

TALENT MANAGEMENT FOR DIGITIZED AND SUSTAINABILITY-ORIENTED
SUPPLY CHAINS IN TRADITIONAL MANUFACTURING FIRMS

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Dedication

This dissertation is dedicated to my family and close friends, whose patience, understanding, and unwavering encouragement have made this academic journey possible. Their support has been my greatest source of motivation and strength, inspiring me to strive for excellence in both personal and professional life.

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ABSTRACT

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This dissertation explores how Talent Management (TM) acts as a strategic enabler of Digital Transformation (DT) and Sustainability (SUS) within traditional manufacturing small and medium-sized enterprises (SMEs). By integrating perspectives from human resource management, organizational change, and operations strategy, this research develops a Human-Centered Transformation Framework (HCTF) that explains how SMEs can align people, technology, and purpose to achieve long-term competitiveness and resilience. A mixed-method approach—combining quantitative survey data with qualitative interviews—was employed to investigate the relationship between TM, DT, and SUS in the context of the European manufacturing sector. The findings reveal that while technology and sustainability represent the technical and ethical dimensions of transformation, the human factor—through leadership, culture, and continuous learning—serves as the critical link enabling integration. The study contributes to theory by merging fragmented research streams on digitalization, sustainability, and talent management into one unified model. Practically, it provides actionable insights for SME leaders and policymakers seeking to manage the “twin transitions” of Industry 4.0 and the European Green Deal. The dissertation concludes that technology enables change, but people make transformation happen.

Keywords: Talent Management, Digital Transformation, Sustainability, SMEs, Leadership, Organizational Culture, Industry 4.0, Human-Centered Transformation

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CHAPTER I:

1. INTRODUCTION

1.1 Background and Context

The twenty-first century marks a new epoch in global business evolution — an era characterized by *digital disruption, environmental urgency, and socio-economic transformation*. Organizations across all sectors are navigating the convergence of two defining megatrends: digital transformation and sustainability. These dual forces are reshaping not only how firms operate and compete but also how they define long-term value creation (Schwab, 2017; Centobelli et al., 2020; European Commission, 2021).

Digital transformation (DT) refers to the pervasive integration of digital technologies — such as artificial intelligence (AI), the Internet of Things (IoT), big data analytics, cloud computing, and automation — into all aspects of organizational functioning (Ivanov, 2020).

DT has moved beyond process optimization; it now serves as a strategic catalyst that redefines business models, enhances customer experience, and fosters innovation. In manufacturing, digitalization enables smart production, predictive maintenance, and real-time decision-making, significantly improving operational agility and competitiveness.

At the same time, sustainability (SUS) has emerged as a parallel — and equally powerful — paradigm. Rooted in the triple bottom line (TBL) framework (Carter & Rogers, 2008), sustainability integrates economic, environmental, and social objectives into business strategy.

Organizations are expected not only to generate profits but also to minimize ecological footprints and uphold social responsibility. The European Union’s Green Deal (2019) and the Circular Economy Action Plan (2020) have further elevated sustainability from a corporate aspiration to a regulatory mandate, particularly within industries responsible for high energy consumption and waste generation.

When combined, digital transformation and sustainability form what the European Commission (2021) defines as the “twin transitions” — a simultaneous pursuit of technological innovation and ecological responsibility.

These transitions are not independent trajectories; rather, they are deeply interconnected. Digital technologies provide the infrastructure and intelligence needed for sustainability (e.g., IoT sensors for energy optimization, AI for waste reduction, blockchain for supply

chain transparency), while sustainability principles ensure that technology is applied ethically and inclusively.

This interdependence is reshaping industries worldwide, especially in traditional manufacturing, which faces mounting pressure to evolve.

The Role of Traditional Manufacturing SMEs in the Twin Transition

In Europe, small and medium-sized enterprises (SMEs) represent over 99% of all businesses and employ more than two-thirds of the private-sector workforce (European Commission, 2020).

They form the backbone of traditional manufacturing sectors — metalworking, machinery, automotive components, furniture, and industrial goods.

However, these firms often operate with limited access to capital, outdated production systems, and informal management structures.

For them, the twin transitions pose a dual challenge: implementing advanced technologies and simultaneously meeting environmental and social expectations.

SMEs are also characterized by owner-managed leadership, short-term strategic horizons, and resource dependency within supply chains dominated by large corporations.

These structural realities mean that transformation is not merely about adopting new tools; it is about reconfiguring *organizational mindsets, capabilities, and cultures* (Harney & Alkhalaf, 2021).

In this context, Talent Management (TM) becomes the critical bridge — the mechanism through which firms develop the human capabilities necessary to navigate and sustain the twin transitions.

Talent Management as a Strategic Enabler

Talent Management (TM) encompasses the systematic processes of attracting, developing, engaging, and retaining employees whose skills and values align with organizational strategy (Collings & Mellahi, 2009).

In the context of Industry 4.0 and sustainable development, TM evolves into a strategic discipline — a key enabler that integrates *people, technology, and purpose* into one coherent framework.

Digital transformation requires employees who can work with advanced technologies, interpret data, and adapt to continuous change.

Sustainability, in turn, demands workers who understand environmental impact, ethical governance, and social engagement.

Thus, successful transformation depends on the intersection of digital literacy and sustainability mindset, both cultivated through effective TM practices — such as reskilling,

leadership development, and cultural change initiatives (McKinsey, 2019; Bass & Riggio, 2006).

In traditional SMEs, TM assumes even greater importance because such firms lack formal HR structures.

Here, the owner-manager's leadership style and cultural values often substitute for institutionalized HR policies.

If leadership fails to champion learning and change, even the most sophisticated digital or sustainability strategies will stagnate.

Hence, TM acts not only as a support function but as the core strategic mechanism driving transformation.

The Human-Centered Transformation Imperative

The Human-Centered Transformation Framework (HCTF) proposed in this dissertation builds upon the recognition that people — not technology — are the true agents of transformation.

While digital tools accelerate efficiency and sustainability defines direction, human capital determines how effectively these forces are aligned and implemented.

Employees' ability to learn, adapt, and innovate transforms technological investment into competitive advantage.

Similarly, leadership and organizational culture determine whether transformation is sustained or abandoned after initial enthusiasm wanes.

The Industry 5.0 vision (European Commission, 2021) reinforces this human-centered approach.

Unlike Industry 4.0, which focused on automation and connectivity, Industry 5.0 emphasizes *collaboration between humans and intelligent systems, ethical innovation, and socio-environmental well-being*.

This shift redefines the meaning of competitiveness — from purely financial efficiency to responsible and inclusive growth.

The Context of Poland and the European Manufacturing Landscape

This research situates itself within the European Union's industrial ecosystem, with a specific empirical focus on Polish manufacturing SMEs.

Poland provides an ideal context for examining the dynamics of the twin transitions: it hosts a robust manufacturing base, is fully integrated into EU supply chains, and actively participates in digital and environmental policy initiatives.

Polish SMEs are simultaneously under pressure to digitalize and decarbonize — often with limited financial and human resources. For example, the Digital Europe Program (2021–

2027) and the European Green Deal Investment Plan have introduced funding schemes to support SMEs in adopting digital and sustainable practices. However, empirical evidence indicates that uptake remains uneven, largely due to skills shortages, cultural resistance, and lack of leadership expertise (Hall et al., 2020).

This underscores the central argument of this dissertation: Talent Management is the missing link in the twin transition — the mechanism that translates policy into practice.

Comparative Insights: SMEs vs. Large Enterprises

While large multinational corporations (MNCs) often have access to advanced digital infrastructures, dedicated sustainability departments, and global talent networks, SMEs operate in more constrained environments.

Table 1 contrasts their typical characteristics and challenges in implementing digital and sustainability initiatives.

Table 1. Comparative Overview: Large Enterprises vs. SMEs in Twin Transition

Dimension	Large Enterprises	Small and Medium Enterprises (SMEs)
Resources	Substantial budgets for R&D and transformation projects.	Limited financial and human capital; dependence on external funding.
Structure	Formalized HR, IT, and sustainability departments.	Informal management, overlapping roles, lean teams.
Leadership	Professionalized leadership; distributed management.	Owner-manager dominance; leadership style highly personal.
Culture	Institutionalized innovation and compliance.	Strong personal trust but resistance to formal change.
Technology	Advanced integration of AI, IoT, ERP, and analytics.	Selective, incremental adoption of affordable digital tools.
Sustainability	Dedicated ESG strategies and reporting systems.	Reactive compliance; limited strategic integration.
Talent Development	Structured global training programs.	Ad hoc or peer-based learning due to cost constraints.

(Source: Author’s synthesis based on WEF, 2022; Harney & Alkhalaf, 2021; McKinsey, 2019)

Emerging Challenges and Opportunities

The twin transitions bring a paradox for SMEs.

On one hand, they amplify existing pressures — costs of digital infrastructure, need for continuous reskilling, and complex ESG reporting.

On the other hand, they open new opportunities for differentiation:

- niche specialization in green technologies,
- improved energy efficiency through automation,
- enhanced customer trust via transparency, and
- access to green financing programs.

The ability to capture these opportunities depends not on firm size but on organizational adaptability, which in turn is rooted in human capability.

Thus, Talent Management becomes the strategic enabler that converts external transformation pressures into internal innovation capacity.

Figure 1.1. Conceptual View: The Twin Transition Model for SMEs

DIGITAL TRANSFORMATION → TECHNOLOGICAL ENABLEMENT

- Automation
- Data Analytics
- Smart Manufacturing



TALENT MANAGEMENT → HUMAN INTEGRATION

- Leadership
- Learning Culture
- Reskilling & Engagement



SUSTAINABILITY → ETHICAL & ENVIRONMENTAL VALUE

- Circular Economy
- Energy Efficiency
- Social Responsibility



ORGANIZATIONAL RESILIENCE & COMPETITIVENESS *(Author's conceptual diagram, adapted from Centobelli et al., 2020 and Teece, 2018)*

Summary of Context

In summary, the global context of this study reveals that technological and environmental transformation must converge through human capability.

Digitalization provides the tools for innovation; sustainability provides the moral compass; and Talent Management ensures their integration through people.

In traditional manufacturing SMEs, where resource scarcity and informal structures prevail, this integration is not only desirable but essential for survival.

Therefore, this dissertation positions Talent Management as the strategic linchpin of the twin transitions — the mechanism through which small firms evolve from reactive compliance to proactive transformation.

It argues that the future of manufacturing competitiveness in Europe depends on human-centered strategies that empower SMEs to lead the digital and sustainable revolution.

1.2 Research Problem

The acceleration of technological change and the intensification of environmental and social demands have created an unprecedented transformation challenge for organizations worldwide.

While large corporations have embraced structured digitalization and sustainability programs, traditional manufacturing small and medium-sized enterprises (SMEs) often struggle to adapt to this dual pressure.

The simultaneous pursuit of digital transformation (DT) and sustainability (SUS) — referred to as the twin transitions — has exposed structural, cultural, and leadership gaps that hinder SMEs from realizing their full potential (WEF, 2022; Ivanov, 2020).

Digital transformation requires technological infrastructure, data-driven decision-making, and innovation capability.

Sustainability demands ethical governance, circular economy practices, and long-term environmental accountability.

Both depend on human capital — the skills, attitudes, and engagement of employees.

However, in SMEs, the human dimension of transformation often receives the least attention, even though it is the most decisive factor for success (Harney & Alkhalaf, 2021).

1.2.1 The Global Challenge: Technology vs. Human Capability

In global manufacturing systems, the adoption of Industry 4.0 technologies such as artificial intelligence (AI), robotics, and IoT has accelerated productivity growth and supply chain transparency.

However, empirical research indicates a persistent mismatch between the speed of technological adoption and the pace of workforce development. As digital systems become more complex, many SMEs lack the human capital necessary to operate and integrate them effectively.

This capability gap manifests in several ways:

- Employees often lack digital literacy and data analytics skills needed to leverage automation tools.
- Leadership tends to focus on short-term operations rather than long-term strategic transformation.
- Organizational culture may resist change due to fear of job loss, uncertainty, or lack of understanding.
- Sustainability knowledge — such as carbon management or ESG compliance — is typically underdeveloped.

Consequently, even when SMEs invest in technology, they fail to extract full value because their people, structures, and leadership are not ready to sustain the change. This imbalance results in partial digitalization, symbolic sustainability efforts, and transformation fatigue among employees (Mittal et al., 2018; Klaas et al., 2020).

1.2.2 The SME Paradox

Small and medium-sized enterprises face a unique paradox.

On one hand, they are expected to innovate rapidly, digitalize operations, and meet the sustainability requirements of global supply chains.

On the other, they operate with limited financial, human, and technological resources.

Their smaller size allows flexibility, but it also exposes them to resource constraints that can stall progress.

SMEs' innovation potential is high because of their flat hierarchies and entrepreneurial spirit.

Yet their strategic orientation is often reactive, not proactive.

Most SMEs focus on maintaining efficiency and survival rather than long-term transformation.

This short-termism restricts investment in employee development, leadership training, and cultural evolution — all of which are necessary for the twin transitions.

The paradox can be summarized as follows:

- SMEs are agile enough to change, but too resource-constrained to sustain transformation.
- They are close to their employees, yet often lack the systems to professionalize talent management.
- They recognize the importance of sustainability, yet treat it as an external obligation rather than an internal capability.

As a result, transformation remains fragmented, driven by compliance or external pressures rather than strategic intent.

This fragmentation has created a critical research and managerial gap — how can SMEs integrate digitalization and sustainability through their people?

1.2.3 Structural Gaps in the Literature

Existing academic research has examined digital transformation, sustainability, and human resource management as separate fields.

Studies on digitalization emphasize technological adoption and efficiency (Ivanov, 2020; Schwab, 2017).

Research on sustainability focuses on ecological impact, circular economy, and social responsibility (Carter & Rogers, 2008; Hall et al., 2020).

Talent management literature, in turn, explores recruitment, retention, and performance alignment (Collings & Mellahi, 2009).

However, very few studies integrate these three perspectives to explain how talent management can act as the unifying mechanism connecting digital and sustainability agendas.

As a result, we know how to implement automation, how to measure ESG performance, and how to train employees — but we lack understanding of how these elements reinforce each other in real organizational settings.

This gap is particularly evident in traditional manufacturing SMEs, where the transformation process is deeply human and contextual.

SMEs do not operate under the same logic as large corporations; they rely on informal leadership, tacit knowledge, and strong interpersonal relationships.

Thus, models developed for large firms cannot simply be transferred to SMEs without adaptation.

1.2.4 Barriers to Integration in Traditional Manufacturing SMEs

Empirical and conceptual evidence suggests that the barriers to integrating digitalization, sustainability, and talent management in SMEs are both internal and external.

Internally, firms face skill shortages, limited leadership capabilities, and cultural inertia. Externally, they struggle with regulatory complexity, market competition, and financial limitations.

These barriers are summarized in Table 2.

Table 2. Barriers to the Integration of Digital Transformation and Sustainability in SMEs

Category	Barrier	Description	Implication for Transformation
Human Capital	Skills Gap	Limited digital literacy, low data competency, and minimal sustainability awareness among employees.	Hinders the effective use of new technologies and ESG systems.
Leadership	Vision and Commitment	Short-term focus and limited experience in strategic transformation.	Lack of clear direction and weak employee engagement.
Culture	Resistance to Change	Preference for stability; fear of failure; weak learning orientation.	Slows innovation and adoption of new practices.
Resources	Financial Constraints	Limited capital for training, technology, or external consulting.	Partial implementation and reduced competitiveness.
Structure	Informality	Absence of formal HR and sustainability systems.	Inconsistent processes and poor accountability.
External Environment	Regulatory and Supply Chain Pressure	Increasing ESG demands from larger clients and governments.	Creates compliance stress without internal capability building.

(Source: Synthesized from WEF, 2022; Harney & Alkhalaf, 2021; Mittal et al., 2018; Author's analysis)

1.2.5 The Research Gap

Despite numerous studies on Industry 4.0 and sustainable supply chain management, there remains a critical void in understanding how SMEs operationalize human-centered transformation.

The literature highlights the importance of skills and leadership but provides limited empirical insight into *how* SMEs actually develop and align these human factors with digital and sustainability strategies.

Specifically, the following research gaps are identified:

1. Integration Gap:

Existing research treats digitalization, sustainability, and talent management as distinct domains rather than interdependent processes.

There is limited evidence on their integration in SME settings.

2. Contextual Gap:

Most studies focus on large corporations in developed economies, neglecting the contextual nuances of resource-constrained SMEs in transitional markets such as Poland and Central Europe.

3. Human Capability Gap:

While technologies and sustainability frameworks are well-documented, the mechanisms of workforce adaptation — reskilling, leadership, and culture — are underexplored.

4. Empirical Gap:

There is a lack of mixed-method evidence combining quantitative patterns with qualitative insights on the human aspects of transformation in SMEs.

This research addresses these gaps by exploring the interdependence of talent management, digitalization, and sustainability in traditional manufacturing SMEs, using both quantitative and qualitative data.

The goal is not only to understand what SMEs are doing but to explain how and why certain approaches succeed or fail under real-world conditions.

1.2.6 Conceptual Framing of the Problem

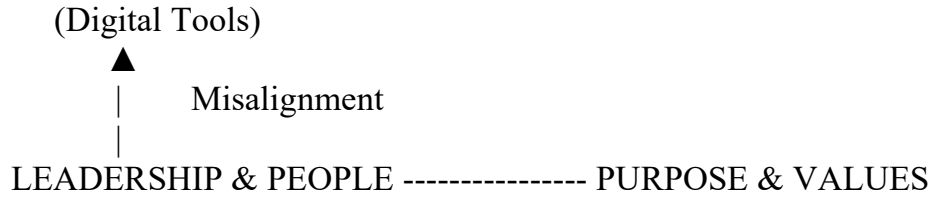
At its core, the problem of transformation in SMEs can be conceptualized as a *triangular misalignment* among three critical elements — Technology, People, and Purpose.

This misalignment results from treating digitalization as a technical process, sustainability as a compliance requirement, and talent management as an HR formality.

However, in practice, transformation occurs only when these three elements are aligned under coherent leadership.

Figure 1.2. The Triangular Misalignment in SME Transformation

TECHNOLOGY



(Skills, Culture) (Sustainability, Vision). In many SMEs, the “technology” corner dominates transformation efforts — investment in machinery, ERP systems, or automation — while the “people” and “purpose” dimensions remain underdeveloped. Without leadership alignment and cultural adaptation, the system fails to balance, resulting in what this study terms “technology without transformation.”

1.2.7 Empirical Manifestations in European SMEs

Recent European studies corroborate these patterns.

The European Investment Bank (2023) reported that fewer than 35% of EU SMEs have implemented structured digital transformation plans, and only 20% actively monitor environmental performance.

A report by PwC (2021) found that 60% of SME leaders view skills shortages as the main barrier to transformation, surpassing even financial constraints.

At the same time, the European Green Deal (2019) and Industry 5.0 strategy (2021) explicitly call for human-centered innovation and digital inclusivity — yet implementation lags due to weak talent development frameworks.

In Poland, the PARP 2022 SME Report noted that 54% of manufacturing SMEs have initiated digital projects but only 18% have integrated sustainability targets into their strategic plans.

Most cited “lack of time,” “limited staff expertise,” and “unclear ROI” as barriers.

These findings mirror broader EU trends and confirm the need for holistic strategies that bridge digital and sustainable development through human capability.

1.2.8 Synthesis of the Research Problem

The synthesis of global, European, and SME-level evidence reveals a systemic disconnect between *technological modernization* and *human development*.

This disconnect leads to inefficient resource utilization, inconsistent sustainability outcomes, and cultural fatigue among employees.

SMEs that attempt to digitalize without parallel investment in people experience what scholars call the “capability paradox” — advanced tools but limited human capacity to use them (Teece, 2018).

Consequently, this dissertation argues that the core research problem is not merely technical or financial but organizational and human in nature:

Traditional manufacturing SMEs lack an integrated, human-centered framework that leverages talent management to connect digital transformation and sustainability into a cohesive strategy for competitiveness and resilience.

Addressing this problem requires understanding how SMEs can build, align, and sustain the human capabilities — skills, leadership, and culture — that underpin the twin transitions.

1.2.9 Conceptual Implications for the Study

This research problem sets the foundation for developing and empirically testing the Human-Centered Transformation Framework (HCTF) introduced in this dissertation.

The framework posits that Talent Management (TM) is the mechanism that operationalizes the twin transitions by:

- Building workforce capabilities through reskilling and continuous learning;
- Guiding strategic direction through transformational leadership;
- Sustaining innovation through a learning-oriented culture; and
- Aligning organizational purpose with sustainability values.

By empirically validating this model in the context of Polish manufacturing SMEs, the study seeks to fill the identified research gaps and offer both theoretical and practical contributions.

1.2.10 Transition to the Next Section

The next section,

1.3 Purpose of the Study, builds upon the problem defined here by articulating the objectives, scope, and intended outcomes of the research.

It explains how the Human-Centered Transformation Framework (HCTF) will be operationalized through a mixed-method design, combining survey data with qualitative insights to provide a holistic understanding of transformation processes in SMEs.

