Diplom oder Vergleichbares

○ Promotion

○ Unbekannt oder keiner der vorstehenden Antworten entsprechend

Q17 Supervisor Qualification Subject

Falls bekannt: In welchem Fach oder in welchem Beruf hat Ihr Vorgesetzter eine Ausbildung erhalten?

[Answers could be provided as free text]

Q18 Szczepanski Proposition

Wie beurteilen Sie nachfolgende Aussage:

„Softwareentwickler wollen an Softwareentwickler berichten, oder zumindest an kürzlich beförderte ehemalige Softwareentwickler“

Die Aussage ist...

○ völlig unzutreffend.

○ überwiegend unzutreffend.

○ teils zutreffend, teils unzutreffend.

○ überwiegend zutreffend.

○ völlig zutreffend.

[The statement is originally from Szczepanski (2017). I did the translation. The source was intentionally not included in the survey, as the survey focused exclusively on the content.]

Q19 Work Country

In welchem Land arbeiten Sie überwiegend?

[Mandatory. A dropdown box offered 195 answer options. Option 1 was Deutschland (Germany), options 2 to 194 were a list of 193 countries, sorted alphabetically by their German names, option 195 was "Nicht aufgeführtes Land (bitte angeben)" which offered a free text field for an alternative answer]

Q20 Migrant Status

Sind Sie ein Migrant, das heißt, arbeiten Sie in einem anderen Land als in Ihrem Herkunftsland?

○ Ja

○ Nein

Q21 Industry

Welche der folgenden Antwortoptionen beschreibt am besten die Branche, in der Ihr Unternehmen tätig ist?

[A dropdown box offered 34 answer options. Option 1 was "Informationstechnologie (IT), IT-Dienstleistungen", options 2 to 33 were a list of 32 alphabetically sorted industries and option 34 was "Andere Branche (bitte angeben):" which offered a free text field for the answer]

Q22 Company Size

Wie viele Mitarbeiter beschäftigt Ihr Arbeitgeber etwa?

○ 1-9 Mitarbeiter

○ 10-49 Mitarbeiter

○ 50-249 Mitarbeiter

○ 250-5000 Mitarbeiter

○ Über 5000 Mitarbeiter

○ Weiß ich nicht oder möchte ich nicht angeben

Q23 Working Hours

Wie viele Stunden pro Woche arbeiten Sie in einer typischen Arbeitswoche? (Bitte runden Sie auf ganze Stunden)

[Answers could be provided either as a whole number between 0 and 80 or by adjusting a horizontal slider to set the visible value within a range between 0 and 80+]

Q24 Education Level

Was ist Ihr höchster Ausbildungsabschluss?

○ Kein beruflicher Abschluss

○ Berufsausbildung/Lehre oder Vergleichbares

○ Bachelor (Universität, Fachhochschule oder vergleichbar)

○ Master (Universität, Fachhochschule oder vergleichbar)

○ Anderer Hochschulabschluss wie Staatsexamen, Magister, Lizenziat, Diplom oder Vergleichbares

○ Promotion

Sonstiges (bitte angeben) *[Here it was possible to enter free text]*

[Mandatory.]

Q25 Education Subject

In welchem Fach oder in welchem Beruf haben Sie eine Ausbildung abgeschlossen?

[Answers as free text]

Q26 Age

Wie alt sind Sie (in Jahren)?

[Answers as numbers between 18 and 99]

Q27 Professional Experience

Über wie viele Jahre Berufserfahrung verfügen Sie insgesamt?

[Answers as numbers between 0 and 60]

Q28 Professional IT Experience

Wie viele Jahre dieser Berufserfahrung waren in der IT?

[Answers as numbers between 0 and 60]

Q29 Gender

Welchem Geschlecht fühlen Sie sich zugehörig?

○ Mann

○ Frau

○ Anders / Non-binär

B.2 English Survey Instrument (Translation)

Q1 Disclaimer

Job Satisfaction of IT Experts

Survey

This questionnaire examines the job satisfaction of IT professionals and its relationship to their managers' expertise.

Participation is voluntary. You may withdraw from the survey at any time without any consequences. It takes about 5-10 minutes to answer the questions.

The data collected are used exclusively for research purposes. All data are collected anonymously. No IP addresses are stored.

The survey is part of a doctoral project by Victor Terber at the University of Gloucestershire. The author can be reached at dissertation@terber.de.

Deutsch: Für die deutsche Version nutzen Sie bitte den Schalter in der rechten oberen Ecke!

☐ I have read the above explanations and confirm that I am of legal age.

[Mandatory. Participants were required to check this box to proceed.]

Q2 Employment Status

Employed IT Specialist?

IT specialists are employees for whom IT is their main activity (definition by the German Federal Statistical Office).

Are you currently or have you been employed as an IT specialist in the last six months?

○ Yes

○ No

[Mandatory. If the user answered "Yes" the survey skipped to Q5]

Q3 Self-Employment

Are you or have you been working as a self-employed IT specialist in the last six months, e.g., as a freelancer, business owner, managing director?

○ Yes

○ No

[Mandatory. If the user answered "No", then the participant was disqualified and the survey was aborted.]

Q4 Self-Employment Form

In what capacity were you most recently self-employed as an IT specialist?

○ As a freelancer (in Germany: "Freiberufler")

○ As a self-employed business owner (in Germany: "Gewerbetreibender")

○ As a managing director or board member of a company (e.g., UG, GmbH, AG)

○ In another capacity

Q4A Note for Self-Employed Individuals

This questionnaire is primarily designed for employees.

References to "supervisors" or "managers" should be interpreted as your primary client contact for your most recent project (e.g., Project Manager, Department Head, Team Lead). Please answer the relevant questions with a specific person in mind.

Q5 General Job Satisfaction - Activities

[Note: Questions Q5 to Q10 reproduce the Kurzfragebogen zur Erfassung von allgemeiner und facettenspezifischer Arbeitszufriedenheit (KAFA; Haarhaus, 2016). The English version is the author's translation.]

Please think about the activities you carry out on a daily basis at work. How well do the following statements describe your activities?

My activities…

are not interesting.

are exciting.

challenge me.

bore me.

are enjoyable.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q6 General Job Satisfaction - Colleagues

Please think about the colleagues you regularly work with. How well do the following statements describe your colleagues?

My colleagues are...

at odds.

likeable.

collegial.

pleasant.

frustrating.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q7 General Job Satisfaction - Development Opportunities

Please think about your current opportunities to develop yourself in your job, to advance and to take on more responsible tasks. How well do the following statements describe your development opportunities?

My development opportunities...

are good.

are quite limited.

are adequate.

barely exist.

are merit-based.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q8 General Job Satisfaction - Pay

Now please think about your current pay, including all allowances and grants. How well do the following statements describe your pay?

My pay...

is fair.

is unfair.

is satisfactory.

is inadequate.

is poor.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q9 General Job Satisfaction - Supervisor

Please think about your direct supervisor (who can give you instructions and monitor your work). How well do the following statements describe your supervisor?

My direct supervisor...

is considerate.

is fair.

is unpopular.

is trustworthy.

is unfair.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q10 General Job Satisfaction - General Facet

The following statements relate to your current job in general. How well do the following statements describe your job?

All in all, my job is…

good.

satisfactory.

poor.

pleasant.

not desirable for anyone.

[Answer options for each of the statements:]

(1) does not apply at all

(2) applies a little

(3) applies partially

(4) applies quite a bit

(5) applies completely

[Mandatory.]

Q11 Job Title

What is your job title?

[Mandatory. Answers could be provided as free text]

Q12 Programming Share of Working Time

What percentage of your working time do you spend on programming?

[Mandatory. Answers could be provided either as a whole number between 0 and 100 or by setting a horizontal slider setting the visible value within a range between 0 and 100]

Q13 IT Competence of the Supervisor - Absolute

The following questions relate to your personal, subjective impression of the knowledge of your supervisor or manager.

How do you assess your supervisor's knowledge in the following areas?

IT in general

Software development

Programming

[Answer options for each of the three areas:]

(1) very weak

(2) weak

(3) moderate

(4) good

(5) very good

Unknown

[Mandatory.]

Q14 IT Competence of the Supervisor - Sufficiency

Do you consider your supervisor's knowledge in the following areas to be sufficient for their role as your supervisor?