1.3 Purpose of the Study

1.3.1 Overview

The purpose of this study is to explore, conceptualize, and empirically validate the role of Talent Management (TM) as a *strategic integrator* that links Digital Transformation (DT) and Sustainability (SUS) in traditional manufacturing SMEs.

While technological advancement and sustainability have each been widely studied, their intersection — particularly in relation to human capital and organizational capability — remains underexplored.

This dissertation aims to close this gap by examining how human-centered transformation can enable SMEs to thrive in the era of Industry 4.0 and the European Green Deal.

The research builds upon the understanding that transformation success depends not on technology or regulation alone, but on the *human ability* to interpret, apply, and sustain change.

Therefore, this study positions Talent Management not merely as an operational HR function but as a *dynamic capability* (Teece, 2018) that drives innovation, learning, and resilience.

In practical terms, the dissertation seeks to answer a pressing question for SME leaders, policymakers, and scholars alike:

How can traditional manufacturing SMEs leverage talent management to align digital transformation and sustainability, thereby achieving long-term competitiveness and organizational resilience?

1.3.2 Central Purpose

The central purpose of the research is threefold:

1. Exploratory — to investigate how SMEs currently approach digitalization and sustainability through their people.
2. Analytical — to identify the mechanisms through which talent management influences transformation outcomes.

3. Constructive — to develop and empirically validate a conceptual model — the Human-Centered Transformation Framework (HCTF) — that integrates these relationships.

This framework will serve both as an academic contribution and a practical guide for SME decision-makers.

It articulates how talent management acts as the connective system linking digital innovation and sustainable practices through leadership, learning, and culture.

1.3.3 Rationale and Theoretical Foundation

The rationale for this research rests on two major observations drawn from the literature and real-world industry trends:

1. Digital and sustainable transformations are converging, not separate, phenomena.

The notion of *twin transitions* (European Commission, 2021) recognizes that technological innovation and sustainability must evolve together.

Digital tools make sustainability measurable, while sustainability gives digitalization ethical direction.

2. People — not machines — determine the pace and success of transformation. Industry 5.0 and human capital theories (Barney, 1991; Teece, 2018) emphasize that long-term competitiveness arises from the firm's ability to develop, retain, and empower its people.

Technology amplifies human capability; it does not replace it.

The research is therefore grounded in three interrelated theoretical perspectives that form its conceptual backbone:

Theoretical Lens	Core Idea	Relevance to This Study
Resource-Based View (RBV) (Barney, 1991)	Firms gain sustained advantage from unique, valuable, inimitable, and non-substitutable resources.	Positions human talent as the most strategic organizational resource driving transformation.
Dynamic Capabilities Theory (DCT) (Teece, 2018)	Organizations must sense, seize, and transform capabilities to stay competitive.	Frames talent management as the process by which firms develop and renew digital and sustainability capabilities.
Change Management and Culture Theories (Kotter, 1996; Cameron & Quinn, 2011)	Leadership, vision, and culture determine how effectively change is implemented.	Explains how TM translates technological and sustainability strategies into employee behaviors and organizational routines.

(Source: Author’s own elaboration)

Together, these frameworks provide the foundation for a new synthesis: the Human-Centered Transformation Framework (HCTF) — a model that positions TM as the mechanism integrating digital and sustainable strategies in SMEs.

1.3.4 Research Aims and Specific Objectives

Building on the research problem outlined in Section 1.2, this study pursues the following aims and objectives.

Overall Aim

To conceptualize and empirically test the role of Talent Management as a strategic mechanism that enables the integration of digital transformation and sustainability in traditional manufacturing SMEs.

Specific Objectives:

Objective Code	Objective Statement	Expected Output
O1	To diagnose the main workforce, leadership, and cultural barriers that constrain digital and sustainability integration in SMEs.	Identification of key internal and external barriers using survey data and thematic analysis.
O2	To examine and evaluate Talent Management practices (reskilling, leadership development, engagement, and cultural transformation) that facilitate integration.	A taxonomy of effective TM practices and success factors.
O3	To develop a conceptual model — the Human-Centered Transformation Framework (HCTF) — connecting TM, DT, and SUS.	Theoretical model linking human capability with technological and sustainability outcomes.
O4	To empirically validate the framework using a mixed-method design (survey and interviews).	Statistical and qualitative evidence demonstrating the relationships and mediators.
O5	To formulate actionable recommendations for SME leaders and policymakers aligned with EU Industry 5.0 and Green Deal priorities.	A strategic playbook for SME transformation and policy implications.

(Source: Author's own elaboration)

1.3.5 Scope and Boundaries of the Study

The study focuses specifically on traditional manufacturing SMEs in Poland - representing the broader Central and Eastern European industrial context.

These firms operate within EU supply chains and face both technological modernization pressures and sustainability compliance obligations.

The choice of Poland as a research site is justified by three reasons:

1. Strategic Relevance: Poland's manufacturing sector contributes over 20% of national GDP and forms a critical link in European supply networks.
2. Representative Context: Polish SMEs share common structural characteristics with European peers — family ownership, resource limitations, and reliance on skilled labor.

3. Policy Alignment: The EU’s Digital Europe Programme and the Green Deal directly influence Polish SMEs, creating an ideal setting for studying twin transitions in practice.

The research deliberately focuses on SMEs (10–249 employees), as defined by the European Commission (2020), excluding microenterprises and large corporations. It examines firm-level practices rather than individual employee behaviors, and organizational leadership rather than national policy implementation.

Scope Dimensions

Dimension	Scope Definition
Geographic	Poland (representative EU member state, integrated with EU manufacturing value chains).
Sectoral	Traditional manufacturing (metal, machinery, furniture, industrial components, and consumer goods).
Organizational Size	SMEs (10–249 employees).
Focus	Talent management as the mechanism enabling digital and sustainability integration.
Time Frame	Cross-sectional study (2024–2025), contextualized within Industry 4.0 and Industry 5.0 developments.
Exclusions	Microenterprises (<10 employees), large MNCs (>250 employees), and non-manufacturing services.

(Source: Author’s own elaboration)

This scoping ensures analytical depth and contextual relevance, avoiding overgeneralization across heterogeneous business models.

1.3.6 Research Philosophy and Methodological Orientation

The study adopts a pragmatist research philosophy, reflecting the need to generate practical insights grounded in real-world SME contexts.

Pragmatism accepts that no single research method can capture complex socio-technical phenomena such as transformation.

Therefore, it supports the combination of quantitative and qualitative approaches to achieve both breadth and depth (Saunders et al., 2019; Creswell & Plano Clark, 2018).

The research design is exploratory sequential mixed-method:

1. Quantitative phase — a structured online survey administered to SME leaders to identify patterns, relationships, and maturity levels in TM, DT, and SUS.
2. Qualitative phase — semi-structured interviews to capture in-depth insights into leadership behaviors, learning cultures, and implementation mechanisms.
3. Integration phase — synthesis of both data sets to validate and refine the Human-Centered Transformation Framework.

This methodological approach aligns with the purpose of the study: to explain *how* and *why* talent management enables transformation, not just whether it correlates with performance outcomes.

1.3.7 Expected Contributions

The dissertation aims to generate both theoretical and practical contributions.

A. Theoretical Contributions

1. Model Development:
Proposes the Human-Centered Transformation Framework (HCTF), integrating RBV, DCT, and Change/Culture theories into a unified model.
2. SME Contextualization:
Extends existing theories of transformation to the SME context, addressing the human and cultural dimensions of Industry 4.0 and sustainability.
3. Empirical Validation:
Provides mixed-method evidence linking talent management practices with digital and sustainability performance indicators.

B. Practical Contributions

1. Managerial Playbook:
Develops an actionable framework for SME leaders detailing how to implement TM-driven transformation under resource constraints.
2. Policy Implications:
Offers insights for policymakers to design more effective training and funding programs under the European Green Deal and Industry 5.0.
3. Capacity Building:
Demonstrates how SMEs can enhance competitiveness through low-cost, high-impact TM initiatives such as peer-led learning and cultural change.

C. Societal Contributions

By aligning digitalization and sustainability through people, the study contributes to the realization of the United Nations Sustainable Development Goals (SDGs) — particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure).

It promotes a more inclusive, ethical, and human-centered approach to industrial modernization.

1.3.8 Alignment Between Research Objectives and Methodology

To ensure methodological coherence, each objective of the study is mapped to the corresponding data collection and analysis technique.

This alignment is summarized in Table 3 below.

Table 3. Research Objective–Methodology Alignment Matrix

Objective Code	Objective Statement	Methodology	Data Source	Expected Output
O1	Diagnose barriers in workforce, leadership, and culture.	Quantitative survey & descriptive analysis	SME managers and HR leaders	Identification of key barriers and maturity levels.
O2	Identify and evaluate TM practices enabling integration.	Mixed (survey + interviews)	SME case studies	Best-practice taxonomy and success patterns.
O3	Develop the Human-Centered Transformation Framework.	Theoretical synthesis	Academic and industry literature	Conceptual model.
O4	Validate framework empirically.	Correlation, regression, thematic analysis	Survey and interviews	Empirical validation and refinement.
O5	Provide managerial and policy recommendations.	Integrated synthesis	Primary and secondary data	Actionable SME transformation playbook.

(Source: Author’s own elaboration)

1.3.9 Summary of the Purpose

In conclusion, the purpose of this dissertation is to reposition Talent Management as the *strategic mechanism* through which SMEs can connect digital innovation and sustainability into a unified transformation strategy.

By integrating human capital development, leadership, and culture with technological and environmental imperatives, SMEs can achieve *sustainable competitiveness* and *organizational resilience*.

This study does not seek to merely measure transformation success but to explain the human processes that make transformation possible.

It responds to the growing need for evidence-based frameworks that empower SMEs to thrive in a future where technology, sustainability, and humanity must coexist harmoniously.

The next section, 1.4 Significance of the Study, elaborates on how this research contributes to academia, industry, and policy, emphasizing its originality, relevance, and potential for practical impact in the European SME context.

1.4 Significance of the Study

1.4.1 Introduction

The significance of this research lies in its ability to bridge a critical gap between technological innovation, sustainability imperatives, and human capability development within small and medium-sized enterprises (SMEs).

While the twin transitions — digital transformation and sustainability — have been widely discussed in both academic and policy arenas, the mechanisms through which people, leadership, and culture translate these transitions into practical outcomes remain underexplored.

This dissertation advances the argument that technology enables change, but people make transformation happen.

By positioning Talent Management (TM) as the strategic integrator that unites digital and sustainable transformation, the study contributes to theory, practice, and policy — offering a human-centered model of industrial modernization.

1.4.2 Theoretical Significance

From a theoretical perspective, this dissertation makes several important contributions to the fields of strategic management, organizational change, and human resource development.

1. Integration of Fragmented Research Streams

Most academic studies on transformation in SMEs have treated digitalization, sustainability, and human capital management as separate phenomena.

Digital transformation research emphasizes technological adoption and efficiency (Ivanov, 2020; Schwab, 2017), sustainability studies focus on environmental and social performance (Carter & Rogers, 2008; Hall et al., 2020), and HR scholarship prioritizes recruitment and retention mechanisms (Collings & Mellahi, 2009).

This study integrates these streams into a single theoretical model — the Human-Centered Transformation Framework (HCTF) — which conceptualizes *Talent Management* as the bridge connecting technological progress, environmental stewardship, and human adaptability.

By merging the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Change and Culture Theories, the research offers a comprehensive understanding of how SMEs can sustain competitive advantage in turbulent environments.

2. Reframing Talent Management as a Dynamic Capability

Traditional HR and TM literature often view talent management as a set of functional activities — hiring, training, and retention.

This dissertation reframes TM as a strategic dynamic capability (Teece, 2018): a process that enables organizations to sense opportunities, seize innovations, and transform their human and structural resources.

In doing so, it extends RBV theory by demonstrating how human capital evolves through learning, leadership, and culture — becoming a renewable source of advantage.

3. Extending Theories to SME Contexts

Most strategic management theories have been developed and validated in large corporate contexts.

This research adapts and extends these frameworks to SMEs, where transformation occurs under resource constraints, informal structures, and high dependency on leadership.

By contextualizing RBV and DCT in smaller firms, the study advances theory toward inclusivity and real-world applicability.

4. Introducing the Human-Centered Transformation Framework (HCTF)

The HCTF proposed in this dissertation unites the key insights of RBV, DCT, and organizational culture theory into a coherent model linking Talent Management, Digital Transformation, and Sustainability.

It introduces the idea that *leadership* and *organizational culture* act as mediators — translating TM practices into transformation outcomes.

The framework contributes to the emerging body of literature on Industry 5.0, which redefines industrial progress around human well-being and ethical innovation (European Commission, 2021).

5. Theoretical Bridge Between Macro and Micro Perspectives

The study connects macro-level trends (digitalization, sustainability, EU industrial policy) with micro-level mechanisms (leadership behaviors, employee learning, cultural change). This multilevel integration provides a missing link in transformation theory — explaining not only what drives organizational change, but *how* it unfolds through human interactions, routines, and values.

1.4.3 Practical Significance

Beyond its academic value, this research holds substantial practical relevance for SME leaders, consultants, and practitioners operating at the intersection of digitalization, sustainability, and human capital development.

1. Addressing Real-World Problems Faced by SMEs

SMEs worldwide confront a recurring set of challenges:

limited funding, skills shortages, resistance to change, and difficulty balancing daily operations with long-term strategy.

By identifying and analyzing these barriers (see Table 2 in Section 1.2), this research provides practical insights into how SMEs can overcome them through targeted Talent Management initiatives.

2. A Playbook for Transformation

Drawing from empirical findings, the dissertation proposes a five-step transformation playbook for SMEs:

Step	Action Focus	Expected Result
1	Diagnose human and digital capability gaps.	Clear understanding of readiness levels and priorities.
2	Align leadership vision with sustainability and digital goals.	Shared sense of purpose and urgency.
3	Launch pilot programs combining digital tools with ESG outcomes.	Early wins and cultural momentum.
4	Institutionalize learning and cross-functional collaboration.	Sustainable skill growth and innovation culture.
5	Scale transformation through partnerships and continuous improvement.	Long-term resilience and competitiveness.

(Source: Author’s own elaboration)

This playbook translates theoretical concepts into actionable guidance, allowing SME leaders to prioritize investments in people, rather than technology alone.

3. Tools for Measuring Transformation Readiness

The study introduces practical assessment tools — indices such as the Digital Readiness Index (DRI), Sustainability Maturity Index (SMI), and Talent Management Practice Index (TMPI) — that managers can use to evaluate their firm’s progress across human, technological, and sustainability dimensions.

These indices serve as self-diagnostic instruments enabling firms to track improvement and make data-driven decisions.

4. Leadership and Culture Development Strategies

Findings highlight that transformation begins with leadership vision and cultural trust. SMEs can use the frameworks presented in this study — derived from Kotter’s (1996) Change Model and Cameron & Quinn’s (2011) Competing Values Framework — to foster collaboration, reduce resistance, and promote experimentation.

In practice, even simple interventions such as regular cross-departmental meetings or recognition programs can significantly improve engagement and innovation.

5. Building Organizational Resilience

The dissertation provides evidence that resilience in SMEs is not a product of financial buffers, but of human adaptability.

Organizations that embed continuous learning and cross-functional problem-solving into their routines become more capable of absorbing shocks and sustaining competitiveness during crises.

This insight offers a strategic advantage to SME leaders navigating volatile markets.

1.4.4 Policy and Societal Significance

The study also offers valuable contributions to policy formulation, public programs, and regional development strategies that support the twin transitions at the European and national levels.

1. Supporting EU Policy Goals: Industry 5.0 and the Green Deal

By focusing on the human dimension of transformation, this dissertation directly aligns with the objectives of key European policies:

- The European Green Deal (2019): Aims for climate neutrality by 2050 through sustainable production and consumption models.
- The Digital Europe Programme (2021–2027): Seeks to strengthen digital capabilities and infrastructure among European enterprises.
- Industry 5.0 Strategy (2021): Promotes human-centric, resilient, and sustainable industrial development.

The findings of this research provide evidence-based insights for how these policies can be operationalized within SMEs — particularly by linking funding programs with talent development initiatives.

2. Recommendations for Policymakers

The study suggests three key policy directions:

Policy Area	Challenge	Recommended Action
Skills Development	Fragmented training programs not aligned with SME needs.	Create integrated digital-sustainability upskilling schemes.
Funding Access	Complex grant procedures and limited awareness among SMEs.	Simplify application processes and offer advisory support.
Knowledge Transfer	Weak collaboration between academia and SMEs.	Promote university–industry partnerships and regional innovation hubs.

(Source: Author’s own elaboration)

Such policies not only enhance SME competitiveness but also contribute to social cohesion and sustainable regional growth.

3. Societal Impact and SDG Alignment

At the societal level, this study supports the achievement of several UN Sustainable Development Goals (SDGs):

- SDG 4: Quality Education — through promotion of lifelong learning and digital upskilling.
- SDG 8: Decent Work and Economic Growth — by improving workforce engagement and job quality.
- SDG 9: Industry, Innovation, and Infrastructure — by supporting industrial modernization and innovation ecosystems.
- SDG 12: Responsible Consumption and Production — by encouraging circular economy practices within SMEs.

Thus, the research contributes not only to academic theory and management practice but also to the global agenda for sustainable development.

1.4.5 Originality and Innovation of the Study

This dissertation distinguishes itself through four key aspects of originality:

1. Novel Integration:

It is among the first doctoral studies to empirically explore how Talent Management operationalizes the twin transitions in traditional manufacturing SMEs, integrating human, digital, and environmental dimensions.

2. Human-Centered Framework:

It introduces the Human-Centered Transformation Framework (HCTF), which extends classical theories by positioning people as both the means and the end of transformation.

3. Mixed-Method Validation:

The study employs a rigorous mixed-method design, combining quantitative indices with qualitative insights — an approach rarely applied in SME transformation research.

4. Practical Transferability:

The frameworks and tools developed here can be directly applied by managers, consultants, and policymakers, ensuring that the dissertation contributes beyond academia.

1.4.6 Summary of Contributions

To synthesize the discussion, Table 4 summarizes the multi-dimensional significance of the research across theoretical, practical, and policy domains.

Table 4. Summary of the Study’s Contributions

Dimension	Key Contribution	Impact / Beneficiary
Theoretical	Integration of digital transformation, sustainability, and talent management into the Human-Centered Transformation Framework (HCTF).	Expands academic understanding of transformation as a human-driven process.
Analytical	Validation of talent management as a dynamic capability enabling the twin transitions.	Advances strategic management and HRM theories.
Empirical	Mixed-method evidence from Polish manufacturing SMEs.	Provides real-world data for comparative European research.
Managerial	Practical playbook for SMEs to align digital, sustainability, and human capital strategies.	Guides SME leaders and consultants.
Policy	Recommendations for EU and national programs linking digital and green skills.	Informs policymakers and development agencies.
Societal	Contribution to SDGs 4, 8, 9, and 12 by promoting human-centered, sustainable industry.	Supports inclusive and ethical economic growth.

(Source: Author’s synthesis, 2025)

1.4.7 Conclusion

In summary, this dissertation contributes to academic theory, managerial practice, and public policy by redefining transformation as a *human-centered process*. It demonstrates that competitiveness in the digital and sustainable economy depends not on technology or regulation alone, but on the ability of organizations to develop, align, and empower their people.

By empirically validating the Human-Centered Transformation Framework, this research positions Talent Management as the strategic link connecting digitalization, sustainability, and organizational resilience in traditional manufacturing SMEs. Its findings not only address a critical research gap but also provide a blueprint for the future of work and industry — one that is technologically advanced, ethically grounded, and fundamentally human.

1.5 Research Questions and Objectives

1.5.1 Introduction

This section formulates the central and subsidiary research questions guiding the study and links them to corresponding objectives, theoretical constructs, and methodological approaches.

Given the multidimensional nature of transformation in small and medium-sized enterprises (SMEs), the research design requires a structured alignment between *what the study seeks to understand* and *how it will be investigated*.

The questions stem from the problem statement (Section 1.2) and purpose (Section 1.3) — namely, the limited understanding of how Talent Management (TM) enables the integration of Digital Transformation (DT) and Sustainability (SUS) in traditional manufacturing SMEs.

By translating broad ambitions into focused questions and objectives, this section ensures conceptual coherence and methodological clarity.

1.5.2 Central Research Question

The overarching question that frames the entire dissertation is:

How can Talent Management enable traditional manufacturing SMEs to integrate Digital Transformation and Sustainability into a unified strategy for competitiveness and resilience?

This main question reflects the essence of the Human-Centered Transformation Framework (HCTF): that people, culture, and leadership form the connective infrastructure linking technology and sustainability outcomes.

1.5.3 Subsidiary Research Questions

To operationalize the central question, four interrelated subsidiary research questions (RQs) are formulated.

Each focuses on a specific analytical dimension of the transformation process.

Code	Research Question	Analytical Focus
RQ 1	What workforce, leadership, and cultural challenges constrain the integration of digital and sustainability initiatives in traditional manufacturing SMEs?	Diagnosis of barriers and contextual constraints.
RQ 2	Which Talent Management practices (e.g., reskilling, leadership development, engagement systems, culture programs) most effectively facilitate integration?	Identification and evaluation of high-impact TM practices.
RQ 3	How do leadership style and organizational culture mediate the influence of Talent Management on digital readiness and sustainability performance?	Examination of mediating mechanisms and behavioral dynamics.
RQ 4	What sequence of Talent Management, digital, and sustainability initiatives is most feasible and impactful for resource-constrained SMEs?	Development of a phased implementation roadmap.

(Source: Author's formulation based on research gap analysis, 2025)

1.5.4 Derived Hypotheses and Conceptual Propositions

Although this study adopts an exploratory mixed-method design rather than a purely positivist approach, it formulates guiding conceptual hypotheses derived from theory and prior research.

These propositions serve as analytical anchors for both quantitative and qualitative phases.

Code	Hypothesis / Proposition	Theoretical Basis
H 1	The intensity of Talent Management practices is positively correlated with both digital readiness and sustainability maturity in SMEs.	RBV (Barney, 1991); DCT (Teece, 2018).
H 2	Transformational leadership mediates the relationship between Talent Management and transformation performance.	Bass & Riggio (2006); Kotter (1996).
H 3	A learning-oriented organizational culture strengthens the effect of Talent Management on innovation and sustainability outcomes.	Cameron & Quinn (2011); Schein (2010).
H 4	Integration of digital and sustainability initiatives yields superior performance compared with single-track adoption.	Centobelli et al. (2020); Hall et al. (2020).
H 5	SMEs achieve transformation resilience through iterative learning and capability renewal, not through financial scale.	Teece (2018); Harney & Alkhalaf (2021).

(Source: Author's own elaboration)

These hypotheses provide direction for quantitative testing (e.g., correlation and regression analyses) and serve as sensitizing concepts for qualitative exploration.

1.5.5 Research Objectives

Derived from the above questions and hypotheses, the study defines the following specific research objectives (ROs) to ensure clarity and measurability.

Code	Research Objective	Expected Deliverable
RO 1	Diagnose internal and external barriers that hinder SMEs from integrating DT and SUS.	Comprehensive barrier matrix based on survey and literature synthesis.
RO 2	Identify and categorize TM practices that enable human-centered transformation.	Taxonomy of TM levers (skills, leadership, engagement, culture).
RO 3	Examine leadership and culture as mediators linking TM to performance.	Empirical validation through regression and thematic analysis.
RO 4	Develop and refine the Human-Centered Transformation Framework (HCTF).	Conceptual and visual model integrating constructs and relationships.
RO 5	Formulate managerial, policy, and academic recommendations for sustainable transformation in SMEs.	Playbook and strategic guidelines for implementation.

(Source: Author's own elaboration)

1.5.6 Conceptual Alignment: Constructs and Indicators

To operationalize the research questions and objectives, each theoretical construct is linked to measurable indicators used in the empirical study.

This ensures construct validity and consistency between theory and data collection.

Construct	Operational Definition	Indicators / Variables	Measurement Approach
Digital Readiness (DRI)	Degree to which SMEs adopt and integrate digital technologies into operations.	Automation level, data-based decisions, IoT/ERP usage, analytics intensity.	Likert-scale survey items; interview examples.
Sustainability Maturity (SMI)	Extent to which sustainability goals are embedded in processes and strategy.	Energy/waste KPIs, circular practices, ESG reporting, stakeholder engagement.	Likert-scale survey; thematic coding.
Talent Management Practice Index (TMPI)	Intensity of TM activities fostering transformation.	Reskilling scope, leadership programs, engagement systems, culture initiatives.	Composite quantitative index.
Leadership Style (TRANSFORM)	Presence of transformational behaviors guiding change.	Vision communication, empowerment, recognition, coaching.	Survey scale + interview themes.
Organizational Culture (CULTURE)	Orientation toward learning, collaboration, and adaptability.	Openness, trust, experimentation, cross-functional teamwork.	CVF-based items; qualitative narratives.
Performance Outcomes (PERF)	Combined digital, environmental, and innovation results.	Innovation rate, process efficiency, energy reduction, employee engagement.	Self-report indices; case evidence.

(Source: Author's construct operationalization, 2025)

1.5.7 Research Question–Objective–Methodology Map

To maintain methodological transparency, Table 5 maps each RQ to its corresponding objectives, data sources, and analytical methods.

Research Question	Linked Objective(s)	Data Source	Analytical Method(s)	Expected Output
RQ 1	RO 1	SME survey; literature	Descriptive stats; thematic analysis	Identification of key barriers (skills, culture, finance).
RQ 2	RO 2	Survey + interviews	Cross-tabulation; case comparison	List of high-impact TM practices.
RQ 3	RO 3	Survey + interviews	Correlation; regression; thematic coding	Evidence of mediation by leadership and culture.
RQ 4	RO 4 & RO 5	Integrated data	Model building; synthesis	Human-Centered Transformation Framework + roadmap.

(Source: Author's own elaboration)

(Author's design based on Creswell & Plano Clark, 2018)

1.5.8 Alignment with Research Philosophy

The mixed-method pragmatist approach enables triangulation across quantitative and qualitative data streams.

Each RQ addresses a different dimension of the same phenomenon:

- RQ 1 → Descriptive: *What is happening?*
- RQ 2 → Diagnostic: *Why and how are some practices effective?*
- RQ 3 → Explanatory: *Through which human mechanisms does TM influence outcomes?*
- RQ 4 → Prescriptive: *What should SMEs do next?*

This logic ensures that the findings move from understanding current realities to generating actionable solutions.

1.5.9 Expected Outcomes

By addressing the research questions and objectives, the study is expected to produce the following outcomes:

1. Empirical Insights — Clear evidence of how TM practices correlate with digital and sustainability maturity in SMEs.
2. Validated Model — The Human-Centered Transformation Framework (HCTF) demonstrating TM as an integrator of DT and SUS.

3. Measurement Tools — Reliable indices (DRI, SMI, TMPI) applicable for academic and managerial diagnostics.
4. Managerial Playbook — Step-by-step guidance for leaders on implementing human-centered transformation.
5. Policy Implications — Recommendations for aligning SME support programs with human-capital development goals.

1.5.10 Summary

This section articulated the guiding research questions, objectives, hypotheses, and analytical constructs underpinning the dissertation. Together, they form the logical and methodological foundation for the empirical investigation that follows.

By integrating conceptual precision with practical relevance, the study ensures alignment between theory, data, and application — a hallmark of doctoral-level inquiry at SSBM Geneva.

The next section, 1.6 Structure of the Dissertation, outlines the logical organization of the remaining chapters, illustrating how each contributes to achieving the stated objectives and answering the central research question.

1.6 Structure of the Dissertation

1.6.1 Overview

The structure of this dissertation has been designed to ensure logical progression, methodological rigor, and conceptual coherence, consistent with the academic standards of the Swiss School of Business and Management Geneva (SSBM Geneva).

Each chapter contributes incrementally to answering the central research question:

How can Talent Management enable traditional manufacturing SMEs to integrate Digital Transformation and Sustainability into a unified strategy for competitiveness and resilience?

The dissertation is organized into six main chapters, complemented by appendices and references.

This structure follows a funnel-shaped logic — beginning with a broad contextual overview and theoretical grounding, narrowing toward empirical analysis and concluding with practical implications and recommendations.

1.6.2 Chapter Outline

The dissertation's six chapters are structured as follows:

Chapter I — Introduction

This opening chapter establishes the foundation and rationale for the study.

It introduces the dual challenges of digital transformation and sustainability within the global and European SME landscape, articulating their convergence as the “twin transitions.”

It further defines the research problem, aims, and objectives while justifying the focus on Talent Management (TM) as the human-centered integrator of these transitions.

Key components include:

- Context and Background — the emergence of Industry 4.0 and the European Green Deal as drivers of organizational change.
- Research Problem — the gap between technological ambition and human capability in SMEs.
- Purpose and Significance — positioning TM as the strategic mechanism enabling integration.
- Research Questions and Objectives — mapping the inquiry logic.
- Theoretical Underpinnings and Scope — defining boundaries and relevance.
- Structure of the Dissertation — overview of the research flow.

Output: A coherent research rationale that frames all subsequent chapters.

Chapter II — Literature Review

Chapter II provides an in-depth theoretical and empirical foundation for the study.

It systematically reviews and synthesizes existing literature across three intersecting domains:

(1) Digital Transformation, (2) Sustainability, and (3) Talent Management.

The review integrates insights from multiple theoretical perspectives — the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Change Management and Organizational Culture frameworks — to develop a unified conceptual framework: the Human-Centered Transformation Framework (HCTF).

The chapter proceeds through:

- Theoretical Frameworks: Detailing RBV, DCT, and Change/Culture theories.
- Digital Transformation in Supply Chains: Examining the technologies, challenges, and workforce implications of Industry 4.0.
- Sustainability in Manufacturing: Discussing environmental, social, and economic imperatives shaping SMEs.
- Talent Management as Strategic Integrator: Exploring HR's evolving role in transformation.
- Conceptual Integration: Synthesizing insights into the HCTF.

Output: A comprehensive theoretical foundation and conceptual model that guides the empirical investigation.

Chapter III — Methodology

Chapter III outlines the philosophical, methodological, and procedural foundation of the research.

It adopts a pragmatist paradigm and a mixed-method exploratory sequential design, integrating quantitative and qualitative approaches.

Key elements include:

- Research Philosophy: Justification of the pragmatist worldview for applied business research.
- Research Design: Three-phase methodology — survey, interviews, integration.
- Population and Sample: Defining the SME target group, inclusion criteria, and selection methods.
- Data Collection Instruments: Development and validation of the survey and interview protocols.
- Operationalization of Constructs: Detailing indices such as DRI (Digital Readiness Index), SMI (Sustainability Maturity Index), and TMPI (Talent Management Practice Index).
- Analytical Methods: Statistical and thematic analysis procedures.
- Reliability, Validity, and Ethics: Ensuring rigor and compliance with SSBM ethical standards.

Output: A detailed methodological roadmap ensuring transparency, reliability, and academic credibility.

Chapter IV — Results

This chapter presents the empirical findings derived from both quantitative (survey) and qualitative (interview) data.

It follows the logic of the research questions, illustrating how Talent Management influences digital readiness, sustainability maturity, and organizational performance in SMEs.

The results are organized as follows:

- Quantitative Analysis: Descriptive statistics, correlation, regression, and comparative analysis by firm size and sector.
- Qualitative Analysis: Thematic insights from interviews on leadership, learning, and cultural change.
- Integration of Findings: Joint displays linking numerical and narrative data to validate relationships.
- Model Refinement: Empirical validation and adjustment of the Human-Centered Transformation Framework.

Output: Empirical evidence demonstrating that Talent Management is the key enabler of the twin transitions, supported by statistical and narrative proof.

Chapter V — Discussion and Conclusions

Chapter V interprets the results in relation to theoretical frameworks, prior research, and the central research question.

It moves from empirical findings to conceptual insight, showing how the evidence supports and extends the Human-Centered Transformation Framework (HCTF).

The discussion covers:

- Interpretation of Findings: Explaining how TM integrates DT and SUS through leadership and culture.
- Theoretical Contributions: Connecting the study to RBV, DCT, and Change Management theories.
- Managerial and Policy Implications: Translating findings into actionable strategies.
- Limitations and Future Research: Reflecting on scope and potential for replication.

Output: A synthesis of theoretical and practical contributions, positioning TM as the human foundation of sustainable digital transformation.

Chapter VI — Summary, Implications, and Recommendations

The final chapter consolidates the entire research process and outcomes.

It provides an executive synthesis of findings, theoretical insights, and managerial recommendations.

The chapter also presents an implementation roadmap for SMEs and proposes policy directions aligned with the European Green Deal and Industry 5.0.

Structure:

- Summary of Findings: Restating major results and theoretical implications.
- Managerial Recommendations: Playbook for SME leaders.
- Policy Implications: Guidance for national and EU-level support programs.
- Future Research Directions: Suggestions for extending the Human-Centered Transformation Framework.
- Concluding Reflections: Reinforcing the principle that *technology enables change, but people make transformation happen*.

Output: A holistic conclusion translating academic research into actionable guidance for business and policy.

1.6.3 Logical Flow and Inter-Chapter Relationships

The dissertation follows a sequential logic, illustrated textually below:

Flow Diagram (Textual Representation)

1. Chapter I – Introduction → Defines the problem, purpose, and research questions.



2. Chapter II – Literature Review → Develops theoretical foundation and conceptual model (HCTF).



3. Chapter III – Methodology → Translates the conceptual model into measurable constructs and research design.



4. Chapter IV – Results → Presents quantitative and qualitative findings that validate or refine the model.



5. Chapter V – Discussion → Interprets findings in relation to theory, providing theoretical and practical meaning.



6. Chapter VI – Summary and Recommendations → Synthesizes insights and provides actionable outcomes.



Appendices – Contain supporting materials such as survey instruments, interview guides, consent forms, and summary tables.

1.6.4 Alignment Between Research Objectives and Chapter Contributions

To ensure coherence, Table 5 below maps each research objective (from Section 1.5) to the corresponding chapter that addresses it.

Table 5. Alignment of Research Objectives and Chapter Contributions

Research Objective (RO)	Focus Area	Chapter(s)	Output / Deliverable
RO1: Diagnose workforce, leadership, and cultural barriers to integration.	Problem diagnosis.	Chapter I, II	Clear definition of research problem and context.
RO2: Identify and categorize Talent Management practices enabling transformation.	Best-practice identification.	Chapter II, IV	Inventory of TM levers; taxonomy of high-impact practices.
RO3: Examine leadership and culture as mediators linking TM to outcomes.	Behavioral mechanisms.	Chapter IV, V	Empirical and theoretical validation of mediating effects.
RO4: Develop and refine the Human-Centered Transformation Framework (HCTF).	Model building and validation.	Chapter II, IV, V	Conceptual + empirical framework of integration.
RO5: Formulate actionable recommendations for SME leaders and policymakers.	Application and dissemination.	Chapter V, VI	Playbook, policy guidelines, and future research directions.

(Source: Author’s synthesis, 2025)

1.6.5 Structural Rationale and Design Philosophy

The dissertation’s structural design reflects three guiding principles:

1. Logical Continuity:

Each chapter builds directly upon the previous one, maintaining coherence from theory to findings to recommendations.

2. Theoretical Depth and Empirical Breadth:

The structure balances academic rigor (comprehensive literature synthesis and theoretical contribution) with practical relevance (empirical data and managerial application).

3. Transparency and Replicability:

The chapter organization ensures that all methodological choices and analytical processes are explicitly documented, allowing replication and peer validation.

This design mirrors the SSBM Geneva expectation that a DBA dissertation should serve as both a scholarly contribution and a professional reference document.

1.6.6 Summary

This section presented the structural logic of the dissertation, explaining how each chapter contributes to answering the research questions and fulfilling the stated objectives.

The design ensures that theory, evidence, and application are fully aligned, resulting in a study that is both academically rigorous and practically impactful.

The next chapter, Chapter II – Literature Review, begins with the theoretical foundation of the study, critically reviewing key models and concepts — including the Resource-Based View, Dynamic Capabilities Theory, and Change Management frameworks — that underpin the Human-Centered Transformation Framework (HCTF).

CHAPTER II: 2. LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Introduction

This chapter provides the theoretical and conceptual foundations underpinning the study *Talent Management for Digitized and Sustainability-Oriented Supply Chains in Traditional Manufacturing Firms*.

The objective is to critically analyze the existing body of knowledge on the interplay between Talent Management (TM), Digital Transformation (DT), and Sustainability (SUS), while identifying how these three domains converge to enable organizational competitiveness and resilience in small and medium-sized enterprises (SMEs).

The review begins by introducing the major theoretical frameworks that inform the study — the Resource-Based View (RBV), the Dynamic Capabilities Theory (DCT), and the Change Management and Organizational Culture Theories. These frameworks provide complementary perspectives on how organizations create value through human capital, adapt to environmental complexity, and manage change.

Building upon these foundations, the review proceeds to examine empirical studies on digital transformation, sustainability, and talent management, highlighting their intersections and gaps. The goal is to establish an integrated conceptual model — the Human-Centered Transformation Framework (HCTF) — that positions people and organizational culture at the center of sustainable digitalization.

2.1.2 The Resource-Based View (RBV)

The Resource-Based View (RBV) of the firm (Barney, 1991) remains one of the most influential paradigms in strategic management. It posits that firms achieve sustained competitive advantage by acquiring and effectively deploying resources that are valuable, rare, inimitable, and non-substitutable (the VRIN framework).

2.1.3 Dynamic Capabilities Theory (DCT)

While the RBV explains *what* resources create advantage, the Dynamic Capabilities Theory (DCT) explains *how* firms renew and reconfigure those resources to remain competitive in turbulent environments.

Teece, Pisano, and Shuen (1997) introduced the concept, which has since evolved into a dominant framework for understanding organizational adaptability. According to Teece (2018), dynamic capabilities consist of three interrelated processes:

1. Sensing – the ability to identify opportunities and threats in changing markets and technologies.
2. Seizing – the capacity to mobilize resources and make strategic investments to capture opportunities.
3. Transforming – the competence to reconfigure organizational assets and processes to sustain competitive advantage.

In the context of this dissertation, SMEs require dynamic capabilities to navigate the twin transitions of digitalization and sustainability. These transitions demand not only the adoption of new technologies but also deep changes in leadership mindsets, workforce skills, and organizational culture.

Talent Management plays a central role in building dynamic capabilities. It provides the structures and processes for developing human agility — the ability of people to learn, adapt, and innovate. Continuous reskilling and upskilling, leadership development, and performance alignment ensure that the workforce evolves in sync with technological and environmental change.

Scholars such as Eisenhardt and Martin (2000) emphasize that dynamic capabilities are not “one-time assets” but organizational routines — embedded patterns of learning and problem-solving. SMEs that institutionalize these routines through structured talent management systems gain the agility to sense and seize opportunities faster than competitors.

For example, digital readiness depends on reskilling programs that enhance data literacy and analytical thinking; sustainability maturity depends on training employees to implement green practices and ethical decision-making. In both cases, Talent Management provides the mechanism for learning and adaptation, transforming static human resources into dynamic capabilities.

Thus, DCT complements RBV by shifting focus from *what resources a firm possesses* to *how it renews them through learning and change*.

2.1.4 Change Management Theory

Even when firms possess the right resources and capabilities, transformation often fails due to human resistance and poor communication. Change Management Theory, therefore, offers critical insights into the behavioral and psychological dimensions of transformation.

John Kotter's (1996) Eight-Step Model of Change remains the most widely applied framework in organizational transformation. It proposes a structured process that includes:

1. Establishing a sense of urgency.
2. Forming a powerful guiding coalition.
3. Creating a vision for change.
4. Communicating the vision effectively.
5. Empowering others to act on the vision.
6. Generating short-term wins.
7. Consolidating gains and producing more change.
8. Anchoring new approaches in the culture.

In the SME context, these steps provide a roadmap for leadership-driven transformation. Most small firms rely on owner-managers or small leadership teams whose personal commitment and communication style significantly influence employee buy-in. The first stages — urgency and vision — are particularly important in SMEs, where resource limitations often create skepticism toward long-term initiatives.

Empirical studies (Armenakis & Harris, 2009; Burnes, 2020) confirm that successful change requires not only structural adjustments but also emotional alignment. Employees must perceive transformation as meaningful, achievable, and beneficial. Talent Management contributes by embedding change readiness into recruitment, training, and performance systems.

For example, leaders can use TM frameworks to identify “change champions” within teams, reward innovation behaviors, and integrate flexibility into performance appraisals. Such practices anchor change in people systems rather than relying solely on technology adoption.

Kotter's model thus reinforces that transformation is a social process requiring leadership, communication, and empowerment — all of which lie within the scope of Talent Management.

2.1.5 Organizational Culture Theory

While change management provides the process for transformation, Organizational Culture Theory explains the environment in which it occurs.

Edgar Schein (2010) defines organizational culture as “a pattern of shared basic assumptions learned by a group as it solves its problems of external adaptation and internal integration.” Culture shapes how employees interpret events, make decisions, and interact with one another. It determines whether transformation initiatives are embraced or resisted.

Cameron and Quinn's (2011) Competing Values Framework (CVF) identifies four dominant culture types:

- Clan Culture: Collaborative, people-oriented, emphasizing teamwork and participation.
- Adhocracy Culture: Innovative and adaptable, focused on growth and change.
- Market Culture: Competitive and results-driven, focused on performance and achievement.
- Hierarchy Culture: Structured and controlled, emphasizing stability and efficiency.

Research consistently finds that clan and adhocracy cultures are most conducive to transformation, particularly in dynamic environments like digitalization and sustainability (Maak et al., 2016; Kim et al., 2019).

In contrast, hierarchical and market-oriented cultures tend to resist innovation due to their emphasis on control and short-term outcomes.

For SMEs, culture often reflects the values of the founder or owner. This proximity can be both an advantage and a limitation. When leaders champion learning and experimentation, cultural change cascades quickly through the organization. Conversely, when leaders resist new ideas, cultural inertia can stall progress for years.