IT in general

Software development

Programming

[Answer options for each of the three areas:]

(1) completely inadequate

(2) rather inadequate

(3) neutral

(4) rather adequate

(5) completely adequate

Unknown

[Mandatory.]

Q15 IT Competence of the Supervisor - Relative

How do you rate your supervisor's knowledge compared to your own knowledge in the following areas?

IT in general

Software development

Programming

[Answer options for each of the three areas:]

(1) My knowledge is significantly inferior

(2) My knowledge is slightly inferior

(3) My knowledge is about equal

(4) My knowledge is slightly superior

(5) My knowledge is significantly superior

Unknown

[Mandatory.]

Q16 Supervisor Qualification Level

What is the highest educational qualification of your supervisor?

[Answer Options:]

○ No vocational qualification

○ Vocational training/apprenticeship or equivalent

○ Bachelor's degree, or equivalent

○ Master's degree, or equivalent

○ Other university degree such as state examination, Magister, Licentiate, Diploma, or equivalent

○ Doctorate

○ Unknown or none of the above answers apply

Q17 Supervisor Qualification Subject

If known: In which subject or profession did your supervisor receive training?

[Answers could be provided as free text]

Q18 Szczepanski Proposition

How do you assess the following statement:

"Programmers want to report to programmers, or at the very least, to recently promoted ex-programmers."

The statement is…

○ completely incorrect.

○ mostly incorrect.

○ partly correct, partly incorrect.

○ mostly correct.

○ completely correct.

[The statement is originally from Szczepanski (2017). The punctuation has been slightly adjusted for easier readability. The source was intentionally not included in the survey, as the survey focused exclusively on the content.]

Q19 Work Country

In which country do you predominantly work?

[Mandatory. A dropdown box offered 195 answer options. Option 1 was Germany, options 2 to 194 were a list of 193 alphabetically sorted countries and option 195 was "Country not listed (please specify)" which offered a free text field for an alternative answer]

Q20 Migrant Status

Are you a migrant, that is, do you work in a country other than your country of origin?

○ Yes

○ No

Q21 Industry

Which of the following answer options best describes the industry in which your company operates?

[A dropdown box offered 34 answer options. Option 1 was "Information Technology (IT), IT Services", options 2 to 33 were a list of 32 alphabetically sorted industries and option 34 was "Other industry (please specify):" which offered a free text field for the answer]

Q22 Company Size

How many employees does your employer have approximately?

○ 1-9 employees

○ 10-49 employees

○ 50-249 employees

○ 250-5000 employees

○ Over 5000 employees

○ I don't know or prefer not to say

Q23 Working Hours

How many hours per week do you work in a typical working week? (Please round to whole hours)

[Answers could be provided either as a whole number between 0 and 80 or by setting a horizontal slider setting the visible value within a range between 0 and 80+]

Q24 Education Level

What is your highest educational qualification?

○ No vocational qualification

○ Vocational training/apprenticeship or equivalent

○ Bachelor's degree, or equivalent

○ Master's degree, or equivalent

○ Other university degree such as state examination, Magister, Licentiate, Diploma, or equivalent

○ Doctorate

Other (please specify) *[Here it was possible to enter free text]*

[Mandatory.]

Q25 Education Subject

In which subject or profession did you complete your training?

[Answers as free text]

Q26 Age

How old are you (in years)?

[Answers as numbers between 18 and 99]

Q27 Professional Experience

How many years of professional experience do you have in total?

[Answers as numbers between 0 and 60]

Q28 Professional IT Experience

How many years of this professional experience were in IT?

[Answers as numbers between 0 and 60]

Q29 Gender

Which gender do you identify with?

○ Male

○ Female

○ Other / Non-binary

B.3 Layout Likert Scales

Questions that had to be answered on a Likert scale were presented in a grid as shown in an example screenshot in Figure B1.

Figure B1

Screenshot of Question 7 (Q7)



Note. The exact appearance depended on the type and version of the browser and operating system. The screenshot shown was taken using Firefox 146 on Microsoft Windows 11.

Appendix C Literature Search and Screening Protocol

C.1 Databases

The foundational keyword search (Phase 1) was conducted across a curated selection of academic databases, academic search engines, and general web search engines. This combination was chosen to ensure comprehensive coverage of peer-reviewed literature in the fields of management, psychology, and information technology, while simultaneously enabling the systematic retrieval of relevant grey literature (e.g., industry reports, practitioner surveys) as methodologically justified in Section 2.2.2. The specific sources queried are detailed in Table C1.

The foundational database searches were conducted between May and July 2024, with citation network expansion continuing until thematic saturation was reached in September 2024. The citation network expansion was repeated in September 2025 and February 2026 to capture new literature prior to final analysis.

Table C1

Databases and Search Engines Used in Foundational Keyword Search

Category	Source Name	URL
Academic Databases	Business Source Complete (via EBSCOhost)	https://search.ebscohost.com
	IEEE Xplore	https://ieeexplore.ieee.org
	PsycINFO	https://www.apa.org/pubs/databases/psycinfo
	PubMed	https://pubmed.ncbi.nlm.nih.gov
	ScienceDirect	https://www.sciencedirect.com
	Scopus	https://www.scopus.com
Academic & Grey Literature Search Engines	Google Scholar	https://scholar.google.com
	Semantic Scholar	https://www.semanticscholar.org
Practitioner & Grey Literature Search Engine	Google Search	https://www.google.com

Note. The listed academic databases were accessed via University of Gloucestershire institutional login. Google Scholar and Semantic Scholar were utilised to retrieve both peer-reviewed literature and academic grey literature. Google Search was utilised specifically to identify industry reports, practitioner surveys, and white papers consistent with the inclusion criteria for professional practice.

C.2 Core Keywords

The foundational search was guided by a structured set of keywords. The keywords were derived from the core constructs of the research question and the theoretical framework detailed in Chapter Two. The keywords were organised into conceptual clusters as shown in Table C2.

Table C2

Core Search Term Clusters, Core Concepts and Keywords

Core Search Term Clusters		
Cluster	**Core Concept**	**Keywords and Synonyms (with truncation*)**
Outcome Constructs	Job Satisfaction	"job satisfaction", "work satisfaction", "employee attitude*", "Arbeitszufriedenheit", "KAFA"
	Turnover	"turnover intention*", "intent* to leave", "intent* to quit", "employee retention", "Kündigungsabsicht*"
	Job Performance	"job performance", "task performance", "employee productivity", "work effectiveness", "Mitarbeiterproduktivität*", "Arbeitsleistung*"
Population & Context	IT Professionals	"IT professional*", "information technology", "software develop*", "software engineer*", "programmer*", "knowledge worker*", "Softwareentwickl*", "Programmierer*", "IT-Expert*", "IT-Fachkr*"
	German Context	"German*", "Germany", "DACH", "Engpassberuf*", "Quereinsteiger"
	Cultural Context	"power distance", "uncertainty avoidance"
	Technological Context	"generative AI", "AI coding assistant", "AI skill threat", "LLM", "artificial intelligence", "Künstliche Intelligenz", "KI", "Generative KI"
Moderators & Boundary Conditions	Professional Role (H3)	"role identity", "task allocation", "programming time"
	Career Seniority (H4a)	"career seniority", "status incongruence", "age-inverse", "professional experience", "employee age", "Berufserfahrung*"

Core Search Term Clusters		
Cluster	**Core Concept**	**Keywords and Synonyms (with truncation*)**
	Educational Background (H4b)	"computer science degree", "formal education", "academic credential*", "educational background", "Quereinsteiger", "Fachinformatiker"
	Organisational Context (H4c)	"company size", "firm size", "organisational scale", "startup*", "enterprise*", "Mittelstand", "KMU", "Unternehmensgröße*"
Phenomenon of Interest	Managerial Competence	"manager* competence", "supervisor* competence", "leader* competence", "manager* skill*", "Vorgesetzte*"
	Technical Competence	"technical competence", "technical skill*", "technical expertise", "domain expertise", "programming skill*", "coding skill*", "bimodal*", "bimodality", "technische Kompetenz*", "technische Fähigkeit*", "Programmierkenntnis*", "Programmierfähigkeit*"
	Leadership/Supervision	"leadership", "supervision", "expert power", "Führungskraft*", "Führungsverhalten", "Führungsstil*"
	Developer Experience (DevEx)	"developer experience", "DevEx", "cognitive load", "cognitive friction", "friction logging*"
Theoretical Lenses	Core Theories	"self-determination theory", "SDT", "leader-member exchange", "LMX", "social identity theory", "SIT"
	Supporting Theories	"social exchange theory", "SET", "role theory", "equity theory", "cognition-based trust", "affect-based trust", "psychological safety"

Note. The asterisk (*) indicates a truncation wildcard used in database searches to capture varying word endings.