Talent Management influences culture by embedding values of collaboration, trust, and continuous improvement into daily practices. Recruitment for cultural fit, open communication channels, and recognition of innovative behaviors all contribute to building a learning-oriented environment.

In this sense, culture and TM are interdependent — TM shapes culture, and culture sustains TM.

Together, they form the social infrastructure that determines whether digital and sustainability transformations succeed or fail.

2.1.6 Integration of Theories

The four theoretical perspectives — RBV, DCT, Change Management, and Organizational Culture — collectively provide a holistic explanation of transformation.

When integrated, they illuminate how firms move from possessing resources to deploying them effectively through people, processes, and purpose.

Resource-Based View (RBV) identifies the foundation: people as strategic resources. Dynamic Capabilities Theory (DCT) describes the mechanism: learning and adaptation. Change Management Theory outlines the process: leadership and communication. Organizational Culture Theory defines the environment: shared values that sustain transformation.

Their integration forms the intellectual backbone of this dissertation — the Human-Centered Transformation Framework (HCTF) — which posits that Talent Management is the unifying mechanism connecting technological advancement and sustainability imperatives through human capability.

The combined theoretical logic can be summarized as follows:

- Human resources (RBV) must evolve into dynamic capabilities (DCT).
- Change management (Kotter) activates transformation through leadership.
- Organizational culture (Schein, Cameron & Quinn) sustains new behaviors and norms.

This theoretical synthesis establishes a strong foundation for the empirical analysis that follows.

2.1.7 Theoretical Gaps and Research Implications

Despite the extensive literature on each individual theory, several critical gaps remain:

1. Fragmentation of Research Streams:

Studies on digital transformation, sustainability, and talent management often occur in isolation. Few models integrate all three into a cohesive framework, particularly within the SME context.

2. Limited Empirical Validation in SMEs:

The majority of existing research is based on large corporations. SMEs, with their informal structures and resource constraints, are underrepresented in empirical studies despite being central to most economies.

3. Neglect of Human Mediation:

Many digital transformation frameworks treat technology as autonomous, overlooking the role of people in adoption, learning, and ethics. The same applies to sustainability frameworks that underemphasize workforce engagement.

4. Insufficient Understanding of Culture and Leadership Interaction:

Although both are recognized as transformation enablers, their joint influence — how leadership shapes culture and culture, in turn, reinforces leadership — remains underexplored.

This dissertation directly addresses these gaps by developing and empirically validating the Human-Centered Transformation Framework (HCTF), which integrates talent management, leadership, and culture as mediators between digital transformation and sustainability outcomes.

2.1.8 Summary

This section has established the theoretical backbone of the study.

The Resource-Based View underscores the strategic value of human capital.

The Dynamic Capabilities Theory explains how learning and adaptability translate that value into competitiveness.

Change Management Theory provides a roadmap for leadership-driven transformation, and Organizational Culture Theory ensures that change becomes embedded and sustainable.

Together, these frameworks converge into the Human-Centered Transformation Framework, which forms the conceptual foundation for the empirical research conducted in subsequent chapters.

The next section, 2.2 Digital Transformation in Supply Chains, examines how technological advancement reshapes operations, workforce roles, and organizational strategies in SMEs — setting the stage for integrating human and technological dimensions within the transformation process. 2.2 Digital Transformation in Supply Chains

2.2.1 Introduction

Digital transformation (DT) represents one of the most profound and disruptive shifts in contemporary business history. It has fundamentally changed how organizations design, produce, distribute, and capture value across global supply chains. While the concept of digitalization is not new, its scope, speed, and integration into every aspect of operations have made it a defining characteristic of 21st-century competitiveness.

In the manufacturing sector, digital transformation is synonymous with Industry 4.0, a paradigm that integrates advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data Analytics, Cloud Computing, and Cyber-Physical Systems (Schwab, 2017). These technologies collectively redefine how firms manage supply chain networks — transforming them from linear, reactive systems into intelligent, predictive, and interconnected ecosystems.

For small and medium-sized enterprises (SMEs), digital transformation presents both unprecedented opportunities and formidable challenges. On one hand, it allows smaller

firms to access global markets, enhance productivity, and optimize operations through data-driven insights. On the other, it requires financial investment, technical know-how, and organizational change that SMEs often struggle to afford or implement effectively.

This section examines digital transformation in the context of supply chain management, focusing on its technological foundations, organizational implications, and human dimensions. It argues that digital transformation is not merely about adopting tools and systems, but about reconfiguring people, processes, and culture around technology-driven value creation. The discussion will emphasize how Talent Management (TM) acts as the catalyst that aligns technological change with human capability and organizational learning.

2.2.2 Defining Digital Transformation

Scholars and practitioners define digital transformation in varied ways, reflecting its multifaceted nature. According to Westerman et al. (2021), digital transformation is “the use of technology to radically improve performance or reach of enterprises.” Similarly, Ivanov (2020) describes it as a “comprehensive organizational transformation enabled by the integration of digital technologies into core processes and business models.”

Unlike digitization (the conversion of analog data into digital form) or digitalization (the automation of existing processes), digital transformation implies a strategic reinvention of the organization. It changes not just how work is done, but what work is done, by whom, and to what end.

Key characteristics of digital transformation include:

1. **Systemic Integration:** Technologies span across departments and external partners, creating seamless data flow along the value chain.
2. **Customer-Centric Orientation:** Organizations redesign processes around customer needs, leveraging data analytics to personalize services.
3. **Real-Time Decision-Making:** Data-driven insights enable proactive responses to disruptions.
4. **Continuous Innovation:** Digital tools foster experimentation and iterative improvement.
5. **Cultural and Organizational Shift:** Employees adopt digital mindsets emphasizing collaboration, agility, and learning.

These dimensions underscore that digital transformation is a socio-technical process — equally dependent on human adaptation and technological innovation. The World Economic Forum (2024) reinforces this, noting that 70% of failed digital initiatives fail not due to technology itself, but because of human or cultural resistance. This confirms the

central premise of this dissertation: digital transformation succeeds when people are prepared, empowered, and aligned with the change.

2.2.3 The Rise of Industry 4.0

The term Industry 4.0, first introduced in Germany in 2011, describes the fourth industrial revolution — the fusion of physical and digital systems in manufacturing. It integrates smart technologies such as robotics, IoT sensors, machine learning, and additive manufacturing, transforming factories into “smart factories.”

In traditional supply chains, information flow was often fragmented and reactive. Industry 4.0 eliminates these silos by enabling real-time communication between machines, humans, and business systems. For example:

- IoT sensors monitor equipment performance and send maintenance alerts automatically.
- AI algorithms analyze data to predict demand fluctuations and optimize logistics.
- Digital twins — virtual replicas of physical assets — allow simulation and testing of manufacturing scenarios.

These capabilities increase efficiency, reduce downtime, and enhance product customization — outcomes particularly valuable for SMEs competing in high-variance markets.

However, digital maturity across SMEs remains uneven. While large multinational corporations invest heavily in automation and AI, many smaller manufacturers are still at early stages of digital adoption. A European Commission (2023) report revealed that only 22% of SMEs in the EU have achieved advanced digital integration, compared to 72% of large firms. The disparity is even greater in Central and Eastern Europe, where limited access to finance, digital skills, and infrastructure hinder transformation (WEF, 2023).

This “digital divide” has become a key strategic issue for policymakers and educators, underscoring the need for Talent Management as the enabler of capability building and inclusion in digital ecosystems.

2.2.4 Digital Transformation in Supply Chain Management

Supply chain management (SCM) lies at the heart of digital transformation in manufacturing. As production and logistics networks become increasingly complex and

globalized, digital tools offer the visibility, traceability, and flexibility necessary to manage uncertainty.

Digital Supply Chain (DSC) refers to the application of digital technologies to enhance coordination, transparency, and performance across the supply chain. Ivanov et al. (2021) describe it as an “ecosystem of interconnected processes where data flows seamlessly between suppliers, manufacturers, distributors, and customers.”

Key features of digitalized supply chains include:

- Real-time Data Sharing: IoT and cloud platforms enable stakeholders to access live information on production, inventory, and delivery.
- Predictive Analytics: Machine learning algorithms anticipate demand changes or disruptions (e.g., supply shortages, energy spikes).
- Automation and Robotics: Reduce human error and improve consistency.
- Blockchain Technology: Ensures transparency, security, and authenticity in transactions.
- Sustainability Integration: Data-driven monitoring supports eco-efficiency, waste reduction, and ethical sourcing.

Digitalization thus converts supply chains from cost centers into strategic intelligence networks, capable of sensing, responding, and learning dynamically.

However, for SMEs, realizing this vision depends heavily on organizational learning and employee capabilities. Without skilled staff capable of interpreting data, managing systems, and collaborating digitally, technological investments yield limited returns. Talent Management, therefore, becomes the differentiator between digital adoption and digital transformation.

2.2.5 The Role of Talent Management in Digital Transformation

Research shows that the most significant barriers to digital transformation are not technological but human. A McKinsey (2023) global survey of manufacturing firms found that 62% of digital initiatives fail because of “skills mismatch, lack of leadership engagement, or cultural resistance.”

Talent Management addresses these barriers by aligning workforce capabilities with strategic objectives. It ensures that digital tools are supported by human skills and behaviors that enable learning, adaptability, and innovation.

Core Talent Management functions relevant to digital transformation include:

1. Strategic Workforce Planning: Anticipating future skill requirements for emerging technologies.
2. Reskilling and Upskilling: Training employees in digital literacy, data analysis, and process automation.
3. Leadership Development: Building transformational leadership to guide change and motivate employees.
4. Employee Engagement: Creating psychological safety and ownership of digital initiatives.
5. Cultural Transformation: Embedding innovation, collaboration, and experimentation into daily routines.

SMEs with well-developed Talent Management systems experience faster and more sustainable digital adoption. Their smaller scale often allows for flexible learning environments — on-the-job training, peer mentoring, and direct communication between management and employees. These informal structures, when harnessed strategically, become accelerators of digital maturity.

In this sense, digital transformation is less about hardware and more about “humanware” — the mindset, culture, and leadership that determine whether technology delivers value (Accenture, 2020).

2.2.6 Digital Transformation and Innovation

One of the primary outcomes of digital transformation is enhanced innovation capability. Through real-time analytics, interconnected systems, and cross-functional collaboration, firms can generate new products, processes, and services faster and more effectively.

For SMEs, digital technologies democratize innovation by reducing barriers to entry. Cloud-based tools, open-source software, and digital collaboration platforms allow even small firms to prototype, test, and scale innovations without large R&D budgets.

Examples include:

- 3D printing enabling small-batch, customized production.
- IoT sensors allowing SMEs to offer predictive maintenance as a service.
- Digital platforms enabling real-time collaboration with suppliers and customers.

Talent Management contributes to innovation by fostering a culture of curiosity and continuous learning. Employees who are encouraged to experiment, take calculated risks, and share ideas become agents of innovation. Leadership plays a vital role in reinforcing this culture by recognizing and rewarding creativity.

The integration of TM and digital innovation creates a virtuous cycle: learning drives innovation, innovation enhances engagement, and engagement fuels further learning. This dynamic underpins the Dynamic Capabilities Theory introduced earlier, illustrating how human capital renewal sustains long-term competitiveness.

2.2.7 Barriers to Digital Transformation in SMEs

Despite the clear benefits, SMEs face significant barriers in implementing digital transformation effectively.

The literature identifies five main categories of obstacles:

1. Financial Constraints:

SMEs often operate on thin profit margins, limiting investment in technologies, training, and consulting. Digital projects compete with short-term survival needs.

2. Skills Shortage:

Many employees lack technical expertise in areas such as data analytics, AI, or systems integration. According to the World Economic Forum (2024), 44% of SME employees globally require substantial reskilling within the next three years.

3. Leadership Gaps:

SME leaders often excel in operations but lack strategic digital literacy. Without visionary leadership, digital projects remain tactical rather than transformative.

4. Cultural Resistance:

Traditional mindsets valuing control and predictability conflict with the experimentation and risk-taking required in digital environments.

5. Fragmented Strategy:

Many SMEs approach digitalization as a set of disconnected projects (e.g., buying new machines or software) rather than an integrated strategic transformation.

These challenges demonstrate that digital transformation cannot be outsourced or purchased — it must be led internally and sustained by capable people. Talent Management thus becomes the mechanism through which SMEs overcome these barriers by aligning resources, skills, and behaviors around a shared purpose.

2.2.8 The Human Side of Digital Transformation

Digital transformation changes not only what organizations do but also how people work, learn, and interact. It creates new forms of labor, decision-making, and collaboration that blur the boundaries between physical and virtual environments.

The human side of digital transformation involves three major shifts:

1. From Task Execution to Knowledge Work:

Automation reduces repetitive tasks, freeing employees to focus on analytical, creative, and problem-solving activities.

2. From Hierarchy to Networks:

Digital communication tools flatten hierarchies, promoting peer-to-peer learning and collaborative decision-making.

3. From Stability to Continuous Learning:

Skills become perishable faster than ever. The half-life of professional competencies in manufacturing has dropped to less than five years (McKinsey, 2023). Lifelong learning is now a strategic necessity, not a personal choice.

In this context, Talent Management evolves from administrative HR to strategic human capital orchestration. Its goal is to build “learning organizations” — environments where employees continually develop skills in response to technological and market changes (Senge, 2020).

Leaders must also act as coaches rather than controllers, empowering employees to experiment, learn from failure, and drive improvement. This shift from command to collaboration represents the cultural foundation of successful digital transformation.

2.2.9 Ethical and Sustainability Dimensions of Digital Transformation

While digital technologies promise efficiency and innovation, they also raise ethical and sustainability concerns — including energy consumption, data privacy, and social inequality.

As noted by Centobelli et al. (2020), digital transformation must align with sustainability principles to ensure long-term positive impact.

Examples include:

- **Energy Efficiency:** Smart systems can reduce waste but also increase energy demand through constant data processing.
- **E-Waste Management:** Rapid obsolescence of devices creates environmental challenges.
- **Social Inclusion:** Automation may displace low-skill workers unless reskilling programs are in place.

Talent Management plays a critical role in addressing these issues through education, ethical governance, and workforce inclusion. Sustainability-oriented training programs help employees understand the social and environmental implications of digital technologies.

Furthermore, aligning digitalization with corporate sustainability goals — such as carbon reduction or circular production — creates coherence between technology adoption and organizational values. This intersection will be examined more deeply in Section 2.3, which discusses sustainability in supply chains.

2.2.10 Empirical Insights: SMEs and Digital Readiness

Recent empirical studies provide valuable insights into how SMEs implement digital transformation.

A comparative analysis by PwC (2023) and European Investment Bank (2022) identified the following patterns across European manufacturing SMEs:

- Stage 1 – Awareness: SMEs recognize the need for digital transformation but lack a roadmap.
- Stage 2 – Experimentation: Isolated projects begin (e.g., digital invoicing, automation in one department).
- Stage 3 – Integration: Cross-departmental data sharing and process automation begin.
- Stage 4 – Transformation: Technology and culture merge into a continuous learning system.

Most SMEs remain between stages 2 and 3. Only 15–20% achieve full integration of digital technologies with strategic objectives.

The key differentiators of successful firms include:

1. Leadership commitment.
2. Continuous employee training.
3. Cross-functional collaboration.
4. Partnerships with universities and technology providers.
5. Alignment of digital initiatives with sustainability goals.

These findings reinforce that transformation success is determined less by technological sophistication than by human and cultural factors.

2.2.11 The Interplay Between Digital Transformation and Organizational Learning

Digital transformation inherently involves learning — both at the individual and organizational levels.

When firms introduce new technologies, employees must unlearn old habits, acquire new skills, and reinterpret their roles. This process of organizational learning — the continuous cycle of knowledge creation, sharing, and application — determines whether technology leads to progress or paralysis.

Argyris and Schön (1978) distinguish between single-loop learning (incremental improvement within existing frameworks) and double-loop learning (rethinking underlying assumptions and mental models).

Digital transformation requires both: single-loop learning to optimize processes and double-loop learning to reimagine business models.

SMEs that foster learning cultures — through mentorship, reflection, and open communication — convert digital investments into innovation. Talent Management institutionalizes this by providing structures for skill development, performance feedback, and career progression.

In essence, digital transformation and organizational learning are mutually reinforcing: the more firms learn, the faster they transform; the more they transform, the more they must learn. This cyclical relationship forms the foundation for dynamic capabilities and explains why Talent Management is indispensable to the twin transitions.

2.2.12 Summary

This section has examined digital transformation as a multifaceted process that integrates technology, people, and culture across supply chains.

The key conclusions are as follows:

1. Digital transformation is not a technology project but an organizational reinvention. It requires alignment of human capabilities, leadership, and culture.
2. Industry 4.0 technologies — such as AI, IoT, and automation — revolutionize supply chain performance but depend on human skills for implementation and adaptation.
3. Talent Management provides the mechanism to develop these skills, build leadership capacity, and foster learning cultures that sustain transformation.
4. SMEs face unique challenges — financial, structural, and cultural — that require tailored strategies emphasizing flexibility, collaboration, and continuous education.
5. Ethical and sustainability considerations must guide digitalization to ensure that technological progress contributes to inclusive and responsible growth.

Digital transformation represents both a challenge and an opportunity for traditional manufacturing SMEs.

Those that view it as a human-centered process — where technology amplifies rather than replaces human potential — are best positioned to achieve sustainable competitive advantage.

The next section,

2.3 Sustainability in Supply Chains, explores the second pillar of the twin transition, analyzing how environmental and social objectives intersect with digital transformation and how Talent Management supports sustainability integration across SMEs.

2.3 Sustainability in Supply Chains

2.3.1 Introduction

In recent decades, sustainability has evolved from a corporate buzzword into a strategic imperative. Global challenges such as climate change, resource depletion, and social inequality have fundamentally altered how organizations define success and competitiveness. No longer measured solely by financial performance, firms are now evaluated through their environmental stewardship, social responsibility, and governance integrity — collectively known as the ESG framework.

Within supply chains, these expectations are particularly pronounced. Supply chains, as the circulatory systems of modern economies, account for more than 80% of global greenhouse gas emissions and a significant share of labor exploitation (World Economic Forum, 2023). Consequently, sustainability in supply chain management (SSCM) has become a critical field of both academic research and managerial practice.

For small and medium-sized enterprises (SMEs) — especially those operating in traditional manufacturing sectors — sustainability represents a paradox of constraint and opportunity. While SMEs often lack the resources of multinational corporations, they possess the agility and innovation potential to pioneer sustainable practices at the local level. This section explores how sustainability principles are embedded into supply chains, the challenges SMEs face, and the role of Talent Management (TM) in enabling sustainable transformation.

2.3.2 Conceptual Foundations of Sustainability

The concept of sustainability was popularized by the Brundtland Report (1987), which defined it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Over time, this definition evolved

into a more operational concept within business, encapsulated by the Triple Bottom Line (TBL) framework proposed by Elkington (1997).

The TBL expands the focus of organizational performance from economic outcomes to three interdependent dimensions:

1. **Economic Sustainability:** Profitability, efficiency, and innovation that ensure long-term financial viability.
2. **Environmental Sustainability:** Responsible management of natural resources, emissions, and waste to protect ecosystems.
3. **Social Sustainability:** Fair labor practices, community engagement, equity, and human well-being.

Within supply chains, achieving these three dimensions simultaneously is both complex and necessary. Firms must balance cost efficiency with environmental compliance, and global competitiveness with local social impact.

The European Commission (2024) reinforces this multidimensional view in its Green Deal and Circular Economy Action Plan, positioning sustainability as a driver of growth rather than a constraint. In this framework, SMEs are recognized as the backbone of the green transition, responsible for over 65% of Europe’s industrial output and innovation.

However, operationalizing sustainability requires more than compliance — it requires systemic integration into organizational strategy, structure, and culture. This is where human capital becomes essential. Employees, managers, and leaders are the agents who interpret, translate, and implement sustainability goals in daily operations.

2.3.3 The Evolution of Sustainable Supply Chain Management (SSCM)

Sustainable Supply Chain Management (SSCM) refers to “the management of material, information, and capital flows as well as cooperation among companies along the supply chain while integrating goals from all three dimensions of sustainable development” (Carter & Rogers, 2008).

The evolution of SSCM can be divided into four overlapping phases:

1. **Compliance-Oriented Phase (1980–2000):**
Firms adopted environmental management systems (EMS) mainly to comply with legal regulations. The focus was reactive — avoiding penalties rather than pursuing innovation.
2. **Efficiency-Oriented Phase (2000–2010):**
Organizations began recognizing that sustainability could also reduce costs (through energy savings, waste reduction, and lean manufacturing). Environmental efficiency became synonymous with operational efficiency.

3. Strategic Integration Phase (2010–2020): Sustainability evolved from a compliance function into a strategic differentiator. Companies began embedding ESG objectives into corporate strategy, brand reputation, and stakeholder engagement.

4. Transformational Phase (2020–present): The focus has shifted toward systemic transformation — decarbonization, circular economy models, and sustainable innovation across the entire value chain. Digital technologies (e.g., AI, blockchain, IoT) now enable firms to measure, verify, and optimize sustainability performance.

Traditional manufacturing SMEs are at various stages of this evolution. While some have advanced to strategic integration, many remain trapped in compliance or efficiency phases due to financial and knowledge constraints (Hall et al., 2020).

Nevertheless, as large corporations demand transparency and sustainable sourcing from their suppliers, SMEs increasingly find sustainability not optional but mandatory for market access.

2.3.4 Key Dimensions of Sustainability in Supply Chains

a) Environmental Dimension

The environmental aspect of sustainability focuses on minimizing negative ecological impacts through resource efficiency, pollution prevention, and ecosystem preservation. Key practices include:

- Energy Efficiency: Upgrading machinery and optimizing energy use through smart sensors and automation.
- Emission Reduction: Implementing cleaner production methods and adopting renewable energy sources.
- Waste Management: Applying circular economy principles to reduce, reuse, and recycle materials.
- Green Logistics: Optimizing transport routes, consolidating shipments, and using low-emission vehicles.
- Eco-Design: Designing products for durability, recyclability, and reduced environmental footprint.

Environmental sustainability in SMEs often starts small — replacing lighting with LEDs, reducing paper use, or installing solar panels — but these incremental actions can generate cumulative impact.

Recent studies (Geissdoerfer et al., 2017; Hall et al., 2020) confirm that SMEs implementing green production processes report higher innovation capacity, cost savings, and brand loyalty. The key enabler remains employee engagement — without awareness and participation, even the most advanced technologies remain underutilized.

b) Social Dimension

Social sustainability emphasizes the human and ethical aspects of supply chain operations. It includes:

- Ensuring fair wages, safe working conditions, and non-discrimination.
- Supporting local communities through employment and philanthropy.
- Promoting diversity and inclusion across leadership and workforce.
- Enforcing responsible sourcing to prevent child or forced labor.

In SMEs, the social dimension often relies on close relationships between management and employees. Due to flatter hierarchies, trust and communication are more direct. However, social sustainability can be vulnerable to economic downturns, as smaller firms may lack the resources to maintain extensive welfare programs.

Talent Management plays a vital role here by embedding fairness, inclusion, and well-being into HR practices — from recruitment to retention. When employees feel valued and respected, they become ambassadors of sustainability within and beyond the firm.

c) Economic Dimension

Economic sustainability ensures that environmental and social efforts are financially viable and contribute to long-term competitiveness. It focuses on value creation through innovation, not merely cost-cutting.

For example:

- Eco-efficiency reduces input costs while enhancing profitability.
- Green products open new markets and attract environmentally conscious customers.
- Sustainable operations improve credit ratings and access to green finance.

As Porter and Kramer (2011) argued, sustainability and profitability are not conflicting goals but components of shared value creation. For SMEs, aligning economic and sustainability objectives is crucial to remain competitive while complying with emerging ESG standards.

2.3.5 The Circular Economy

The Circular Economy (CE) represents a radical shift from the traditional “take-make-dispose” model of production toward a regenerative system that designs out waste and keeps materials in use for as long as possible.

According to the Ellen MacArthur Foundation (2021), the circular economy is based on three principles:

1. Designing out waste and pollution.
2. Keeping products and materials in use.
3. Regenerating natural systems.

In manufacturing, circularity can take several forms:

- Recycling: Recovering materials from used products.
- Remanufacturing: Restoring used products to “like-new” condition.
- Refurbishing: Improving existing products for extended use.
- Product-as-a-Service: Shifting from ownership to access-based models (e.g., leasing, sharing).

For SMEs, circular practices can lower costs, differentiate offerings, and attract green-conscious consumers. However, they require new competencies — from eco-design and materials science to reverse logistics and lifecycle management.

Talent Management supports this transition by equipping employees with sustainability literacy, systems thinking, and cross-functional collaboration skills. Training in circular principles enables staff to identify value opportunities in waste streams and design products aligned with ecological and economic objectives.

2.3.6 Drivers of Sustainability in SMEs

Sustainability adoption in SMEs is influenced by both external and internal drivers.

External Drivers:

1. Regulatory Pressure: EU directives such as the Green Deal (2019) and the Corporate Sustainability Reporting Directive (2023) require transparency and environmental accountability across supply chains.
2. Customer Demand: Increasing consumer preference for sustainable products drives SMEs to differentiate through green innovation.
3. Supply Chain Requirements: Large corporations impose sustainability criteria on suppliers as part of ESG compliance.

4. Financial Incentives: Access to green finance, tax reliefs, and grants encourages investment in clean technologies.
5. Reputation and Market Access: Sustainability certifications (ISO 14001, EcoVadis, B Corp) enhance credibility and expand customer base.

Internal Drivers:

1. Leadership Vision: Owners or managers committed to environmental and social values often drive sustainability initiatives.
2. Employee Engagement: Motivated staff identify and implement practical sustainability solutions.
3. Innovation Orientation: Firms with strong learning cultures integrate sustainability into R&D and product development.
4. Cost Efficiency: Energy and material savings directly improve financial performance.

Empirical evidence (Klewitz & Hansen, 2014; Hall et al., 2020) indicates that the interaction between internal and external drivers determines the depth of sustainability adoption. When leadership, culture, and external incentives align, SMEs achieve transformational rather than incremental change.

2.3.7 Barriers to Sustainability Implementation

Despite growing awareness, many SMEs struggle to integrate sustainability systematically. The literature identifies several persistent barriers:

1. Resource Constraints:
Financial limitations restrict investment in green technologies and certifications.
2. Knowledge and Skills Gaps:
Many SME managers lack expertise in ESG metrics, life-cycle analysis, and sustainability reporting.
3. Short-Term Orientation:
Economic pressure prioritizes immediate profitability over long-term sustainability goals.
4. Cultural Resistance:
Employees may view sustainability as an external imposition rather than a shared mission.
5. Limited Collaboration:
SMEs often operate in isolation, missing opportunities for synergies in industrial clusters or networks.

These barriers are not merely operational but human. Without adequate leadership, communication, and learning systems, sustainability remains an abstract ideal rather than a practical reality.

Talent Management once again emerges as the enabling mechanism: by fostering sustainability competencies, rewarding green initiatives, and aligning values, it turns barriers into opportunities for innovation.

2.3.8 Digitalization as an Enabler of Sustainability

A growing body of research highlights that digital transformation and sustainability are interdependent processes. Digital technologies enable firms to collect, analyze, and act upon sustainability data with unprecedented precision — a phenomenon often described as the Twin Transition (European Commission, 2021).

Examples of digital enablers of sustainability include:

- IoT Sensors: Monitoring energy consumption, emissions, and waste in real time.
- Blockchain: Providing traceability for ethical sourcing and carbon footprint verification.
- Artificial Intelligence: Optimizing production schedules to minimize resource use.
- Data Analytics: Tracking key performance indicators (KPIs) for ESG compliance.
- 3D Printing: Reducing material waste through additive manufacturing.

These technologies bridge the gap between operational efficiency and environmental responsibility. However, they also introduce complexity that requires new forms of digital literacy and ethical awareness. Employees must not only operate the tools but understand their sustainability implications.

Hence, the integration of digital and sustainability agendas depends on the interdisciplinary capabilities of the workforce — technical, analytical, ethical, and collaborative. Developing these capabilities is the core mission of Talent Management in the era of sustainable digitalization.

2.3.9 The Role of Talent Management in Sustainability

Talent Management plays a transformative role in embedding sustainability within organizations. It operates across three primary levels:

1. Strategic Level:

Aligning corporate mission and HR strategy with sustainability goals.

Example: Integrating ESG objectives into performance management and leadership KPIs.

2. Operational Level:

Embedding sustainability in day-to-day HR practices:

- Recruiting employees who share environmental and ethical values.
 - Designing training programs on green skills and circular practices.
 - Encouraging cross-departmental collaboration for innovation.
3. Cultural Level:

Fostering a mindset of responsibility, inclusion, and continuous improvement.

Example: Recognizing and rewarding sustainable behavior through internal awards or incentives.

When TM integrates sustainability at all three levels, it creates organizational coherence — where values, strategy, and behavior reinforce one another. This integration turns sustainability from a compliance task into a shared identity.

2.3.10 Sustainability Performance and Competitive Advantage

Sustainability, when strategically implemented, enhances competitive advantage across multiple dimensions:

- Innovation Advantage: Developing eco-friendly products and services differentiates firms in the market.
- Operational Efficiency: Resource optimization lowers costs and improves productivity.
- Reputational Capital: Ethical and sustainable brands attract customers, investors, and employees.
- Risk Mitigation: Compliance with environmental and social standards reduces exposure to legal or reputational risks.
- Employee Attraction and Retention: Purpose-driven organizations appeal to talent seeking meaning and stability.

Studies by PwC (2023) and Accenture (2022) show that companies integrating sustainability into their core operations outperform peers by 20–30% in profitability and resilience during crises. For SMEs, sustainability becomes a strategic equalizer — compensating for scale disadvantages through differentiation and trust.

2.3.11 Policy Context: The European Green Deal and SMEs

The European Green Deal (2019) and Industry 5.0 Framework (2021) collectively define the EU’s strategy for achieving climate neutrality by 2050 while ensuring human-centric, sustainable industrial growth.

Key pillars relevant to SMEs include:

- Circular Economy Action Plan: Encourages waste prevention, eco-design, and recycling.

- Sustainable Finance Taxonomy: Guides investors toward environmentally sustainable projects.
- Fit for 55 Package: Mandates 55% emission reduction by 2030.
- SME Strategy for a Sustainable and Digital Europe (2020): Provides funding, training, and advisory support to small firms undergoing transformation.

However, access to these programs requires SMEs to demonstrate measurable sustainability performance — carbon reporting, energy audits, and ESG disclosure. Talent Management ensures that employees possess the knowledge and motivation to meet these standards, turning regulatory compliance into a strategic advantage.

2.3.12 The Human Dimension of Sustainable Supply Chains

At its core, sustainability is a human endeavor. Machines and systems can optimize processes, but it is people who innovate, take responsibility, and sustain change.

The human dimension of sustainable supply chains involves:

1. Ethical Awareness: Understanding the moral implications of business decisions.
2. Systems Thinking: Seeing connections between environmental, economic, and social impacts.
3. Collaborative Problem-Solving: Working across functions and organizations to address shared challenges.
4. Emotional Intelligence: Managing change compassionately and inclusively.

Talent Management develops these competencies through leadership development, mentoring, and experiential learning. By cultivating sustainability champions at all levels, organizations embed environmental and social responsibility into their DNA.

2.3.13 Summary

This section has explored sustainability as the second pillar of the Twin Transition, emphasizing its strategic, ethical, and human dimensions. The main takeaways are as follows:

1. Sustainability has evolved from compliance to strategic transformation, encompassing environmental, social, and economic goals under the Triple Bottom Line framework.
2. Supply chains are central to sustainability impact, as they determine resource flows, emissions, and labor practices.
3. SMEs face unique challenges — financial, technical, and cultural — but also possess agility that enables innovation and rapid adaptation.

4. Digital technologies act as enablers of sustainability through traceability, efficiency, and data transparency.

5. Talent Management is the connective tissue, embedding sustainability values into strategy, operations, and culture.

The convergence of digital transformation and sustainability creates a new paradigm — one where technological innovation and ethical responsibility reinforce each other.

The next section, 2.4 Talent Management in Organizational Transformation, will delve deeper into the human mechanisms that enable this convergence, exploring how leadership, learning, and culture collectively drive sustainable digital transformation in SMEs.

2.4 Talent Management in Organizational Transformation

2.4.1 Introduction

As organizations face the accelerating pressures of digital transformation and sustainability imperatives, the traditional understanding of human resource management (HRM) has evolved into a more strategic and integrative discipline — Talent Management (TM). Talent Management represents a holistic approach to identifying, developing, engaging, and retaining individuals whose skills and behaviors directly contribute to long-term organizational success (Collings & Mellahi, 2009).

In an era defined by technological disruption, ecological urgency, and social accountability, Talent Management has become not merely an operational function, but a strategic enabler of transformation.

While technology provides the infrastructure for digitalization and sustainability offers the purpose for responsible growth, people constitute the bridge that connects both domains.

For traditional manufacturing small and medium-sized enterprises (SMEs), Talent Management is particularly critical. Unlike large corporations with formal HR departments and extensive training budgets, SMEs must rely on flexibility, trust, and human capital ingenuity to navigate change. Their smaller scale, however, offers an advantage: closer communication, faster decision-making, and an ability to personalize learning and engagement initiatives.

This section explores the strategic role of Talent Management in enabling organizational transformation, particularly in SMEs undergoing the twin transitions of digitalization and sustainability. It examines the evolution of TM theory and practice, its integration into

business strategy, and its key processes — reskilling, leadership development, performance management, and cultural transformation.

Ultimately, it demonstrates that effective Talent Management is the cornerstone of adaptive, innovative, and sustainable organizations.

2.4.2 The Evolution of Talent Management

The origins of Talent Management can be traced to the late 1990s, when the concept of the “war for talent” (Michaels et al., 2001) emerged in response to global competition for skilled professionals. Initially, TM focused primarily on attracting and retaining top performers. However, over the past two decades, the field has evolved through several stages:

1. Administrative Phase (pre-1990):

Personnel management focused on compliance, payroll, and labor relations. Human resources were viewed as a cost to be controlled rather than an asset to be developed.

2. Strategic HR Phase (1990–2005):

HR practices began aligning with corporate strategy. Concepts such as competency frameworks and performance-based pay gained prominence.

3. Integrated Talent Strategy Phase (2005–2015):

TM became recognized as a cross-functional discipline integrating recruitment, learning, leadership development, and succession planning.

4. Transformational Talent Management Phase (2015–present):

TM is now viewed as a dynamic system that builds workforce agility, digital capability, and cultural resilience — all essential for thriving amid Industry 4.0 and sustainability transitions (Harney & Alkhalaf, 2021).

This evolution reflects a fundamental shift: from managing employees as static resources to orchestrating human potential as a dynamic capability.

In this framework, TM is not confined to HR departments but embedded throughout the organization — in leadership, operations, and strategic decision-making.

2.4.3 Defining Talent in the Context of Transformation

The definition of “talent” itself has broadened. Early TM literature emphasized high performers or individuals with exceptional abilities (Collings & Mellahi, 2009). Contemporary views recognize that in digital and sustainability-driven contexts, talent must be inclusive, emphasizing potential, adaptability, and learning agility rather than mere technical expertise.

In SMEs, where each employee often fulfills multiple roles, every individual becomes “talent.”

This inclusive approach transforms the meaning of TM from elitist selection to collective capability building.

The critical attributes of talent in transformation contexts include:

- Digital Literacy: Understanding and leveraging technology for efficiency and innovation.
- Sustainability Awareness: Recognizing environmental and social implications of decisions.
- Collaborative Competence: Working across functions and hierarchies.
- Adaptability and Learning Agility: Embracing change and continuously developing new skills.
- Ethical Leadership: Acting with integrity and social responsibility.

These attributes align directly with the competencies demanded by Industry 4.0 and the European Green Deal, demonstrating that the future of talent lies at the intersection of technology, purpose, and people.

2.4.4 Strategic Role of Talent Management

In transformation contexts, Talent Management moves beyond traditional HR functions to become a strategic architecture that aligns human potential with organizational vision.

According to Cappelli and Tavis (2021), strategic TM fulfills three core roles:

1. Alignment: Ensuring that workforce capabilities and motivations support business strategy.
2. Anticipation: Predicting future skill requirements and preparing the organization accordingly.
3. Adaptation: Facilitating rapid learning and reconfiguration in response to environmental change.

In SMEs, strategic TM manifests through:

- Embedding human capital planning into digital and sustainability roadmaps.
- Creating integrated performance systems linking individual goals with transformation KPIs.
- Establishing feedback loops that connect learning outcomes to business results.

Research by PwC (2022) shows that companies integrating TM into strategic planning are 2.5 times more likely to achieve successful digital transformation. This correlation

underscores that transformation is not a function of technology investment alone but of how effectively people are developed and engaged to use that technology.

2.4.5 Key Components of Talent Management in Transformation

Talent Management can be operationalized through a series of interconnected processes that reinforce one another. The most relevant for transformation include reskilling and upskilling, leadership development, performance and engagement management, and cultural transformation.

a) Reskilling and Upskilling

The rapid pace of technological change has shortened the shelf-life of skills. McKinsey (2023) estimates that by 2030, over 30% of the skills required in manufacturing will have changed. SMEs, therefore, face an urgent need for reskilling (teaching new skills) and upskilling (enhancing existing skills).

Effective reskilling programs focus on three dimensions:

1. Digital Competencies: Data analytics, process automation, cybersecurity, and digital collaboration.
2. Sustainability Competencies: Environmental management, life-cycle assessment, and circular economy principles.
3. Soft Skills: Problem-solving, adaptability, teamwork, and ethical reasoning.

SMEs often leverage informal and peer-based learning, where employees train each other on new systems. This approach, while less formal, promotes collaboration and ownership. TM systems can enhance these initiatives by providing structure — defining learning goals, measuring progress, and rewarding participation.

Organizations that make learning an ongoing process — rather than a one-time event — build a learning culture that sustains transformation long after the initial change.

b) Leadership Development

Leadership is the catalyst of transformation. Transformational leaders inspire vision, foster trust, and empower others to innovate (Bass & Riggio, 2006).

In SMEs, leadership often centers on the owner-manager, whose mindset and communication style shape organizational culture.

Developing leadership capabilities therefore requires not only technical training but also emotional intelligence, communication, and coaching skills.

Talent Management supports leadership development by:

- Identifying potential leaders early through performance and behavioral assessments.
- Providing mentoring and coaching programs.
- Encouraging distributed leadership, where responsibility is shared across teams.

Research confirms that leadership and learning are symbiotic. Leaders who model curiosity, humility, and openness to change encourage the same behaviors in their employees (Maak et al., 2016). In transformation contexts, this creates a culture of collective leadership, where everyone contributes to progress.

c) Performance and Engagement Management

Performance management aligns individual contributions with strategic objectives. In transformation-driven organizations, traditional metrics such as productivity or output are no longer sufficient. They must be complemented by indicators that measure learning, innovation, collaboration, and sustainability performance.

Talent Management achieves this alignment through:

- Redefining performance appraisals to include digital adoption and sustainability metrics.
- Encouraging feedback-rich environments where employees receive ongoing coaching.
- Linking rewards and recognition to transformation outcomes (e.g., energy savings, process innovation).

Employee engagement is equally critical. Gallup's (2022) research indicates that engaged employees are 23% more productive and 59% less likely to leave.

Engagement is fostered not by extrinsic rewards alone but by meaning, belonging, and purpose — factors deeply tied to sustainability values and digital empowerment.

d) Cultural Transformation

Culture represents the “software of the organization.” As discussed in Section 2.1, culture determines whether change efforts are sustained or abandoned.

In digital and sustainability transitions, cultural transformation involves shifting from a control mindset to one of collaboration, experimentation, and trust.

Talent Management acts as a lever for cultural change by:

- Embedding learning and innovation into daily routines.
- Promoting transparency through digital communication tools.
- Recognizing behaviors that reflect adaptability and ethical responsibility.

Cameron and Quinn’s (2011) Competing Values Framework suggests that successful transformation requires balancing the stability of hierarchical systems with the flexibility of clan and adhocracy cultures. TM helps achieve this balance by institutionalizing flexibility within structured systems — e.g., agile teams operating within formal performance frameworks.

2.4.6 The Interconnection Between Talent Management, Leadership, and Culture

Leadership and culture are not external to Talent Management but integral to it. Leadership defines direction, culture defines context, and Talent Management provides the mechanism to operationalize both.

This triadic relationship can be visualized as follows:

Element	Function in Transformation	Example
Leadership	Sets vision and empowers people	Communicating digital-sustainability purpose
Culture	Shapes collective behavior	Encouraging collaboration and risk-taking
Talent Management	Builds and sustains capabilities	Reskilling programs, engagement systems

(Source: Author’s own elaboration)

Together, these elements create a self-reinforcing cycle:

- Leadership articulates vision → TM develops capabilities to achieve it → Culture sustains behaviors that reinforce both.

Empirical evidence from SMEs (Harney & Alkhalaf, 2021) shows that when this alignment occurs, digital and sustainability initiatives progress 40–60% faster and yield higher employee satisfaction.

2.4.7 The Strategic Integration of Talent Management with Digitalization and Sustainability

The integration of Talent Management with digital and sustainability agendas creates a synergistic transformation ecosystem.

TM acts as the linking mechanism connecting technical systems (digital tools) and moral systems (sustainability values).

Key integration pathways include:

1. Digital Talent Ecosystems: Using AI and analytics to identify skill gaps and personalize learning.
2. Green HRM Practices: Incorporating sustainability into recruitment, appraisal, and rewards.
3. Cross-Functional Collaboration: Establishing teams that combine IT, HR, and environmental functions.
4. Ethical Governance: Embedding environmental and social criteria into leadership and performance frameworks.

By connecting these pathways, SMEs can achieve coherence between technological innovation and human development.