The core terms were combined using Boolean operators for search execution in the databases. Where necessary, the strings were adapted to accommodate the specific syntax of each database.

C.3 Citation Network Expansion

Following the foundational keyword search (Phase 1), citation network expansion was executed to uncover interconnected research streams and identify relevant literature that may have been missed by Boolean keyword queries alone. As established in Section 2.2.3, this second phase utilised LitMaps, a dedicated Citation Network Analysis (CNA) tool (McLaren & Bruner, 2022).

Foundational "seed" articles identified in Phase 1 were imported into the LitMaps environment. The software algorithmically mapped both backward citations (tracing foundational theoretical works cited by the seed articles) and forward citations (identifying subsequent research that cited the seed articles). This iterative snowballing process facilitated the identification of highly connected "hub" articles and emerging conceptual clusters relevant to the SDT-LMX-SIT framework. All relevant literature identified through this network expansion was subsequently advanced to Phase 3 for screening.

C.4 Screening and Thematic Saturation

During Phase 3, I screened the abstracts and full texts of the literature identified through the foundational keyword search (Phase 1) and citation network expansion (Phase 2). I determined that thematic saturation was reached when iterative forward and backward citation tracking in LitMaps repeatedly led to articles that no longer revealed any new aspects. I applied a set of inclusion and exclusion criteria, presented in Table 2.2 (Section 2.2.3), to make selection decisions.

Exclusion Criteria		
Subject Matter	Studies where the primary focus was on non-organisational contexts (e.g., student satisfaction in academic settings), with the exception of educational literature utilised to contextualise the cognitive and perceptual nature of programming aptitude	Maintains a clear focus on organisational behaviour within the IT work environment.
Population	Studies focused exclusively on non-knowledge work contexts (e.g., manual labour, retail sales) unless they presented a foundational theory of broad applicability or provided cross-domain empirical evidence of universal leader-follower dynamics.	Aiming for focus, but retaining flexibility to include seminal works (e.g., on social power or job characteristics) from other fields that are central to the theoretical framework.
Publication Type	Editorials, book reviews, and opinion pieces lacking an evidence base were excluded (with the explicit exception of practitioner assertions selected specifically to document the existence of the industry beliefs being investigated, such as the Szczepanski Proposition), unpublished manuscripts, conference abstracts without a full paper, non-doctoral theses / dissertations (e.g., master's or bachelor's theses)	Ensures the quality and substantiation of the evidence base, excluding sources that do not meet a minimum threshold of academic or professional rigour.
Language	Publications written in languages other than English or German	Reflects the linguistic competencies of the researcher, ensuring accurate interpretation of complex theoretical constructs without the risk of translation artefacts.
Publication Date	Literature relying on obsolete technological or business paradigms (e.g., pre-Agile environments), unless providing foundational psychological theory, domain-specific framework origins, or necessary historical context	The exclusions were based on conceptual relevance rather than arbitrary time limits. Older literature was excluded only if its technical or business paradigms were no longer relevant to today’s IT environment.

C.5 Documentation

All bibliographic records retrieved during the foundational searches (Phase 1) and citation network expansion (Phase 2) were imported into a centralised project library of Zotero, an open-source reference management software (Chigbu et al., 2023).

Zotero's automated deduplication features were applied to identify and resolve overlapping records retrieved from the multiple databases queried in Phase 1. Throughout the screening process (Phase 3), the software's folder hierarchy and custom tagging systems were employed to record inclusion and exclusion decisions in accordance with the criteria detailed in Table 2.2 (Section 2.2.3), resulting in a final reference list.

Appendix D Ethics

This appendix outlines the ethical protocols and data-handling standards adhered to throughout this doctoral research. The study was conducted in accordance with the ethical guidelines of the University of Gloucestershire (UoG). By ensuring strict data anonymity, the research design actively placed the resulting dataset outside the material scope of European and German data protection legislation (GDPR, UK GDPR, DSGVO, and BDSG); nevertheless, the substantive principles underpinning that legislation - informed consent, anonymity, data minimisation, and secure handling - were treated as binding research-ethics commitments, as elaborated in Section D.3. Furthermore, in accordance with contemporary standards of academic integrity, this appendix includes a transparent declaration of the digital and artificial intelligence (AI) tools utilised in the preparation of the thesis.

D.1 Institutional Ethical Approval

Formal institutional ethical approval was obtained prior to the commencement of data collection. The Project Approval Form (PAF) was submitted to the UoG on 9 October 2024. The mandatory ethics section of the PAF explicitly stated the foundational ethical commitments of the study:

The research project will adhere to the University of Gloucestershire's ethical guidelines, along with the European Union's General Data Protection Regulation (GDPR), Germany's General Data Protection Regulation (Datenschutz-Grundverordnung, DSGVO), and Germany's Federal Data Protection Act (Bundesdatenschutzgesetz BDSG). All participants will participate voluntarily and with informed consent. All data, which will be collected anonymously and stored securely, will be used for research purposes only.

This protocol was evaluated and approved by the UoG on 16 October 2024. Although the Project Approval Form committed to adhering to these data protection regulations as a foundational baseline, the final research design fulfilled this commitment by intentionally precluding the collection of any personally identifiable information (PII). This approach ensured anonymity, thereby placing the dataset

entirely outside the material scope of the GDPR, UK GDPR, DSGVO, and BDSG, as detailed in Section D.3.

D.2 Informed Consent and Voluntary Participation

Participation in the study was voluntary. In accordance with the principles of informed consent, all prospective participants were presented with a mandatory disclaimer (Q1) prior to accessing the survey instrument. This introduction detailed the study's academic purpose, the estimated completion time, and an explicit assurance that all collected data would remain anonymous and be used exclusively for research purposes.

To proceed to the survey items, participants were required to actively confirm their legal age of majority and provide informed consent by endorsing the statement: "*Ich habe vorstehende Erläuterungen gelesen und bestätige, dass ich volljährig bin*" (I have read the above explanations and confirm that I am of legal age). Participants could exit the survey at any point without penalty.

D.3 Data Protection, Anonymity, and Legal Scope

An ethical principle of this research design was the preservation of respondent anonymity and the application of data minimisation (*Datensparsamkeit*). The survey was engineered to collect no personally identifiable information (PII). No names, email addresses, employer identifiers, geolocation data, or IP addresses were solicited or recorded by the survey platform.

Because the survey design precluded the identification of any natural person, the resulting dataset falls entirely outside the material scope of the General Data Protection Regulation (GDPR), the UK GDPR, the German implementation of the GDPR (*Datenschutz-Grundverordnung*, DSGVO), and the German Federal Data Protection Act (*Bundesdatenschutzgesetz*, BDSG). This legal exclusion is explicitly defined in Recital 26 of the GDPR:

"This Regulation does not therefore concern the processing of such anonymous information, including for statistical or research purposes." (GDPR, 2016, Recital 26)

As a safeguard, all qualitative free-text responses (e.g., job titles [Q11] and educational fields [Q17, Q25]) were screened during the data preparation phase for inadvertently entered PII. No such PII was detected. Had any identifiable data been present, it would have been deleted prior to analysis to ensure the dataset remained fully anonymous. All raw data were stored securely on encrypted, password-protected systems accessible only by the author.

D.4 Protection of Pilot Study Participants

Prior to the live deployment of the survey, a bilingual pilot study was conducted with a panel of IT professionals to evaluate the instrument. To protect the privacy of these colleagues, their identities have been withheld from this thesis. Prior to requesting their support, the author guaranteed that their names would not be disclosed. This protocol ensured they could provide candid feedback without professional exposure.