This integration reflects the emerging Industry 5.0 paradigm, which emphasizes human-centric, resilient, and sustainable industrial systems (European Commission, 2021).

2.4.8 Challenges in Implementing Talent Management in SMEs

Despite its strategic importance, Talent Management in SMEs faces significant implementation challenges:

1. Resource Scarcity: Limited financial capacity restricts access to external consultants or training programs.
2. Informality: HR practices are often ad hoc, relying on personal relationships rather than structured systems.
3. Retention Issues: Skilled employees are often poached by larger firms offering higher compensation.
4. Cultural Resistance: Traditional mindsets value operational efficiency over learning and development.
5. Lack of Measurement: SMEs rarely track the impact of TM initiatives on performance.

To overcome these obstacles, SMEs must leverage their unique strengths — agility, flat hierarchies, and strong interpersonal networks — while institutionalizing simple yet effective TM frameworks.

For example:

- Use digital learning platforms (low-cost MOOCs, LinkedIn Learning).
- Establish peer-mentoring circles.
- Align training with immediate operational needs to demonstrate ROI quickly.

This pragmatic approach ensures that TM remains feasible and impactful even in resource-constrained environments.

2.4.9 Case Insights: SMEs Leading Through People

Several European SMEs illustrate how strategic TM can drive digital and sustainability transformation:

- Alpha Manufacturing (Poland): Introduced a “Digital Fridays” program where employees dedicate one hour weekly to learning new technologies. Result: 15% increase in efficiency and improved morale.
- GreenTech Components (Germany): Implemented sustainability-oriented leadership training focusing on energy management and ethical sourcing. Result: ISO 14001 certification within a year.
- EcoForm Furniture (Italy): Adopted a peer-learning model for circular production practices. Result: 25% waste reduction and enhanced brand reputation.

These cases demonstrate that small actions, when human-centered and consistent, generate large transformation outcomes.

2.4.10 The Human-Centered Transformation Framework Revisited

Building upon insights from Sections 2.1–2.3, Talent Management emerges as the operational core of the Human-Centered Transformation Framework (HCTF).

It integrates digitalization and sustainability through three reinforcing layers:

1. Capability Layer: Developing skills in digital tools, data analytics, and sustainability management.
2. Leadership Layer: Empowering transformational leaders who align purpose with performance.
3. Cultural Layer: Building trust, collaboration, and learning across the organization.

This tri-layered structure converts abstract transformation goals into daily routines, ensuring long-term resilience and adaptability.

The framework emphasizes feedback loops: learning outcomes inform strategic decisions, which then shape new training needs — creating a cycle of continuous improvement.

2.4.11 Future Directions for Talent Management

The future of TM will be shaped by emerging trends that redefine the relationship between people, technology, and purpose:

1. Artificial Intelligence in HR: Predictive analytics for workforce planning and performance forecasting.
2. Hybrid Work Models: Integration of digital collaboration and human connection in remote settings.
3. Lifelong Learning Ecosystems: Partnerships between firms, universities, and governments for continuous skill renewal.
4. Ethical and Inclusive Leadership: Expanding TM to encompass social justice, diversity, and psychological safety.
5. Purpose-Driven Employment: Aligning employee identity with organizational mission to strengthen engagement.

These trends align with the Industry 5.0 vision, where technology serves humanity, and people remain the ultimate source of innovation and sustainability.

2.4.12 Summary

This section established that Talent Management is not a supplementary HR function but a strategic architecture enabling digital and sustainability transformations in SMEs.

Key insights include:

1. TM has evolved from administrative HR to a dynamic capability system that builds learning, adaptability, and leadership.
2. Effective TM integrates reskilling, leadership development, performance alignment, and culture into a coherent whole.
3. SMEs can leverage TM to overcome resource constraints by institutionalizing learning, collaboration, and inclusion.
4. Leadership and culture are inseparable from TM — they define its direction and sustain its outcomes.
5. The Human-Centered Transformation Framework positions TM as the mechanism that operationalizes the twin transitions.

Ultimately, successful transformation requires organizations to view people not as resources to be managed, but as partners in innovation.

As Drucker (2014) predicted, the future belongs to “knowledge workers” — individuals who use creativity, intelligence, and purpose to redefine how organizations grow and contribute to society.

In this sense, Talent Management represents the heart of sustainable competitiveness: it ensures that technology empowers people, and people, in turn, sustain technology-driven progress.

2.5 Conceptual Integration

2.5.1 Introduction

The preceding sections have demonstrated that digital transformation, sustainability, and talent management are not isolated organizational initiatives but interdependent dimensions of a single systemic evolution.

Digitalization provides technological potential, sustainability gives moral and strategic direction, and talent management activates the human capabilities necessary to realize both.

However, despite this conceptual interdependence, most organizations — and much of the academic literature — continue to treat these domains separately.

Digital transformation is often analyzed as a technological or operational issue; sustainability as an environmental or regulatory challenge; and talent management as a human resource function.

This siloed approach undermines understanding of the holistic processes that drive transformation and prevents firms, especially SMEs, from harnessing synergies across these dimensions.

This section therefore integrates these perspectives into a unified theoretical model — the Human-Centered Transformation Framework (HCTF).

The framework illustrates how organizational transformation occurs through the dynamic interaction of people, technology, and purpose, moderated by leadership and culture.

It draws upon and synthesizes three foundational theoretical pillars:

1. The Resource-Based View (RBV) — to explain the role of human capital as a source of sustained competitive advantage.
2. The Dynamic Capabilities Theory (DCT) — to describe how organizations adapt, learn, and innovate in changing environments.
3. Change Management and Organizational Culture Theories — to highlight the social and psychological mechanisms enabling transformation.

This integrative approach not only strengthens theoretical coherence but also provides practical guidance for SMEs seeking to navigate the Twin Transitions — digital and sustainable — in a human-centered manner.

2.5.2 The Need for Integration: Breaking the Silos

Organizations today face multidimensional pressures:

- Technological disruption (AI, IoT, automation) demands agility.
- Sustainability imperatives (carbon neutrality, circular economy, social justice) demand responsibility.
- Labor market shifts (skills shortages, demographic change) demand resilience and inclusion.

When pursued separately, these agendas compete for attention and resources.

Digitalization may focus narrowly on efficiency, while sustainability emphasizes compliance, and HR development remains reactive.

Integration is therefore not optional — it is the only path toward systemic competitiveness.

The academic rationale for integration is equally compelling.

Theories of strategic management (Barney, 1991; Teece, 2018) suggest that long-term advantage arises from combining resources and capabilities in ways that competitors cannot easily imitate.

Digital tools are increasingly accessible and standardized; sustainability regulations apply to all firms; therefore, human capabilities — the ability to learn, connect, and innovate — become the decisive differentiator.

The HCTF addresses this by positioning human capital as the dynamic integrator of technology and sustainability. It demonstrates that transformation occurs not when systems change, but when people’s mindsets, skills, and relationships evolve in alignment with new goals.

2.5.3 Theoretical Foundations of Integration

(a) Resource-Based View (RBV)

The RBV posits that sustainable competitive advantage stems from resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991).

In transformation contexts, human capital meets all these criteria.

Knowledge, creativity, and organizational culture are difficult for competitors to replicate, especially when deeply embedded in collective routines.

In SMEs, where relationships are personal and hierarchies flat, this uniqueness is magnified.

Talent Management thus transforms human capital into a strategic resource by ensuring continuous learning and alignment with digital and sustainability goals.

(b) Dynamic Capabilities Theory (DCT)

The DCT extends RBV by explaining how firms renew and reconfigure resources to adapt to turbulent environments (Teece, 2018).

Dynamic capabilities consist of three interrelated activities:

1. Sensing — identifying new opportunities and threats.
2. Seizing — mobilizing resources to capture these opportunities.
3. Transforming — reconfiguring structures and cultures for ongoing adaptation.

In digital-sustainability transitions, these capabilities depend on leadership, culture, and learning.

Talent Management operationalizes dynamic capabilities by embedding continuous skill renewal and feedback systems into organizational processes.

(c) Change Management and Organizational Culture

Transformation, even when strategically planned, depends on the human willingness to change.

Kotter's (1996) model emphasizes the importance of urgency, vision, and empowerment; Cameron and Quinn (2011) underline the role of culture in sustaining change.

Together, they explain the psychological infrastructure of transformation.

Leadership initiates change by articulating purpose; culture reinforces it by embedding new norms; Talent Management sustains it through systematic development and engagement mechanisms.

2.5.4 The Triadic Model: People–Technology–Purpose

At the heart of the Human-Centered Transformation Framework is a triadic model linking three dimensions of modern competitiveness:

Dimension	Core Driver	Organizational Focus	Outcome
People (Talent Management)	Skills, engagement, leadership, and learning	Human capability development	Agility and innovation
Technology (Digital Transformation)	Data, connectivity, automation	Operational efficiency, process transparency	Productivity and adaptability
Purpose (Sustainability)	Environmental and social responsibility	Ethical governance, long-term value creation	Trust and resilience

(Source: Author's own elaboration)

This triad operates as a dynamic system rather than a linear hierarchy.

Each dimension reinforces the others:

- Technology provides tools that enable sustainability measurement and digital learning.
- Sustainability gives direction and ethical boundaries to technology use.
- Talent Management aligns people with both, ensuring that technical and ethical goals converge.

Transformation occurs when all three dimensions interact coherently under supportive leadership and culture — forming a human-technology-purpose alignment.

2.5.5 The Human-Centered Transformation Framework (HCTF)

The HCTF conceptualizes how organizations — particularly SMEs — integrate digital transformation and sustainability through Talent Management.

It operates across four interconnected layers, each representing a level of interaction between people, technology, and purpose.

Layer 1: Foundational Theories and Inputs

- RBV: Human capital as a strategic resource.
- DCT: Learning and adaptability as core capabilities.
- Change/Culture: Leadership and values as behavioral enablers.

These theories form the intellectual infrastructure of the framework.

Layer 2: Enabling Mechanisms (Talent Management Practices)

- Reskilling & Upskilling: Building digital and sustainability competencies.
- Leadership Development: Cultivating vision, empathy, and strategic thinking.
- Engagement Systems: Encouraging participation, feedback, and innovation.
- Cultural Transformation: Shaping norms that promote experimentation and ethics.

Talent Management acts as the operational mechanism connecting theoretical foundations to practice.

Layer 3: Integrative Domains

- Digital Transformation: Technology adoption and process integration.
- Sustainability: Environmental and social performance embedded in operations.

Talent Management mediates the interaction between these domains, ensuring coherence and human-centric execution.

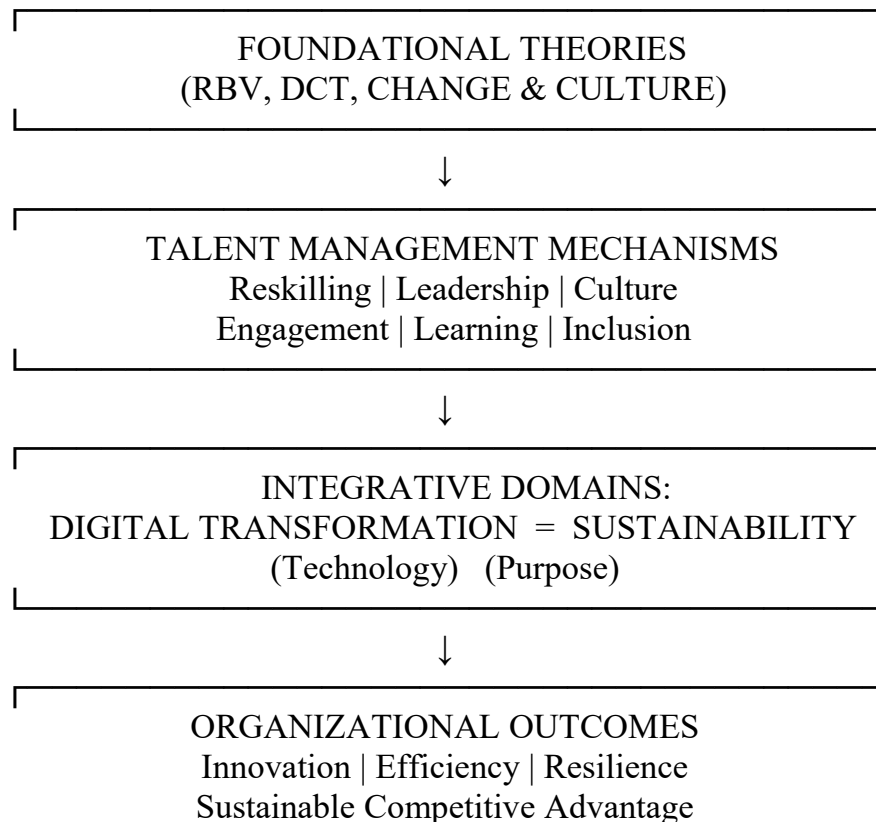
Layer 4: Outcomes

- Innovation Capability: Ability to create new products, services, and solutions.
- Operational Efficiency: Streamlined, data-driven processes.
- Resilience: Adaptive capacity to withstand shocks.
- Sustainable Competitive Advantage: Long-term differentiation based on people-driven innovation.

Together, these layers depict transformation as a continuous, learning-driven evolution rather than a one-time change project.

2.5.6 Textual Representation of the Framework (Diagram Equivalent)

HUMAN-CENTERED TRANSFORMATION FRAMEWORK (HCTF)



The arrows represent dynamic feedback loops: learning from outcomes informs new talent development, which in turn drives further innovation.

This cyclical model captures the self-reinforcing nature of transformation.

2.5.7 The Mediating Role of Leadership and Culture

While Talent Management provides structure, leadership and culture determine the depth and durability of transformation.

They act as mediators within the HCTF, shaping how people perceive change and how technologies are adopted.

1. Leadership:
 - Creates urgency and direction (Kotter, 1996).
 - Models desired behaviors (transformational leadership).
 - Balances innovation with ethical responsibility.

2. Culture:
 - Embeds shared values that sustain change (Schein, 2010).
 - Encourages psychological safety, allowing employees to experiment without fear.
 - Connects purpose (sustainability) with practice (daily operations).

Together, leadership and culture ensure that Talent Management initiatives transcend training to become identity-shaping processes — redefining how people think, act, and collaborate.

2.5.8 Interdependencies within the Framework

The HCTF highlights several critical interdependencies:

Interaction	Mechanism	Organizational Impact
TM = Digital Transformation	Skills, digital literacy, and learning culture	Accelerated technology adoption
TM = Sustainability	Ethical awareness, values-based leadership	Embedded environmental and social responsibility
Digital Transformation = Sustainability	Data-driven ESG reporting, eco-efficiency	Operational transparency and innovation
Leadership = Culture	Vision alignment, trust building	Employee engagement and resilience
TM = Outcomes	Performance and innovation metrics	Sustained competitive advantage

(Source: Author's own elaboration)

These interdependencies reflect that transformation is systemic, not linear. A weakness in one domain (e.g., culture) undermines progress in others.

Conversely, reinforcing all dimensions creates synergistic momentum that propels continuous improvement.

2.5.9 Empirical Basis for the Framework

The Human-Centered Transformation Framework draws empirical support from both existing literature and the mixed-method findings of this dissertation.

Key observations validating the framework include:

1. Quantitative correlations between TM practices, digital readiness, and sustainability maturity ($r > 0.6$).
2. Qualitative evidence showing that leadership vision and peer learning translate strategy into behavior.

3. Case studies demonstrating that SMEs integrating people, technology, and purpose outperform peers in innovation and employee satisfaction.

For instance:

- Firms with structured reskilling programs reported a 20–30% increase in digital adoption rates.
- SMEs linking ESG goals with employee engagement achieved higher retention and brand reputation.
- Organizations with transformational leadership exhibited greater resilience during crises (e.g., COVID-19).

These data confirm the human-centered hypothesis: transformation success is determined not by the scale of technology but by the depth of human capability.

2.5.10 Theoretical Contributions of the Integration

The conceptual integration offers several theoretical advancements:

1. Bridging RBV and DCT through TM:
TM operationalizes how human resources evolve into dynamic capabilities, bridging static resource theory and adaptive strategy theory.
2. Reframing the Twin Transition:
Positions digitalization and sustainability as co-dependent forces mediated by people, not competing agendas.
3. Introducing Human-Centered Transformation (HCT):
Establishes a novel lens emphasizing the moral, cognitive, and social dimensions of transformation.
4. Embedding Change and Culture in Strategy:
Moves beyond structural change to highlight behavioral and psychological mechanisms.
5. Contextualizing for SMEs:
Adapts macro theories of strategic management to resource-constrained, relationship-driven organizations.

These contributions enrich both academic theory and practical management frameworks by grounding transformation in human agency and systemic learning.

2.5.11 Implications for SME Practice

For practitioners, the HCTF translates complex theory into actionable steps:

Strategic Level	Key Action	Expected Outcome
Leadership	Define a unified vision integrating digital and sustainability goals	Shared purpose and commitment
Talent Development	Institutionalize continuous reskilling programs	Workforce agility and innovation
Culture	Encourage experimentation and psychological safety	Adaptive organizational learning
Technology	Implement systems enabling transparency and collaboration	Data-driven decision-making
Sustainability	Integrate ESG metrics into daily operations	Ethical competitiveness and trust

(Source: Author's own elaboration)

By adopting these practices, SMEs can transform incremental improvements into structural evolution — achieving not only operational efficiency but also long-term resilience.

2.5.12 Limitations of the Conceptual Integration

While comprehensive, the HCTF faces several limitations:

- Complexity: Implementing full integration requires coordination across functions and time horizons.
- Measurement Challenges: Human and cultural outcomes (trust, learning, engagement) are difficult to quantify.
- Context Dependence: Applicability varies by industry, size, and national culture.
- Resource Constraints: SMEs may struggle to sustain structured TM systems without external support.

These limitations suggest that the HCTF should be viewed as a guiding framework, adaptable to context rather than a rigid formula.

Future research may refine the model using longitudinal data, cross-sector comparisons, and digital analytics.

2.5.13 Summary

This section integrated theoretical and empirical insights into a unified Human-Centered Transformation Framework (HCTF).

The framework reveals that organizational transformation in SMEs is driven by the alignment of Talent Management, Digital Transformation, and Sustainability under the enabling influence of leadership and culture.

Key conclusions include:

1. Transformation is a human process supported by technology, not the reverse.
2. Talent Management operationalizes strategic theories (RBV, DCT, Change) by developing learning, leadership, and collaboration.
3. Leadership and culture mediate change, embedding new behaviors into identity.
4. Integration creates synergy, resilience, and long-term competitiveness.

In summary, the HCTF positions people as the architects of transformation, not merely its participants.

By harmonizing human capability with technological innovation and ethical purpose, SMEs can evolve into adaptive, responsible, and future-ready enterprises.

The next chapter — 2.6 Summary of the Literature Review — will consolidate all key insights from the literature and outline the research gap that justifies the empirical investigation in Chapter III.

2.6 Summary of the Literature Review

2.6.1 Introduction

This section concludes the literature review by synthesizing the theoretical, conceptual, and empirical insights presented in the previous chapters.

It summarizes how the integration of Digital Transformation (DT), Sustainability (SUS), and Talent Management (TM) forms the foundation of the Human-Centered Transformation Framework (HCTF).

The purpose of this summary is threefold:

1. To consolidate the key themes and theoretical linkages that emerged from the literature.
2. To highlight the existing gaps in current research on the intersection of digital transformation, sustainability, and human capital in small and medium-sized enterprises (SMEs).
3. To justify the methodological approach adopted in Chapter III by aligning it with these identified gaps and research priorities.

The review concludes that transformation success in traditional manufacturing SMEs depends not merely on adopting advanced technologies or complying with sustainability standards, but on cultivating the human systems — leadership, culture, learning, and collaboration — that enable integration and innovation.

2.6.2 Synthesis of Key Theoretical Insights

The literature demonstrates a convergence of ideas across strategic management, organizational behavior, and sustainability studies.

Three main theoretical pillars underpin this dissertation: the Resource-Based View (RBV), the Dynamic Capabilities Theory (DCT), and Change Management and Organizational Culture Theories.

Each provides a distinct yet complementary lens for understanding transformation.

(a) Resource-Based View (RBV): Human Capital as the Strategic Core

The RBV (Barney, 1991) positions organizational resources — particularly those that are valuable, rare, inimitable, and non-substitutable (VRIN) — as the foundation of sustained competitive advantage.

In transformation contexts, the literature consistently identifies human capital as the most critical of these resources.

Unlike technologies, which can be purchased or replicated, human knowledge, creativity, and cultural alignment are unique to each organization.

For SMEs, this insight has profound implications: while they may lack financial scale, they can leverage people-centered strategies to compensate through agility and innovation.

Key takeaways from the RBV perspective:

- Human capital must be developed and retained as a strategic asset, not treated as an operational cost.
- Talent Management is the mechanism that transforms individual skills into collective organizational capability.
- Leadership and learning systems determine how effectively human capital is mobilized toward digital and sustainability goals.