D.5 Transparency Statement on the Use of Digital Tools and Artificial Intelligence (AI)

In the interest of full academic transparency and research integrity, the author formally declares the use of digital tools and Artificial Intelligence (AI) Large Language Models (LLMs) in the preparation of this thesis.

It is stated unequivocally that the entirety of this doctoral thesis, including the problem statement, the articulation of the research aim, the deductive formulation of hypotheses, the theoretical approach, the survey creation, and the translations, is the original intellectual property and creation of the author. The thesis is entirely free from plagiarism; all ideas drawn from the literature are accompanied by source citations, and all direct quotations are identified as such and remain unaltered.

Digital tools and AI LLMs were utilised as editorial, analytical, and linguistic assistants. Their specific applications are catalogued below to ensure methodological transparency:

- Translation and Linguistic Verification: DeepL and Google Translate were used to facilitate back-translations, ensuring cross-linguistic equivalence between the

German and English survey instruments. The bilingual dictionary LEO (leo.org) and the parallel corpus database Linguee were queried to verify the conventional translation of psychological and technical terminology within professional IT contexts.

- Editorial Refinement: Grammarly was utilised to check the correctness and appropriateness of English usage, correct punctuation and typographical errors, and suggest phrasing improvements.
- Literature Research: LitMaps was employed as a Citation Network Analysis (CNA) tool to conduct forward and backward citation tracking of articles.
- Large Language Models (LLMs): AI models, specifically Google Gemini and Anthropic's Claude Opus, were used iteratively as interactive research assistants during the drafting process. Their application was restricted to the following supportive tasks:
  - Offering pre-emptive criticism of drafted arguments to allow the author to proactively address potential counterarguments within the text.
  - Pointing out potential logical gaps in the argumentation for further refinement.
  - Checking the logical and grammatical consistency of the written results.
  - Suggesting stylistic improvements to specific phrasings to ensure adherence to correct British English conventions.
  - Checking the consistency of internal cross-references throughout the manuscript.
  - Assisting in verifying that citations and the reference list adhered to APA 7th edition guidelines.
  - Proofreading for typographical errors, punctuation, and consistent British English spelling.

  At no point were these tools used to generate primary data, fabricate results, or author original academic concepts. The author retains full and final responsibility for all content, analysis, and conclusions presented in this thesis.

Appendix E

Supplementary Statistical Outputs

This appendix provides the supplementary statistical documentation and diagnostic visualisations supporting the empirical analyses reported in Chapter Four. To facilitate cross-referencing and ensure a transparent audit trail, the internal sections of this appendix are ordered chronologically to mirror the analytical sequence of the main text. The appendix begins with initial data preparation and assumption checks (Sections E1 to E4), progresses through baseline descriptive statistics (Section E5), provides detailed outputs for the confirmatory hypothesis tests and sensitivity analyses (Sections E6 and E7), and concludes with the supplementary outputs for the pre-specified exploratory analyses (Sections E8 and E9). Consistent with the analytical strategy established in Section 3.7.5, all continuous predictors in moderated models were mean-centred prior to the computation of interaction terms.

E1 Non-Response Bias Testing

Table E1

Independent-Samples t Tests for Non-Response Bias (Completers vs. Late Dropouts)

Variable	Group	*n*	*M*	*SD*	*t*	df	*p*	Hedges' *g*
Overall Job Satisfaction	Completers	330	3.75	0.65	-0.34	4.19	.749	-0.12
	Late Dropouts	5	3.67	0.52				
Satisfaction with Supervision	Completers	330	3.89	0.96	-0.16	4.21	.880	-0.06
	Late Dropouts	5	3.84	0.74				
Perceived Mgr. Prog. Skill	Completers	302	3.19	1.30	0.31	4.10	.774	0.16
	Late Dropouts	5	3.40	1.52				
Programming Time (%)	Completers	330	34.03	32.22	0.46	4.11	.669	0.22
	Late Dropouts	5	41.00	33.62				

Note. Completers are compared against late-stage dropouts who completed the core analytic variables but omitted terminal demographic data. Due to extreme sample size disparities, the Welch-Satterthwaite adjustment for degrees of freedom (equal variances not assumed) is applied. Hedges' g is reported as the bias-corrected effect

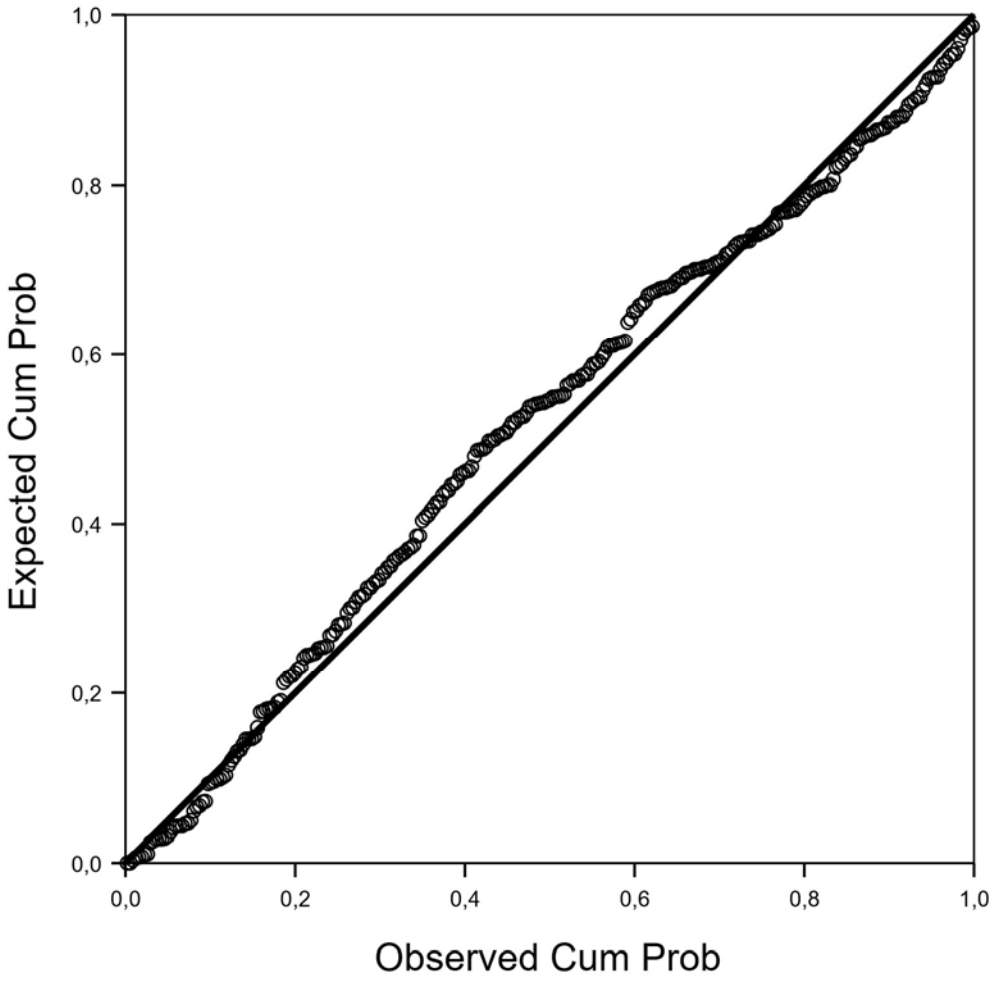
size metric. No statistically significant differences were detected, validating the available-case analysis protocol. Two-tailed p-values are reported.

E2 Statistical Assumption Diagnostics

The following figures provide visual confirmation of the normality of error terms and homoscedasticity for the primary main effect (H2) and moderation (H3) regression models, as evaluated via visual inspection in Section 4.2.4.

Figure E1

Normal P-P Plot of Regression Standardised Residuals for the Foundational Predictive Model (H2)

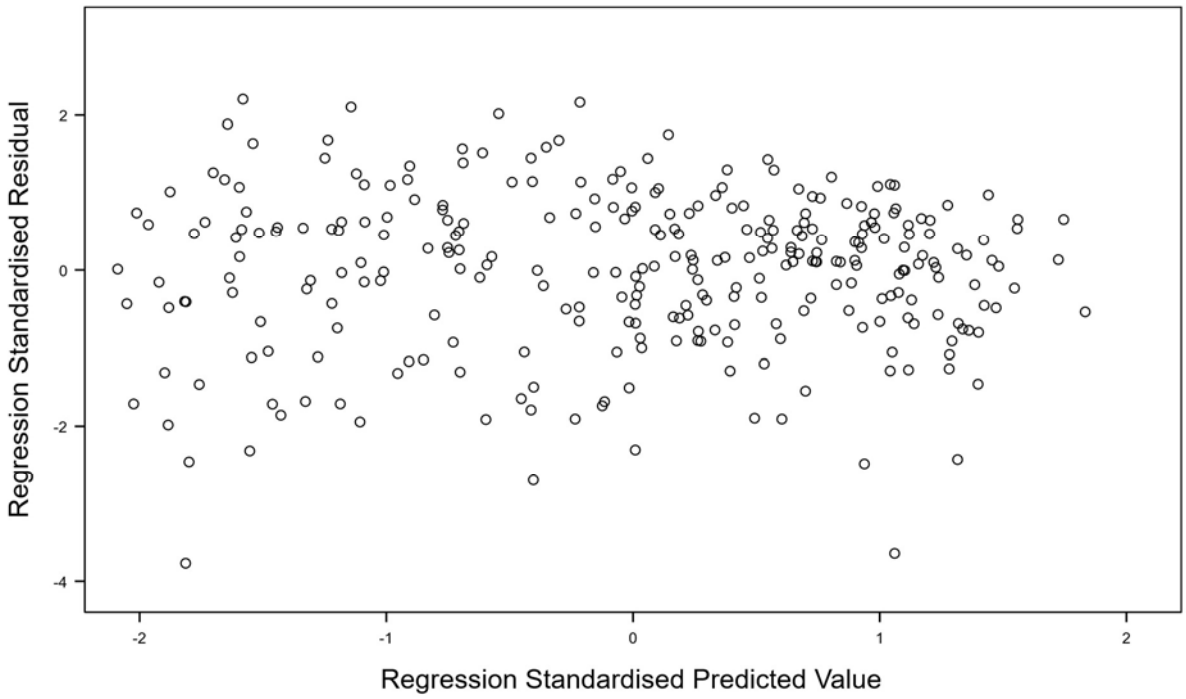


Note. The dependent variable is Overall Job Satisfaction (KAFA_Overall). The distribution of residuals closely follows the diagonal, confirming the assumption of

normally distributed error terms and demonstrating that the platykurtic distribution of the independent variable did not violate the normality of residuals.

Figure E2

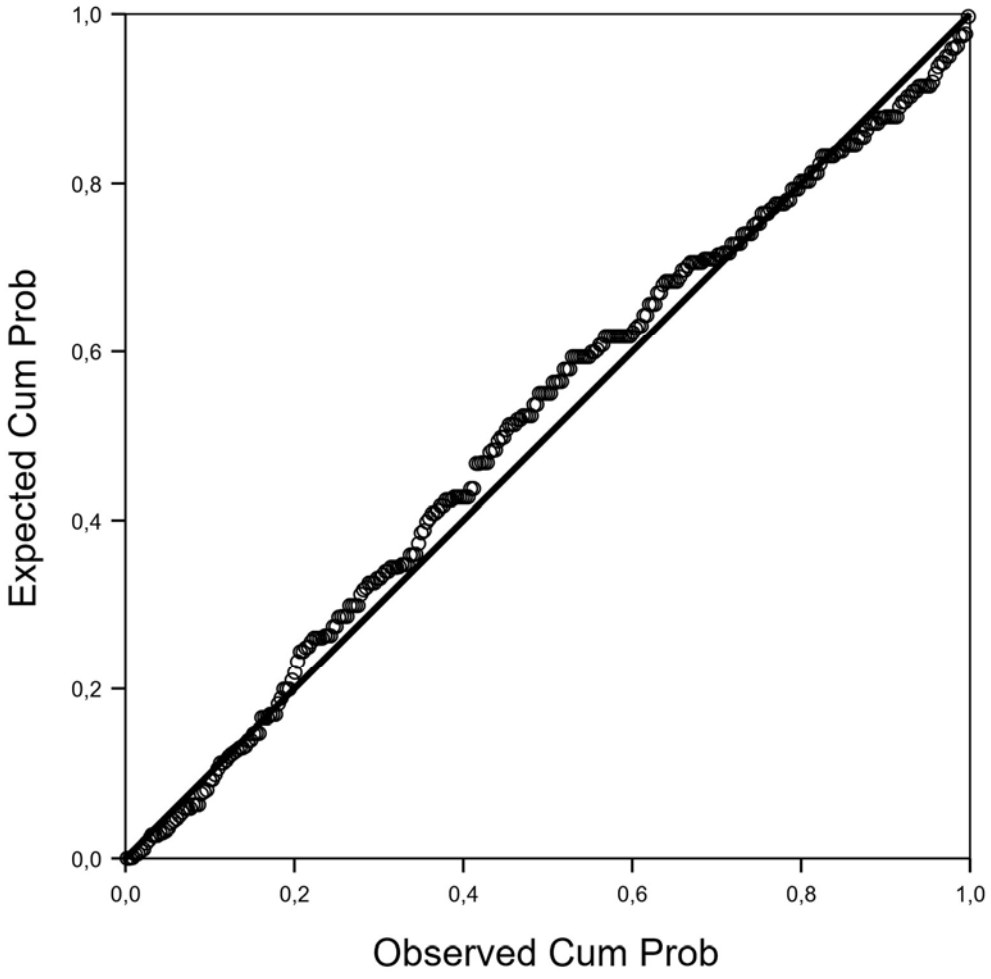
Scatterplot of Standardised Residuals vs. Standardised Predicted Values (H2)



Note. The dependent variable is Overall Job Satisfaction (KAFA_Overall). In contrast to the discrete vertical clustering observed in the study's categorical moderation models (e.g., Figure E4), the continuous horizontal dispersion of predicted values seen here reflects the inclusion of fully continuous covariates (subordinate age and programming time) in the H2 hierarchical regression equation. The downward diagonal slopes visible along the upper and lower boundaries of the residual cloud represent the mechanical ceiling and floor artefacts inherent to predicting a strictly bounded dependent variable (range 1.0-5.0). Despite these boundaries, the residuals display a random, uniform vertical dispersion across the continuum of predicted values. The absence of any distinct systematic funnel or fan pattern visually confirms that the assumption of homoscedasticity (constant variance of the error terms) is satisfied.

Figure E3

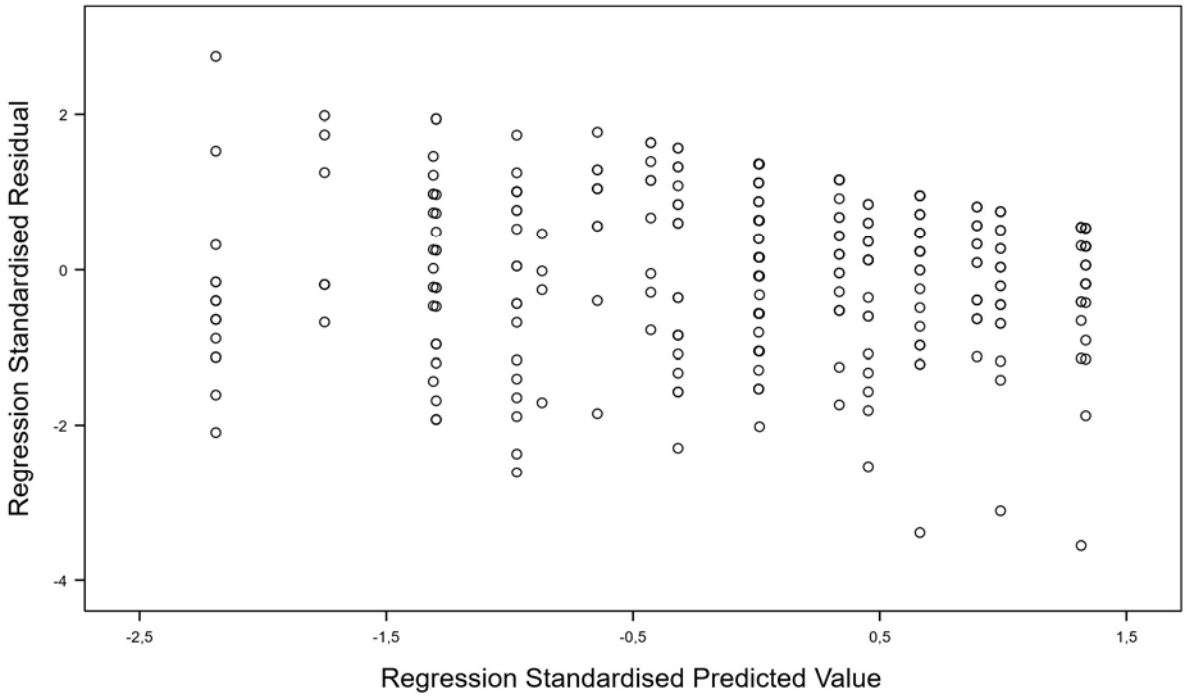
Normal P-P Plot of Regression Standardised Residuals for the Role-Based Moderation Model (H3)



Note. The dependent variable is Satisfaction with Supervision (KAFA_Manager). Visual inspection confirms the normal distribution of error terms for the moderated multiple regression.