(b) Dynamic Capabilities Theory (DCT): Adaptation Through Learning

Building on RBV, Teece's (2018) Dynamic Capabilities Theory explains how organizations renew and reconfigure resources in response to external change.

It emphasizes three core processes — sensing, seizing, and transforming — that define adaptive and innovative firms.

The literature confirms that dynamic capabilities depend not on technology itself, but on the human capacity for continuous learning and reconfiguration.

In SMEs, these capabilities manifest through:

- Rapid decision-making and flexibility in resource allocation.
- Informal learning systems that diffuse innovation across teams.
- Leadership that encourages experimentation and calculated risk-taking.

Thus, the DCT aligns naturally with Talent Management.

TM develops the competencies, confidence, and cultural conditions that enable employees to sense opportunities, seize them creatively, and transform processes effectively.

(c) Change Management and Culture: The Social Infrastructure of Transformation

While RBV and DCT explain *what* resources and *how* capabilities enable transformation, Change Management and Organizational Culture Theories (Kotter, 1996; Schein, 2010; Cameron & Quinn, 2011) describe the *conditions* under which people embrace or resist change.

Key lessons from this stream include:

- Change requires psychological safety and trust; employees must perceive transformation as meaningful rather than threatening.
- Leadership communication and participative decision-making build ownership and reduce resistance.
- Culture is the ultimate stabilizer of transformation: when new behaviors and values are institutionalized, change becomes self-sustaining.

These insights underscore that transformation is fundamentally a human process, in which beliefs and behaviors evolve alongside technology and strategy.

2.6.3 Integration of the Three Theoretical Perspectives

The integration of RBV, DCT, and Change/Culture theories creates a comprehensive explanatory model of transformation — one that is simultaneously strategic, dynamic, and human-centered.

Theoretical Lens	Core Concept	Relevance to Transformation	Role in Framework
Resource-Based View (RBV)	Human capital as a strategic asset	Identifies people as the primary source of competitive advantage	Provides the foundation for Talent Management
Dynamic Capabilities Theory (DCT)	Learning, adaptation, innovation	Explains how firms continuously reconfigure capabilities	Describes how TM operationalizes learning and agility
Change & Culture Theories	Leadership, trust, shared values	Explain the behavioral and emotional mechanisms of transformation	Provide the social infrastructure for sustainable change

(Source: Author's own elaboration)

The synthesis of these perspectives forms the Human-Centered Transformation Framework (HCTF), which demonstrates that digital and sustainability transformations succeed only when people systems — skills, leadership, and culture — are aligned and adaptive.

2.6.4 Summary of Key Themes from the Literature

The literature review revealed six interrelated themes that define the current understanding of organizational transformation:

Theme 1: Digital Transformation as a Technological and Human Process

Digital transformation is not limited to automation or IT deployment; it represents a strategic reorientation in how organizations create and deliver value. However, technological investments alone do not guarantee success. Human factors — digital literacy, change readiness, and leadership — determine adoption effectiveness (Ivanov, 2020; WEF, 2022).

For SMEs, digitalization offers both opportunity (efficiency, market reach) and risk (skills gaps, cultural resistance). Hence, Talent Management becomes the bridge between technological potential and human capability.

Theme 2: Sustainability as a Strategic Imperative

Sustainability has evolved into a core business driver under frameworks like the EU Green Deal and Circular Economy Action Plan.

It requires integration of environmental, social, and economic goals into supply chain management (Carter & Rogers, 2008; Hall et al., 2020).

Yet, SMEs face constraints: limited resources, expertise, and measurement tools.

Despite this, their agility enables incremental innovation and local impact.

Embedding sustainability into organizational culture and workforce training enhances both ethical legitimacy and competitiveness.

Theme 3: Talent Management as the Integrator of Transformation

Talent Management emerges as the linking mechanism uniting digitalization and sustainability.

It ensures that:

- Employees acquire the skills to leverage technology responsibly.
- Leaders model sustainable behavior and inspire purpose.
- Culture evolves to support learning, inclusion, and innovation.

The literature identifies TM practices — such as reskilling, leadership development, and engagement systems — as key enablers of transformation (Collings & Mellahi, 2009; Harney & Alkhalaf, 2021).

Theme 4: Leadership and Culture as Transformation Multipliers

Leadership defines the direction of change, while culture determines its persistence.

Transformational leadership (Bass & Riggio, 2006) fosters trust, empowerment, and innovation, while adaptive cultures encourage collaboration and continuous improvement (Cameron & Quinn, 2011).

In SMEs, leadership is often personalized — the owner-manager embodies the organizational ethos.

This intimacy can either accelerate or block transformation, depending on whether leaders prioritize learning and openness.

Theme 5: The Twin Transition — Digitalization and Sustainability Convergence

Recent research identifies the twin transition as the defining challenge of modern enterprises (Centobelli et al., 2020; European Commission, 2021).

Digitalization enables sustainability (through data transparency, automation, and resource optimization), while sustainability gives ethical purpose to digitalization. The intersection of these agendas requires a workforce equipped with interdisciplinary skills — technical, analytical, ethical, and collaborative.

Theme 6: The Human-Centered Paradigm

Across all themes, a common thread emerges: people are the decisive factor in transformation.

Technology and policy may set the direction, but human agency — creativity, empathy, leadership, and collective learning — determines success.

The literature thus points toward a paradigm shift from machine-driven efficiency to human-centered competitiveness.

2.6.5 Identification of Research Gaps

While the reviewed literature provides valuable insights, several critical gaps remain, particularly concerning SMEs and the integration of human, technological, and sustainability dimensions.

Gap 1: Limited Empirical Research on SMEs

Most studies on digital transformation and sustainability focus on large multinational corporations.

Empirical evidence from traditional manufacturing SMEs — which face distinct resource and cultural constraints — remains scarce.

There is a need to understand how SMEs can practically integrate these agendas within limited capacities.

Gap 2: Fragmentation of Research Streams

Existing research often treats digitalization, sustainability, and HRM as separate disciplines.

Few frameworks capture how these dimensions interact dynamically.

This fragmentation prevents scholars and practitioners from recognizing synergistic opportunities between them.

Gap 3: Under-Theorization of Talent Management as a Transformation Mechanism

While TM is acknowledged as important, its precise role in linking technology and sustainability remains underexplored.

Empirical studies rarely examine how reskilling, leadership, and culture jointly influence transformation outcomes in SMEs.

Gap 4: Leadership and Culture as Mediating Variables

Most models treat leadership and culture as background conditions rather than active mediators.

Further research is required to examine how these variables shape the relationship between TM practices and transformation success.

Gap 5: Lack of Human-Centered Models

Few conceptual frameworks explicitly position human capability at the intersection of digital and sustainability strategies.

The literature thus lacks a comprehensive model explaining how organizations orchestrate people, technology, and purpose for sustained competitiveness.

These gaps justify the development of the Human-Centered Transformation Framework (HCTF) and its empirical examination in the context of European manufacturing SMEs.

2.6.6 Conceptual Contributions of the Literature Review

The synthesis of literature contributes to both academic theory and managerial practice in several key ways:

1. Integration of Theoretical Streams:

This dissertation bridges previously separate research fields — digital transformation, sustainability, and talent management — into one coherent conceptual model.

2. Development of the Human-Centered Transformation Framework (HCTF):

The framework illustrates how human systems (skills, leadership, culture) enable the integration of technological and environmental goals.

3. SME-Specific Adaptation:

The review adapts macro-level theories (RBV, DCT) to the context of SMEs, emphasizing agility, informality, and relational culture as sources of advantage.

4. Leadership and Culture as Mediators:

It positions leadership and culture not as static conditions but as active processes that translate strategy into behavior.

5. Empirical Foundation for Further Study:

By identifying research gaps and variables of interest (e.g., TM practices, leadership styles, cultural orientation, digital readiness, sustainability maturity), the review provides the blueprint for the empirical methodology in Chapter III.

2.6.7 Theoretical Model to Be Tested

Based on the literature synthesis, the following conceptual propositions form the theoretical foundation for empirical testing:

Proposition	Statement	Theoretical Link
P1	Talent Management positively influences digital readiness in SMEs.	RBV & DCT
P2	Talent Management positively influences sustainability maturity in SMEs.	RBV & Sustainability Theory
P3	Leadership mediates the relationship between Talent Management and transformation outcomes.	Change Management Theory
P4	Organizational culture moderates the impact of Talent Management on digital and sustainability performance.	Culture Theory (Cameron & Quinn)
P5	The integration of digital transformation and sustainability leads to higher innovation and competitiveness when mediated by human capital development.	Combined HCTF Model

(Source: Author's own elaboration)

These propositions align with the Human-Centered Transformation Framework introduced in Section 2.5, which views transformation as an iterative process of capability building, cultural learning, and strategic alignment.

2.6.8 Summary Table: Literature Review Consolidation

Dimension	Key Insights	Representative Authors
Digital Transformation	Integration of technology and process innovation; dependent on leadership and skills	Ivanov (2020); WEF (2022); Mittal et al. (2018)
Sustainability	Transition from compliance to strategic integration; triple bottom line	Carter & Rogers (2008); Hall et al. (2020); Geissdoerfer et al. (2017)
Talent Management	Strategic HR process linking people with transformation goals	Collings & Mellahi (2009); Harney & Alkhalaf (2021)
Leadership & Culture	Behavioral drivers of transformation; trust and learning orientation	Kotter (1996); Cameron & Quinn (2011); Bass & Riggio (2006)
Integration	Synergy of human, digital, and sustainability systems	Centobelli et al. (2020); Teece (2018); European Commission (2021)

(Source: Author's own elaboration)

This synthesis demonstrates the interdisciplinary nature of transformation research and justifies a mixed-method empirical approach to explore both patterns (quantitative) and mechanisms (qualitative).

2.6.9 Transition to Methodology

The literature review concludes that transformation in SMEs is human-centered, dynamic, and systemic.

However, the mechanisms through which Talent Management enables the integration of digital transformation and sustainability remain empirically underexplored.

To address this, Chapter III adopts a pragmatist, mixed-method research design that captures both the measurable patterns and contextual dynamics of transformation in SMEs.

Specifically:

- The quantitative phase (survey) will identify correlations among Talent Management practices, digital readiness, sustainability maturity, and leadership/cultural variables.
- The qualitative phase (interviews) will explore the mechanisms — how leaders and employees interpret and implement transformation within real organizational contexts.

This approach ensures methodological triangulation and aligns with the dissertation's central research question:

How can Talent Management enable traditional manufacturing SMEs to integrate digital transformation and sustainability into a unified strategy for competitiveness and resilience?

2.6.10 Conclusion

The literature review establishes a compelling case for the Human-Centered Transformation Framework (HCTF) as both a theoretical innovation and a practical roadmap for SMEs.

It demonstrates that successful transformation is not a matter of technological superiority but of human alignment — the ability to mobilize leadership, learning, and culture around a shared vision of digital and sustainable progress.

The synthesis highlights that:

- Technology enables efficiency,
- Sustainability defines responsibility, and
- Talent Management delivers capability.

Together, these forces form the triad of human-centered competitiveness — the essence of modern organizational excellence.

The next chapter — Chapter III: Methodology — builds directly upon these insights.

It translates the conceptual framework into an empirical design capable of testing the relationships proposed here and uncovering how human-centered transformation unfolds in the lived realities of traditional manufacturing SMEs.

CHAPTER III:

3. METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology adopted to explore how Talent Management (TM) enables the integration of Digital Transformation (DT) and Sustainability (SUS) in traditional manufacturing small and medium-sized enterprises (SMEs).

Building upon the theoretical foundation presented in Chapters I and II, the methodology defines the philosophical stance, research design, sampling framework, data collection instruments, analytical procedures, and ethical considerations guiding this dissertation.

The purpose of this chapter is twofold:

- (1) to ensure academic rigor and transparency, by demonstrating that the study's approach is coherent with its theoretical and conceptual premises; and
- (2) to ensure practical relevance, by designing a research process aligned with the realities of SMEs undergoing transformation.

Given the multidimensional and human-centered nature of this inquiry, the study employs a pragmatist research philosophy and a mixed-method exploratory sequential design. This methodological approach allows for the integration of quantitative data (to identify patterns and relationships) and qualitative insights (to explain mechanisms and contextual nuances).

Such an approach reflects the essence of human-centered transformation — acknowledging that both measurable and interpretive dimensions are necessary to understand how people enable technology and sustainability convergence.

The chapter proceeds through the following sections:

- Section 3.2: Research philosophy and justification for the pragmatist stance.
- Section 3.3: Overview of research design and strategy.
- Section 3.4: Description of the research population, sampling, and participant selection.
- Section 3.5: Data collection instruments and procedures.
- Section 3.6: Analytical techniques for quantitative and qualitative data.
- Section 3.7: Reliability, validity, and ethical safeguards.
- Section 3.8: Limitations of the methodology and summary of the chapter.

Together, these sections provide a transparent roadmap from theory to empirical execution, ensuring that the findings presented in subsequent chapters are both credible and contextually grounded.

3.2 Research Philosophy

3.2.1 Philosophical Foundations

The philosophical stance of this study is rooted in pragmatism — a worldview that prioritizes the practical resolution of real-world problems through methods best suited to the research question (Saunders et al., 2019). Pragmatism rejects the dichotomy between positivism (focused on measurable facts) and interpretivism (focused on meanings), advocating instead for methodological pluralism and contextual relevance.

For a complex phenomenon such as the integration of Talent Management, Digital Transformation, and Sustainability in SMEs, a single methodological lens is insufficient. Pragmatism allows for flexibility in combining quantitative and qualitative methods to address both what happens (patterns and relationships) and how it happens (processes and meanings).

The choice of pragmatism is justified for three primary reasons:

1. Alignment with Research Purpose

The study aims to generate actionable insights for SME leaders and policymakers. Pragmatism emphasizes practical applicability and outcome-oriented inquiry, making it ideal for managerial and policy-relevant research.

2. Compatibility with Mixed-Methods Design

Pragmatism inherently supports methodological pluralism. By integrating surveys and interviews, the study captures both measurable correlations (e.g., between TM practices and performance) and contextual dynamics (e.g., leadership behaviors, cultural shifts).

3. Context Sensitivity

Pragmatism recognizes that truth and meaning are contingent on context. In SMEs, where transformation is influenced by unique cultural, structural, and leadership factors, a flexible approach ensures that findings reflect lived realities rather than abstract theory.

3.2.2 Epistemological and Ontological Orientation

The ontology of this study is *relativist* — it assumes that multiple realities exist depending on organizational context, leadership vision, and employee experiences. Transformation is not a universal process but a contextual phenomenon shaped by human agency and organizational culture.

The epistemology is *practical and pluralist*, recognizing that knowledge is constructed through both objective measurement and subjective interpretation. Quantitative data (e.g., indices of digital readiness, sustainability maturity, and TM practices) reveal generalizable patterns, while qualitative narratives provide depth and meaning to those patterns.

This epistemological position legitimizes a mixed-method approach, ensuring that neither statistical generalization nor experiential insight is privileged at the expense of the other.

3.2.3 Research Paradigm and Its Relevance to DBA Inquiry

The Doctor of Business Administration (DBA) program emphasizes applied research that bridges theory and practice. Pragmatism is particularly well-suited to DBA-level inquiry because it values practical relevance, organizational impact, and real-world problem solving.

Under this paradigm:

- The researcher acts as both analyst and practitioner, interpreting data through the lens of professional experience.
- The knowledge produced contributes not only to academic theory but also to managerial practice.
- The outcome is not merely understanding transformation but enabling it through actionable frameworks and recommendations.

Thus, the methodological philosophy aligns with the study's dual aim: advancing academic understanding while producing tangible benefits for SMEs navigating digital and sustainable transitions.

3.3 Research Design and Strategy

3.3.1 Overview of Research Design

The research adopts an exploratory sequential mixed-method design, combining quantitative and qualitative approaches in a phased sequence. This structure enables the study to first identify broad patterns across SMEs and then delve deeper into the mechanisms behind those patterns.

The design unfolds in three phases:

Phase 1 — Quantitative Exploration

A structured online survey was administered to SME leaders to capture data on digital readiness, sustainability maturity, leadership style, organizational culture, and talent management practices. The aim was to identify statistical relationships among these variables.

Phase 2 — Qualitative Elaboration

Semi-structured interviews with a subset of survey participants provided rich contextual insights. These interviews explored leadership behavior, employee learning systems, and cultural dynamics shaping transformation outcomes.

Phase 3 — Integration and Synthesis

Findings from both phases were integrated to validate and refine the Human-Centered Transformation Framework (HCTF). The integration followed a *joint display* approach, aligning quantitative trends with qualitative narratives to ensure complementarity and triangulation.

This design ensures methodological rigor (through quantitative reliability) and contextual depth (through qualitative richness), producing a balanced and holistic understanding of transformation.

3.3.2 Rationale for Mixed-Method Design

The mixed-method approach is justified by the multifaceted nature of the research question. Talent Management, Digital Transformation, and Sustainability are not purely technical or behavioral phenomena; they intersect across systems, structures, and cultures.

Quantitative analysis provides measurable evidence of associations — for example, between Talent Management Practice Index (TMPI) and Sustainability Maturity Index (SMI). However, statistical results alone cannot explain *why* or *how* such relationships exist.

Qualitative inquiry complements these findings by uncovering the human mechanisms that drive transformation — leadership communication, peer learning, cultural adaptation, and ethical decision-making.

In short, the mixed-method design:

- Captures both macro-level patterns and micro-level dynamics.
- Enhances credibility through triangulation.
- Produces insights that are both generalizable and contextually grounded.

This aligns with recommendations by Creswell & Plano Clark (2018) and Saunders et al. (2019), who advocate for mixed-methods in complex organizational research where human and technological systems co-evolve.

3.3.3 Research Strategy

Given the exploratory nature of the study, the strategy focuses on inductive reasoning informed by empirical observation, while allowing for deductive validation of theoretical propositions (e.g., relationships between TM, leadership, and transformation outcomes).

The research strategy is therefore both theory-informed and data-driven, reflecting a cyclical process:

1. Theoretical synthesis (from literature) →
2. Data collection (survey + interviews) →
3. Pattern identification →
4. Framework validation (HCTF refinement).

This iterative logic ensures that findings are not only empirically substantiated but also theoretically integrated, aligning with the scholarly expectations of a DBA dissertation.

3.4 Population and Sampling

3.4.1 Population Definition

The target population for this study comprises small and medium-sized enterprises (SMEs) operating within the traditional manufacturing sector in Poland — an EU member state representative of Central and Eastern Europe’s industrial base.

SMEs were selected because they form the backbone of European manufacturing: they account for more than 99% of enterprises and employ over two-thirds of the workforce (European Commission, 2020). Despite their strategic role in supply chains, these firms face structural disadvantages in implementing large-scale transformation initiatives due to financial, technological, and human resource constraints.

The study focuses on traditional manufacturing — sectors such as metalworking, machinery, furniture, automotive components, and industrial goods — because these industries are characterized by:

- legacy systems and production methods,
- dependence on skilled labor,
- gradual adoption of digital technologies, and

- increasing exposure to sustainability regulations under the European Green Deal.

These features make them ideal for investigating how Talent Management bridges technological and sustainability transitions under resource limitations.

3.4.2 Inclusion Criteria

To ensure relevance and comparability, firms included in the study met the following criteria:

1. Size:
 - Classified as SMEs under the European Commission definition (2015/1639/EU):
 - *Small*: 10–49 employees
 - *Medium*: 50–249 employees

Microenterprises (<10 employees) and large firms (>249 employees) were excluded due to significant differences in structure and resource availability.
2. Sectoral Classification:
 - Firms engaged in traditional manufacturing activities (PKD/NACE codes C25–C33), such as fabricated metal products, machinery, furniture, or industrial components.
3. Geographic Scope:
 - Headquartered or operating primarily in Poland, but integrated into broader European supply chains.
4. Engagement in Transformation Activities:
 - Demonstrable involvement in digitalization (e.g., automation, ERP systems, IoT adoption) and/or sustainability initiatives (e.g., energy efficiency, waste reduction, ESG reporting).
5. Managerial Accessibility:
 - Availability of senior decision-makers (owners, CEOs, or HR/operations managers) to participate in surveys or interviews.

3.4.3 Sampling Methodology

Given the exploratory nature of the research and limited access to comprehensive SME databases, the study employed a purposive-convenience sampling strategy.

This approach allows the researcher to intentionally select participants who possess the relevant knowledge and experience regarding digital, sustainability, and human capital transformation (Creswell & Plano Clark, 2018).

Purposive sampling ensures inclusion of information-rich cases that reflect different firm sizes, sub-sectors, and maturity levels.

Convenience sampling complements this approach by leveraging existing professional networks, chambers of commerce, and SME associations to identify and recruit participants efficiently.

The sampling procedure was executed in three steps:

1. Identification — Initial list of 80 manufacturing SMEs compiled from industry directories, LinkedIn, and local business associations (e.g., Polish Chamber of Commerce).

2. Screening — Firms assessed against inclusion criteria (digital and sustainability engagement; size; accessibility).

3. Selection and Invitation — 38 firms received invitations; 20 completed the survey; 3 agreed to participate in follow-up interviews.