Figure E4

Scatterplot of Standardised Residuals vs. Standardised Predicted Values (H3)



Note. The prominent vertical clustering of data points into distinct columns reflects the highly discrete nature of the model's independent variables (the binary developer classification and the half-point increments of the bi-item managerial skill composite). Furthermore, the downward diagonal slope visible along both the upper and lower boundaries of the residual cloud is a mechanical artefact of the strictly bounded dependent variable (KAFA_Manager, range 1.0-5.0). Because residuals are calculated as observed minus predicted values, an increase in the predicted value mathematically restricts the maximum attainable positive residual (a ceiling effect) while simultaneously extending the minimum attainable negative residual (a parallel floor effect). This diagonal bounding does not constitute heteroscedasticity; the overall vertical dispersion of the residuals remains approximately constant across the range of predicted values, displaying no systematic funnel pattern.

E3 Step-by-Step Collinearity Diagnostics

Table E2

Collinearity Diagnostics (Tolerance and VIF) for Confirmatory Hierarchical Regression Models (H2, H3, H4a-c)

Model / Step	Predictor Variable	Tolerance	VIF
H2: Overall Job Satisfaction (Block 2)	Age	.968	1.033
	Programming Time (%)	.929	1.076
	Perceived Mgr. Prog. Skill	.955	1.047
H3: Satisfaction with Supervision (Block 2)	Managerial Skill (Mean-Centred)	.502	1.992
	Role (Is_Developer)	.979	1.021
	Skill × Role Interaction	.504	1.982
H4a: Age Moderation (Block 2)	Managerial Skill (Mean-Centred)	.989	1.012
	Age (Mean-Centred)	.996	1.004
	Skill × Age Interaction	.985	1.015
H4a: Experience Moderation (Block 2)	Managerial Skill (Mean-Centred)	.993	1.007
	Total Experience (Mean-Centred)	.999	1.001
	Skill × Experience Interaction	.993	1.007
H4b: CS Degree Moderation (Block 2)	Managerial Skill (Mean-Centred)	.560	1.785
	CS Degree (Dummy)	.990	1.010
	Skill × CS Degree Interaction	.564	1.774
H4c: Company Size Moderation (Block 2)	Managerial Skill (Mean-Centred)	.991	1.009
	Company Size (Mean-Centred)	.999	1.001
	Skill × Company Size Interaction	.991	1.009

Note. VIF = Variance Inflation Factor. Values represent the collinearity statistics for the final block of each respective regression model. All continuous predictors and moderators were mean-centred prior to calculating interaction terms. Diagnostics for H4a-c reflect models predicting Overall Job Satisfaction (KAFA_Overall). All VIF values remain well below the conservative cut-off threshold of 3.0 (Hair et al., 2019), confirming the absence of problematic multicollinearity in the confirmatory models.

Table E3

Collinearity Diagnostics Highlighting the Multicollinearity Artefact at Extreme Classification Thresholds (> 0% Sensitivity Model)

Threshold Model	Predictor Variable	Tolerance	VIF
> 0% Threshold (Block 2)	Managerial Skill (Mean-Centred)	.096	10.454
	Role (> 0% Programming)	.919	1.088
	Skill × Role Interaction (> 0%)	.097	10.336

Note. VIF = Variance Inflation Factor. This table documents the mathematical multicollinearity artefact referenced in Sections 4.2.4 and 6.4.1. At the highly inclusive > 0% programming threshold, the categorical grouping variable acts almost as a constant within the sample, artificially inflating the VIF for the interaction term (VIF = 10.454) and mechanically suppressing statistical significance.

E4 Supplementary Methodological Diagnostics

Table E4

Total Variance Explained: Harman's Single-Factor Test for Common Method Bias

Component	Initial Eigenvalues (Total)	% of Variance	Cumulative %
1	12.093	37.790	37.790
2	2.902	9.069	46.859
3	2.444	7.637	54.496
4	2.135	6.672	61.167
5	1.802	5.631	66.799
6	1.131	3.535	70.334
7	0.905	2.829	73.163
8	0.755	2.359	75.521
9	0.727	2.272	77.793
10	0.556	1.736	79.529

Note. Extraction Method: Principal Component Analysis (unrotated). The table displays the first 10 extracted components. The single largest component accounted for 37.79% of the total variance, failing to capture a majority of the shared variance. This post-hoc diagnostic supports the procedural and analytical safeguards against common method variance detailed in Section 3.7.3.

Table E5

Model Fit for the Confirmatory Factor Analysis With and Without the Common Latent Factor

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA [90% CI]	SRMR
Baseline (7 trait factors)	892.022	444	2.009	.933	.926	.057 [.052, .063]	.052
With orthogonal CLF	884.193	443	1.996	.934	.927	.057 [.052, .063]	.052

Note. N = 307. Both models utilize listwise deletion based on the same 32 observed indicator items. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA =

Root Mean Square Error of Approximation; CI = Confidence Interval; SRMR = Standardized Root Mean Square Residual.

Table E6

Standardised Trait Loadings With and Without the Common Latent Factor

Item	Facet	λ without CLF	λ with CLF	Δ
T1_n (reverse-scored)	Tätigkeit [Job Tasks]	.793	.705	.088
T2_n	Tätigkeit [Job Tasks]	.859	.751	.108
T3_n	Tätigkeit [Job Tasks]	.692	.603	.089
T4_n (reverse-scored)	Tätigkeit [Job Tasks]	.790	.712	.078
T5_n	Tätigkeit [Job Tasks]	.755	.621	.134
K1_n (reverse-scored)	Kollegen [Colleagues]	.624	.442	.182
K2_n	Kollegen [Colleagues]	.826	.648	.178
K3_n	Kollegen [Colleagues]	.854	.699	.155
K4_n	Kollegen [Colleagues]	.853	.682	.171
K5_n (reverse-scored)	Kollegen [Colleagues]	.680	.515	.165
E1_n	Entwicklung [Development]	.909	.841	.068
E2_n (reverse-scored)	Entwicklung [Development]	.843	.787	.056
E3_n	Entwicklung [Development]	.823	.736	.087
E4_n (reverse-scored)	Entwicklung [Development]	.816	.773	.043
E5_n	Entwicklung [Development]	.669	.567	.102
B1_n	Bezahlung [Compensation]	.852	.766	.086
B2_n (reverse-scored)	Bezahlung [Compensation]	.837	.747	.090
B3_n	Bezahlung [Compensation]	.725	.654	.071
B4_n (reverse-scored)	Bezahlung [Compensation]	.826	.731	.095
B5_n (reverse-scored)	Bezahlung [Compensation]	.823	.747	.076
V1_n	Vorgesetzter [Supervisor]	.831	.753	.078
V2_n	Vorgesetzter [Supervisor]	.903	.823	.080
V3_n (reverse-scored)	Vorgesetzter [Supervisor]	.745	.666	.079
V4_n	Vorgesetzter [Supervisor]	.874	.791	.083
V5_n (reverse-scored)	Vorgesetzter [Supervisor]	.794	.686	.108
G1_n	Gesamt [Overall Satisfaction]	.881	.787	.094
G2_n	Gesamt [Overall Satisfaction]	.716	.611	.105
G3_n (reverse-scored)	Gesamt [Overall Satisfaction]	.859	.773	.086
G4_n	Gesamt [Overall Satisfaction]	.684	.531	.153
G5_n (reverse-scored)	Gesamt [Overall Satisfaction]	.710	.560	.150
Skill_Prog_n	Skill	.795	.741	.054
Suff_Prog_n	Skill	.802	.746	.056

Note. Δ = |λ without CLF − λ with CLF|. No Δ exceeded 0.20. Reverse-scored items were recoded once in SPSS prior to export. CLF = Common Latent Factor.

E5 Descriptive Statistics and Bivariate Correlations

Table E7

Bivariate Correlations, Means, and Standard Deviations for Primary Study Variables and Covariates

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. KAFA_Overall	3.750	0.650	—														
2. KAFA_Manager	3.890	0.960	.740**	—													
3. Perceived Skill (Composite)	3.190	1.300	.528**	.516**	—												
4. Programming Time (%)	34.130	32.200	.023	-.015	.200**	—											
5. Age (Years)	40.480	10.110	.156**	.088	.024	-.138*	—										
6. Total Experience (Years)	16.650	10.270	.191**	.136*	.022	-.165**	.926**	—									
7. IT Experience (Years)	14.320	9.760	.201**	.131*	.016	-.109*	.852**	.895**	—								
8. Weekly Working Hours	40.520	6.460	-.008	-.102	-.004	-.072	.164**	.156**	.198**	—							
9. Company Size	3.990	1.010	.075	-.010	.024	-.067	.008	-.044	.006	-.028	—						
10. Developer Role	0.370	0.480	.013	-.044	.140*	.915**	-.112*	-.144**	-.105	-.067	-.088	—					
11. CS Degree	0.430	0.500	.060	.011	.101	.218**	-.027	-.134*	-.007	.145*	.018	.203**	—				
12. Core IT Sector	0.280	0.450	.038	.054	.126*	.142*	.063	.079	.093	.143*	-.229**	.141*	.109	—			
13. Manager Degree	0.870	0.330	.167**	.042	.220**	.037	.165**	.065	.083	.036	.190**	.025	.175**	-.103	—		
14. Female	0.120	0.320	.027	.022	.099	-.103	-.036	-.057	-.131*	-.174**	.047	-.058	-.090	-.062	-.016	—	
15. Migrant Status	0.140	0.350	.071	-.042	.153**	.162**	-.078	-.133*	-.134*	.180**	.104	.130*	.084	.083	.122*	.047	–

Note. N ranges from 245 to 335 due to pairwise deletion for missing data. Variables 10-15 are dichotomous dummy variables (0 = No, 1 = Yes). Variable 9 (Company Size) is treated as ordinal-to-continuous (1 = 1-9 employees, 5 = >5000 employees). Categorical variables are dummy-coded (e.g., Is_Developer: 0 = Other IT Expert, 1 = Core Software Developer). KAFA_Overall = Overall Job Satisfaction; KAFA_Manager = Satisfaction with Supervision

* $p < .05$. ** $p < .01$. (two-tailed).

E6 Sensitivity Analyses and Robustness Checks (Hypothesis 3)

Table E8

Hierarchical Moderated Multiple Regression Testing the Continuous Programming-Time Gradient (H3 Sensitivity)

Exploratory Moderator	*B*	*SE B*	β	*t*	*p* (two-tailed)	ΔR^2
Categorical Thresholds						
> 0% Threshold (Block 2)						.002
Interaction Term	0.111	0.124	.141	0.893	.372	
≥ 20% Threshold (Block 2)						.009
Interaction Term	0.154	0.077	.168	1.991	.047	
≥ 30% Threshold (Block 2)						.004
Interaction Term	0.097	0.075	.096	1.301	.194	
≥ 40% Threshold (Block 2)						.005
Interaction Term	0.111	0.074	.107	1.513	.131	
≥ 50% Threshold (Primary)						.006
Interaction Term	0.118	0.073	.110	1.607	.109	
≥ 60% Threshold (Block 2)						.007
Interaction Term	0.127	0.075	.108	1.683	.093	
≥ 70% Threshold (Block 2)						.013
Interaction Term	0.192	0.082	.139	2.336	.020	
≥ 80% Threshold (Block 2)						.010
Interaction Term	0.219	0.108	.121	2.025	.044	
Continuous Model						.009
Continuous Interaction	0.002	0.001	.100	1.981	.048	

Note. N = 307. The dependent variable is Satisfaction with Supervision (KAFA_Manager). Both Perceived Managerial Programming Skill and actual Programming Time (%) were mean-centred prior to the computation of the continuous interaction term. This continuous specification avoids the variance loss inherent in dichotomisation.

Table E9

Summary of Hierarchical Moderated Regressions Across Iterative Categorical Programming-Time Thresholds (H3 Sensitivity)

Threshold	*n* (Developers)	Interaction *B*	*SE*	*t*	*p* (two-tailed)	ΔR^2
≥ 20%	—	0.154	0.077	1.991	.047	.009
≥ 30%	—	0.097	0.075	1.301	.194	.004
≥ 40%	—	0.111	0.074	1.513	.131	.005
≥ 50%	122	0.118	0.073	1.607	.109	.006
≥ 60%	—	0.127	0.075	1.683	.093	.007
≥ 70%	—	0.192	0.082	2.336	.020	.013
≥ 80%	—	0.219	0.108	2.025	.044	.010

Note. The dependent variable is Satisfaction with Supervision (KAFA_Manager) across all models. Valid *N* = 307. Each row represents Block 2 of a separate hierarchical moderated regression model evaluating a different binary threshold for classifying a "Core Software Developer". Exact subgroup sizes (*n*) for the dynamic sensitivity intervals were omitted from the primary analytical output to conserve matrix space. The > 0% threshold is omitted due to the severe multicollinearity artefact documented in Table E3. All p-values are two-tailed.

Table E10

Hierarchical Moderated Multiple Regression Using Title-Based Re-Classification (H3 Sensitivity)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.901*** (0.066)		3.895*** (0.067)	
Managerial Skill (Mean-Centred)	0.389*** (0.037)	.522	0.359*** (0.055)	.482
Nominal Role (Job_Title_Dev)	-0.080 (0.096)	-.041	-0.080 (0.096)	-.041
Skill × Nominal Role Interaction			0.054 (0.074)	.054

Note. N = 307. The dependent variable is Satisfaction with Supervision (KAFA_Manager). The categorical moderator is a nominal identity-based dummy variable derived from qualitative text analysis of Q11 (0 = Nominal Other IT Expert, 1 = Nominal Software Developer), irrespective of actual programming time. Block 1 R^2 = .268; Block 2 ΔR^2 = .001 (*p* = .465 for the R^2 change).

*** *p* < .001 (two-tailed).

Table E11

Single-Item Robustness Check (Q13): Hierarchical Moderated Multiple Regression for Role-Based Moderation (H3)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.979*** (0.065)		3.949*** (0.065)	
Absolute Skill (Mean-Centred)	0.310*** (0.038)	.441	0.214*** (0.051)	.304
Role (Is_Developer)	-0.287** (0.106)	-.145	-0.310** (0.105)	-.157
Absolute Skill × Role			0.207** (0.075)	.199
R^2	.180		.200	
ΔR^2	.180***		.020**	
F for change in R^2	33.891***		7.662**	

Note. N = 312. The dependent variable is Satisfaction with Supervision (KAFA_Manager). To isolate the focal relationship from the criterion contamination identified in Section 4.2.3, the independent variable composite was replaced with the single-item absolute skill rating (Q13), mean-centred prior to interaction computation. Role is a binary variable (0 = Other IT Expert, 1 = Core Software Developer).

** $p < .01$. *** $p < .001$ (two-tailed).

E7 Full Hierarchical Regression Models for Contextual and Demographic Moderation (H4a-H4c)

Section 4.4.4 and Table 4.6 in the main text present the consolidated null findings for the hypothesised moderation effects of career seniority (H4a), educational background (H4b), and company size (H4c). To explicitly verify the behaviour of the main effects and confirm the absence of suppression effects prior to the introduction of the interaction terms, Tables E12 through E15 detail the complete, block-by-block hierarchical regression outputs for these tests. The tables display the primary main effects isolated in Block 1 and the interaction terms subsequently introduced in Block 2.

The models presented below predict the primary dependent variable, Overall Job Satisfaction (KAFA_Overall). The parallel hierarchical models tested against the Satisfaction with Supervision facet (KAFA_Manager) yielded mathematically

equivalent null patterns; their block-by-block outputs are omitted here for brevity but are accurately reflected in the consolidated summary in Table 4.6.

E7.1 Career Seniority (H4a)

Table E12

Hierarchical Moderated Multiple Regression Predicting Overall Job Satisfaction from Managerial Skill and Subordinate Age (H4a)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.747*** (0.032)		3.748*** (0.032)	
Managerial Skill (Mean-Centred)	0.264*** (0.025)	.524	0.261*** (0.025)	.518
Age (Mean-Centred)	0.008* (0.003)	.121	0.008* (0.003)	.117
Skill × Age Interaction			-0.003 (0.002)	-.066
R^2	.293		.297	
Adjusted R^2	.288		.290	
ΔR^2	.293***		.004	
F for change in R^2	60.03***		1.75	

Note. N = 293. The dependent variable is Overall Job Satisfaction. Both the independent variable (Perceived Managerial Programming Skill) and the moderator (Age) were mean-centred prior to calculating the interaction term. *B* represents unstandardised coefficients; *SE* represents standard error; β represents standardised coefficients.

* $p < .05$. *** $p < .001$ (two-tailed).

Table E13

Hierarchical Moderated Multiple Regression Predicting Overall Job Satisfaction from Managerial Skill and Total Professional Experience (H4a)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.745*** (0.032)		3.746*** (0.032)	
Managerial Skill (Mean-Centred)	0.264*** (0.025)	.523	0.260*** (0.025)	.515
Total Experience (Mean-Centred)	0.010*** (0.003)	.163	0.010*** (0.003)	.162
Skill × Experience Interaction			-0.005 (0.002)	-.095

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
R^2	.304		.313	
Adjusted R^2	.299		.306	
ΔR^2	.304***		.009	
F for change in R^2	63.85***		3.77	

Note. $N = 295$. The dependent variable is Overall Job Satisfaction.

*** $p < .001$ (two-tailed).

E7.2 Educational Background (H4b)

Table E14

Hierarchical Moderated Multiple Regression Predicting Overall Job Satisfaction from Managerial Skill and Educational Background (H4b)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.748*** (0.045)		3.745*** (0.046)	
Managerial Skill (Mean-Centred)	0.259*** (0.025)	.532	0.241*** (0.034)	.493
CS Degree (Dummy)	0.014 (0.067)	.011	0.014 (0.067)	.011
Skill × CS Degree Interaction			0.043 (0.051)	.058
R^2	.284		.286	
Adjusted R^2	.279		.278	
ΔR^2	.284***		.002	
F for change in R^2	52.75***		0.71	

Note. $N = 269$. The dependent variable is Overall Job Satisfaction. CS Degree is a dummy-coded variable (1 = Formal CS Degree, 0 = Other Background/No Formal CS Degree).

*** $p < .001$ (two-tailed).

E7.3 Company Size (H4c)

Table E15

Hierarchical Moderated Multiple Regression Predicting Overall Job Satisfaction from Managerial Skill and Company Size (H4c)

Predictor	Block 1: *B* (*SE*)	Block 1: β	Block 2: *B* (*SE*)	Block 2: β
(Constant)	3.747*** (0.032)		3.748*** (0.032)	
Managerial Skill (Mean-Centred)	0.259*** (0.024)	.522	0.256*** (0.024)	.515
Company Size (Mean-Centred)	0.038 (0.031)	.060	0.037 (0.031)	.059
Skill × Company Size Interaction			-0.035 (0.022)	-.077
R^2	.277		.283	
Adjusted R^2	.273		.276	
ΔR^2	.277***		.006	
F for change in R^2	57.61***		2.45	

Note. N = 303. The dependent variable is Overall Job Satisfaction. Company size is an ordinal-to-continuous variable (5 brackets).

*** $p < .001$ (two-tailed).

E8 Formal Normality Tests and Subgroup Descriptives

As discussed in Section 4.5.1.1, the independent variable composite and its individual constituent items exhibit a distinct non-normal, platykurtic distribution characterised conceptually as the "hollow middle". To provide definitive statistical support for this exploratory finding, Table E16 details the formal Shapiro-Wilk *W* statistics, alongside skewness and kurtosis parameters. These parameters confirm the severe negative kurtosis and violation of normality across the total sample and within the respective professional subgroups.

Table E16

Descriptive Statistics and Tests of Normality for Managerial Skill Evaluations by Professional Role

Variable and Cohort	*n*	Skewness (*SE*)	Kurtosis (*SE*)	Shapiro-Wilk *W*	*p*
Total Sample					
Absolute Programming Skill (Q13)	307	0.13 (0.14)	-1.22 (0.28)	0.888	< .001
Perceived Sufficiency (Q14)	307	-0.60 (0.14)	-1.17 (0.28)	0.802	< .001
Composite Managerial Programming Skill	307	-0.30 (0.14)	-1.14 (0.28)	0.919	< .001
Core Software Developers					
Absolute Programming Skill (Q13)	122	-0.29 (0.22)	-1.22 (0.44)	0.874	< .001
Perceived Sufficiency (Q14)	122	-0.62 (0.22)	-1.24 (0.44)	0.778	< .001
Composite Managerial Programming Skill	122	-0.52 (0.22)	-1.18 (0.44)	0.864	< .001
Other IT Experts					
Absolute Programming Skill (Q13)	185	0.34 (0.18)	-0.97 (0.36)	0.881	< .001
Perceived Sufficiency (Q14)	185	-0.58 (0.18)	-1.12 (0.36)	0.817	< .001
Composite Managerial Programming Skill	185	-0.23 (0.18)	-1.02 (0.36)	0.938	< .001

Note. All continuous variables were measured on a 5-point scale. Listwise deletion was applied across all three variables for consistency. A perfectly normal distribution exhibits Skewness and Kurtosis values of zero. The consistent negative kurtosis (< -1.0) mathematically confirms the highly platykurtic, "hollow middle" distributional shape across both the total sample and the subgroups. All Shapiro-Wilk tests reject the null hypothesis of normal distribution at $p < .001$. Minor fractional variances in total sample skewness and kurtosis compared to Table 4.2 reflect the strict application of listwise deletion ($N = 307$) required for this comparative assumption test, whereas Table 4.2 maximised the sample size via available-case analysis.

E9 Exploratory Boundary Condition Tests

Table E17

Hierarchical Moderated Regressions Testing Secondary Contextual Boundary Conditions on Satisfaction with Supervision

Exploratory Moderator	*B*	*SE B*	β	*t*	*p* (two-tailed)	ΔR^2
Core IT Sector (Block 2)						.003
Interaction Term	0.084	0.081	.052	1.034	.302	
Gender [Female] (Block 2)						.006
Interaction Term	-0.199	0.128	-.081	-1.552	.122	
Migrant Status (Block 2)						.001
Interaction Term	-0.089	0.116	-.040	-0.765	.445	
Weekly Work Hours (Block 2)						.000
Interaction Term	0.001	0.005	.013	0.254	.800	

Note. The dependent variable is Satisfaction with Supervision (KAFA_Manager). Each row represents the interaction term from Block 2 of an independent hierarchical moderated regression. The focal predictor (Perceived Managerial Programming Skill) and the continuous exploratory variable (Weekly Working Hours) were mean-centred. Categorical exploratory moderators (Gender, Migrant Status, Core IT Sector) were dummy-coded. All interaction terms yielded non-significant results ($p > .05$), corroborating the "universal baseline" dynamic reported in Section 4.5.4 and Section 5.4.

Appendix F Raw Data

The data are available at DOI 10.5281/zenodo.20081785 or at https://doi.org/10.5281/zenodo.20081785

The data contain:

- The raw survey data as exported from SurveyMonkey in CSV form
- The SPSS syntax file used to calculate all statistical outputs
- Supplementary files used by SPSS for formatting purposes