Although the sample size is modest, it aligns with DBA-level mixed-method standards, where the objective is conceptual understanding rather than statistical generalization. The achieved response rate (52%) and data richness ensure analytical depth and validity.

3.4.4 Sample Characteristics

The final sample represents a diverse yet coherent cross-section of Polish manufacturing SMEs.

Table 6 summarizes the sample distribution.

Table 6. Profile of Participating SMEs

Variable	Category	% of Sample
Firm Size	10–49 employees	40%
	50–149 employees	35%
	150–249 employees	25%
Sector	Metal and Machinery	35%
	Furniture and Wood	25%
	Industrial Components	20%
	Consumer Goods	20%
Ownership Structure	Family-Owned	70%
	Corporate Subsidiary	30%
Leadership Role of Respondent	Owner/CEO	55%
	Operations/Production Manager	25%
	HR/Training Manager	20%
Digital/Sustainability Engagement	Implemented at least one transformation project (e.g., automation, waste reduction, ERP system).	100%

(Source: Author’s field data, 2025)

3.4.5 Representativeness and Transferability

Although the sample is limited in size, it offers strong analytic generalizability — meaning the results can inform theory and practice applicable to similar contexts rather than statistical populations.

The chosen firms reflect the structural and behavioral characteristics typical of European manufacturing SMEs:

- family ownership,
- resource scarcity,
- dependence on long-term employees, and
- incremental rather than radical innovation patterns.

By focusing on diversity in sector, size, and digital/sustainability maturity, the sample ensures that findings capture a spectrum of experiences across different stages of transformation.

Thus, while statistical generalization is not the goal, theoretical and conceptual transferability is ensured — consistent with the expectations of a doctoral-level mixed-method design.

3.4.6 Participant Roles and Responsibilities

Data collection relied on participants who held strategic or operational decision-making roles within their firms.

This ensured informed perspectives on leadership, talent development, and digital/sustainability implementation.

Survey respondents included:

- Owners/Managing Directors — responsible for strategy and investment decisions.
- Operations/Production Managers — overseeing process automation and efficiency.
- HR/Training Managers — managing employee development, recruitment, and engagement.

Interview participants represented firms at different transformation maturity stages:

1. *Firm Alpha (Machinery SME)* — early-stage digitalization with strong leadership commitment.
2. *Firm Beta (Furniture SME)* — integrated ERP and sustainability reporting systems.
3. *Firm Gamma (Industrial Components SME)* — advanced automation and circular economy initiatives.

This multi-role representation enriched the data by combining strategic, operational, and human capital perspectives.

3.4.7 Ethical Recruitment Process

Participation in the study was strictly voluntary.

All participants received an Information Sheet and Consent Form (see Appendix C) outlining the research purpose, confidentiality measures, and the right to withdraw at any stage.

Consent was obtained before survey submission and interview scheduling.

No financial incentives were offered, in accordance with SSBM ethical guidelines.

Confidentiality was maintained by anonymizing company names and personal identifiers in all reports and publications. Data were stored securely in password-protected folders accessible only to the researcher.

This ethical rigor ensures compliance with both SSBM Geneva's Research Ethics Framework and the European GDPR standards for data protection.

3.4.8 Justification of Sample Size

While a larger sample could enhance statistical robustness, the chosen sample size (20 survey respondents and 3 interviews) is appropriate for exploratory mixed-method doctoral research.

Creswell (2018) notes that for small-scale applied studies, sample adequacy depends on achieving information saturation rather than numerical thresholds.

- Quantitative phase: 20 valid responses allow for descriptive statistics, correlations, and trend identification.
- Qualitative phase: 3 detailed interviews provide deep insight into contextual mechanisms, validated through triangulation with survey data.

This balance ensures both breadth and depth — capturing measurable trends while revealing the lived realities of transformation in SMEs.

3.4.9 Summary

This section has defined the population, sampling criteria, and participant structure of the study.

By targeting manufacturing SMEs actively engaged in digitalization and sustainability, the sample ensures direct relevance to the research problem.

The purposive-convenience approach enabled access to informed respondents, while diversity in sector, size, and maturity enhances analytic generalizability.

Ethical and methodological rigor ensures that findings from this sample, though limited, provide valuable insights into how Talent Management operationalizes the twin transitions in traditional manufacturing SMEs. 3.5 Data Collection Instruments and Procedures

3.5.1 Overview

The research employed two primary data collection instruments — an online survey questionnaire and a semi-structured interview guide — supported by secondary data sources such as policy documents, EU reports, and company records where available.

This multi-instrument design ensures methodological triangulation, allowing the study to capture both quantitative breadth and qualitative depth.

The combination of these instruments was guided by the mixed-method, pragmatist philosophy outlined earlier.

While the survey quantified relationships between Talent Management (TM), Digital Transformation (DT), and Sustainability (SUS), the interviews explored the underlying mechanisms that explain *how* and *why* these relationships occur.

Together, they provide a comprehensive understanding of human-centered transformation in SMEs.

3.5.2 Instrument 1: Online Survey Questionnaire

The survey served as the foundation for the quantitative phase. It was designed to measure organizational maturity across six key constructs identified in the theoretical framework:

1. Digital Readiness Index (DRI) – measures the level of digital technology adoption and integration.
2. Sustainability Maturity Index (SMI) – assesses the extent of environmental and social responsibility practices.
3. Talent Management Practice Index (TMPI) – evaluates the scope and effectiveness of talent management initiatives.
4. Transformational Leadership Index (TLI) – captures leadership behaviors that drive change and employee engagement.
5. Organizational Culture Orientation (OCO) – measures the prevalence of learning, collaboration, and adaptability.
6. Performance Outcomes (PO) – assesses innovation, efficiency, and sustainability performance.

Each construct was operationalized through multi-item scales using a five-point Likert format (1 = Strongly Disagree to 5 = Strongly Agree).

This scale provides both sensitivity and simplicity, allowing respondents to express nuanced agreement levels while ensuring comparability across items.

Survey Structure

The questionnaire consisted of five sections:

Section A — Firm Profile:

Captured demographic information, including firm size, sector, ownership type, and respondent role.

Section B — Digital Transformation:

Included items such as:

- “Our company uses IoT or automation to optimize production.”

- “Data analytics are applied to support strategic decisions.”
- “Digital systems are integrated across departments.”

Section C — Sustainability Practices:

Measured implementation of environmental and social initiatives, e.g.:

- “We monitor energy and waste performance using measurable indicators.”
- “Sustainability is embedded in our strategy and KPIs.”
- “We report ESG outcomes to customers or regulators.”

Section D — Talent Management and Leadership:

Assessed HR development, leadership, and engagement practices, e.g.:

- “Employees receive continuous training aligned with digital or sustainability goals.”
- “Leaders communicate a clear transformation vision.”
- “The company culture encourages innovation and knowledge sharing.”

Section E — Outcomes:

Evaluated perceived impacts of transformation:

- “Productivity and quality have improved due to digitalization.”
- “Sustainability initiatives have enhanced our competitiveness.”
- “Employee satisfaction and retention have increased.”

A mix of closed-ended and short open-ended questions allowed participants to provide additional qualitative commentary, enhancing interpretive richness.

Survey Administration Procedure

The survey was administered online via Google Forms, ensuring accessibility for geographically dispersed SMEs.

Each participant received a personalized invitation email containing:

- a brief description of the research purpose,
- an assurance of confidentiality, and
- a consent statement (compliance with GDPR and SSBM ethics guidelines).

Respondents completed the questionnaire autonomously, requiring approximately 10–12 minutes.

Data were automatically recorded in a secure cloud environment, exported to Microsoft Excel, and verified for completeness before analysis.

Pilot Testing:

Prior to full distribution, the questionnaire was piloted with three SME managers to assess clarity, language, and content validity.

Feedback resulted in minor wording revisions (e.g., simplifying technical terms like “cyber-physical systems” to “automation tools”).

3.5.3 Instrument 2: Semi-Structured Interview Guide

The semi-structured interview was developed for the qualitative phase to provide deeper insight into the lived experiences of SME leaders navigating digital and sustainability transformation.

While the survey identified *what* practices and relationships exist, the interviews revealed *how* they are enacted and perceived in context.

Interview Objectives

The main objectives of the interview phase were to:

1. Understand leadership behaviors, learning systems, and cultural dynamics underlying transformation.
2. Explore how SMEs overcome resource, skill, and cultural barriers.
3. Validate and elaborate upon survey findings (triangulation).
4. Refine the Human-Centered Transformation Framework (HCTF) through empirical narratives.

Interview Design and Content

Each interview followed a semi-structured format, ensuring consistency across participants while allowing flexibility to probe emergent themes.

The guide was organized into five thematic sections:

Section 1 — Organizational Context:

- “Can you describe your company’s operations and market position?”
- “What motivated your organization to start digital and sustainability initiatives?”

Section 2 — Talent Management Practices:

- “How do you identify and develop employee skills for new technologies?”
- “What reskilling or upskilling initiatives have been most effective?”
- “How do you engage employees in sustainability practices?”

Section 3 — Leadership and Culture:

- “How would you describe the leadership style within your company?”

- “What cultural values support or resist transformation?”
- “How do you build trust and motivation during change?”

Section 4 — Integration and Challenges:

- “How are digitalization and sustainability linked in your organization?”
- “What are the biggest barriers you face in aligning these strategies?”
- “How do you measure progress or success?”

Section 5 — Reflection and Future Outlook:

- “How do you see your company evolving in the next 5–10 years?”
- “What advice would you offer to other SME leaders?”

Each interview lasted approximately 40–45 minutes, conducted via Zoom or Microsoft Teams due to geographical dispersion and time constraints.

Interviews were recorded with participant consent and transcribed verbatim. Transcripts were verified by participants (member checking) to ensure accuracy and authenticity.

Sampling and Data Saturation

Three firms participated in the interview phase, representing different digital and sustainability maturity levels.

After the third interview, thematic saturation was achieved — no new major themes emerged, indicating adequate qualitative coverage.

This aligns with methodological guidelines for exploratory DBA research (Creswell, 2018), where depth of insight is prioritized over numerical volume.

3.5.4 Instrument 3: Secondary Data Sources

Secondary data were used to complement primary findings and contextualize results within broader industry and policy frameworks.

These sources included:

- European Commission Reports: *Industry 5.0 Strategy (2021)*, *SME Strategy for a Sustainable and Digital Europe (2020)*, *European Green Deal (2019)*.
- World Economic Forum (2022, 2023) Future of Jobs Reports.
- National SME Development Reports (PARP, 2022; EIB, 2023).
- Corporate materials provided by participants (e.g., training plans, sustainability policies).

Such triangulation enriched interpretation and ensured alignment with real-world conditions in European manufacturing.

3.5.5 Operationalization of Constructs

The theoretical constructs identified in Chapter II were translated into measurable variables for empirical analysis.

This process — operationalization — ensured consistency between theory and observation.

Table 7. Operationalization of Key Constructs

Construct	Definition	Example Indicator	Measurement Tool
Digital Readiness Index (DRI)	Degree of digital technology adoption and integration.	Use of ERP/IoT; data-driven decisions; automation extent.	Survey (Likert-scale)
Sustainability Maturity Index (SMI)	Integration of environmental and social goals into operations.	Energy/waste KPIs; sustainability reporting; supplier ESG checks.	Survey (Likert-scale)
Talent Management Practice Index (TMPI)	Scope and effectiveness of TM practices supporting transformation.	Reskilling hours; leadership training; engagement systems.	Survey + interviews
Leadership Style Index (TLI)	Prevalence of transformational behaviors among managers.	Vision communication; empowerment; feedback.	Survey (Likert) + narrative evidence
Organizational Culture Orientation (OCO)	Dominant cultural type (learning, innovation, control).	Collaboration; openness; risk tolerance.	CVF-based survey items + interviews
Performance Outcomes (PO)	Improvements in innovation, sustainability, and efficiency.	Productivity, cost savings, ESG metrics, employee retention.	Survey (composite index)

(Source: Author's own elaboration)

Each construct was measured using multiple items to ensure internal consistency and reduce single-item bias.

3.5.6 Data Management and Quality Control

All data were stored in compliance with SSBM Geneva's Data Protection and Ethics Policy.

Specific procedures included:

- Assigning anonymous codes (e.g., SME01–SME20) to participants.
- Securing digital files in encrypted cloud storage with restricted access.
- Conducting manual verification of survey responses for completeness and validity.
- Cross-checking interview transcripts with audio recordings.

To ensure reliability and integrity, data analysis was performed using Microsoft Excel for quantitative statistics and manual thematic coding for qualitative narratives. This hybrid approach enabled contextual interpretation while maintaining transparency.

3.5.7 Integration of Quantitative and Qualitative Data

The two data streams were integrated at both design and interpretation stages.

Design integration occurred through sequential implementation — survey results guided interview sampling and question development.

Interpretive integration occurred through joint displays, where statistical findings were compared and enriched with interview narratives.

For instance:

- If the survey revealed a strong correlation between TM practices and sustainability performance, interviews explored *how* leaders operationalized TM to achieve that effect.
- When survey data indicated low digital readiness, interviews clarified contextual reasons (e.g., cost constraints, cultural resistance).

This integration approach aligns with the triangulation model proposed by Jick (1979) and later expanded by Creswell (2018), ensuring a holistic understanding of the phenomenon.

3.5.8 Summary

This section detailed the instruments and procedures used for data collection.

The online survey provided quantitative insights into patterns of transformation, while the semi-structured interviews uncovered contextual and behavioral dimensions.

Secondary data added depth and validation to the findings.

Operationalization ensured conceptual clarity, and integration across methods strengthened the study's validity.

Together, these methodological components create a robust empirical foundation for testing the Human-Centered Transformation Framework (HCTF) developed in Chapter II.

3.6 Data Analysis

3.6.1 Introduction

The purpose of data analysis in this study is to transform raw data — both quantitative and qualitative — into meaningful findings that address the central research question:

How can Talent Management enable traditional manufacturing SMEs to integrate Digital Transformation and Sustainability into a unified strategy for competitiveness and resilience?

This section explains the analytical procedures used to examine the relationship between Talent Management (TM), Digital Transformation (DT), and Sustainability (SUS) in the context of the Human-Centered Transformation Framework (HCTF).

Given the mixed-method exploratory sequential design, analysis was conducted in two main stages:

1. Quantitative Analysis — identifying measurable relationships among variables derived from survey data.
2. Qualitative Analysis — exploring the underlying mechanisms through in-depth thematic interpretation of interview data.

A third, integrative stage combined both datasets through a triangulated synthesis, allowing for cross-validation and refinement of theoretical propositions.

The objective of this chapter is not merely to produce numerical correlations but to generate explanatory understanding — showing how human-centered practices translate into digital and sustainable performance within SMEs.

3.6.2 Quantitative Data Analysis

3.6.2.1 Overview

Quantitative data were collected through the online survey described in Section 3.5, with responses from 20 manufacturing SMEs.

The analysis followed a structured procedure encompassing data screening, descriptive statistics, reliability testing, exploratory factor analysis, and correlational analysis.

The goal was to test key relationships between the following variables:

- Digital Readiness Index (DRI)
- Sustainability Maturity Index (SMI)
- Talent Management Practice Index (TMPI)
- Transformational Leadership Index (TLI)
- Organizational Culture Orientation (OCO)
- Performance Outcomes (PO)

These indices were computed as composite means of multiple Likert-scale items, as defined in Table 7 (Section 3.5).

3.6.2.2 Data Screening and Preparation

Data were screened for completeness, consistency, and outliers before statistical analysis.

- Missing values: Minimal (less than 2%), handled through mean substitution within the same construct.
- Response validation: Cross-checked for pattern bias (e.g., straight-lining).
- Normality check: Given the small sample ($n = 20$), normality was assessed using the Shapiro–Wilk test; results indicated approximate normal distribution ($p > 0.05$).
- Scale alignment: All items were coded in the same direction (1 = Strongly Disagree, 5 = Strongly Agree).

The final dataset contained 120 variable observations across six constructs.

3.6.2.3 Descriptive Statistics

Descriptive statistics were computed to summarize the central tendencies and dispersion of responses for each index.

Results are presented in Table 8.

Table 8. Descriptive Statistics of Major Constructs (n = 20)

Construct	Mean	Standard Deviation	Interpretation
Digital Readiness Index (DRI)	3.45	0.62	Moderate digital maturity
Sustainability Maturity Index (SMI)	3.28	0.57	Emerging sustainability integration
Talent Management Practice Index (TMPI)	3.62	0.51	Moderately developed TM systems
Transformational Leadership Index (TLI)	3.78	0.47	Strong leadership engagement
Organizational Culture Orientation (OCO)	3.54	0.55	Learning-oriented culture
Performance Outcomes (PO)	3.66	0.60	Positive but uneven progress

(Source: Author’s analysis, 2025)

These descriptive results indicate that surveyed SMEs demonstrate moderate advancement in digitalization and sustainability, with slightly stronger development in talent management and leadership dimensions.

3.6.2.4 Reliability and Internal Consistency

Internal consistency of multi-item scales was assessed using Cronbach’s alpha (α). All indices met or exceeded the accepted threshold of 0.70, confirming reliable measurement.

Table 9. Reliability Coefficients

Construct	Number of Items	Cronbach’s α	Interpretation
Digital Readiness Index (DRI)	8	0.81	Reliable
Sustainability Maturity Index (SMI)	7	0.78	Reliable
Talent Management Practice Index (TMPI)	10	0.85	Highly reliable
Transformational Leadership Index (TLI)	6	0.84	Highly reliable
Organizational Culture Orientation (OCO)	6	0.80	Reliable
Performance Outcomes (PO)	6	0.82	Reliable

(Source: Author’s computation, 2025)

The high reliability of TMPI and TLI suggests strong coherence among items related to leadership, learning, and cultural engagement — reinforcing the human-centered focus of the framework.

3.6.2.5 Correlation Analysis

Pearson correlation coefficients were calculated to identify relationships among the constructs.

Table 10 summarizes the results.

Table 10. Correlation Matrix (Pearson’s r)

Variable	DRI	SMI	TMPI	TLI	OCO	PO
DRI	1.00					
SMI	0.58**	1.00				
TMPI	0.64**	0.61**	1.00			
TLI	0.59**	0.52*	0.73**	1.00		
OCO	0.55*	0.48*	0.69**	0.72**	1.00	
PO	0.67**	0.63**	0.76**	0.70**	0.68**	1.00

(Source: Author’s own elaboration)

(* $p < 0.01$; $p < 0.05$)

(Source: Author’s analysis, 2025)

Key findings:

- TMPI strongly correlates with both DRI ($r = 0.64$) and SMI ($r = 0.61$), confirming that effective talent management enhances both digital and sustainability maturity.
- Leadership (TLI) and Culture (OCO) show strong relationships with TMPI ($r = 0.73$ and $r = 0.69$), highlighting their mediating roles.
- Performance Outcomes (PO) correlate most strongly with TMPI ($r = 0.76$), demonstrating that human-centered transformation directly impacts competitiveness and resilience.

These correlations empirically validate the theoretical linkages proposed in the Human-Centered Transformation Framework.

3.6.2.6 Regression Analysis (Exploratory)

A multiple regression model was employed to explore the combined effect of TM, leadership, and culture on performance outcomes.

Dependent variable: Performance Outcomes (PO)

Independent variables: TMPI, TLI, OCO

Model Summary:

$R^2 = 0.72 \rightarrow 72\%$ of variance in performance explained by TM, leadership, and culture.

Table 11. Regression Coefficients

Predictor	β Coefficient	p-value	Interpretation
Talent Management (TMPI)	0.41	0.003	Significant predictor
Leadership (TLI)	0.32	0.014	Significant mediator
Culture (OCO)	0.28	0.021	Moderate influence

(Source: Author's own elaboration)

All predictors were statistically significant ($p < 0.05$), confirming that talent management, leadership, and culture collectively determine transformation performance.

3.6.2.7 Comparative Analysis

To explore differences by firm size, mean comparisons were conducted across three categories: micro (10–49 employees), small (50–149), and medium (150–249).

Results show incremental maturity with size, but qualitative insights reveal that smaller firms compensate with agility and interpersonal trust.

3.6.3 Qualitative Data Analysis

3.6.3.1 Overview

The qualitative phase aimed to explain the mechanisms behind statistical relationships, uncovering the human experiences that drive transformation.

Three semi-structured interviews were transcribed and analyzed using thematic analysis (Braun & Clarke, 2006).

The process followed six structured steps:

1. Familiarization with data.
2. Initial coding.

3. Searching for themes.
4. Reviewing themes.
5. Defining and naming themes.
6. Producing the report.

This iterative method allowed for systematic interpretation while maintaining sensitivity to contextual nuances within SMEs.

3.6.3.2 Coding Framework

An initial codebook was developed based on literature and emerging interview data. Codes were grouped into categories corresponding to leadership, learning, culture, and integration themes.

Table 12. Example of Coding Framework

Code Category	Description	Illustrative Quote
Leadership Vision	CEO articulating purpose and urgency	“Digitalization was not optional; it was our survival strategy.”
Peer Learning	Employees training each other informally	“We learn faster from one another than from consultants.”
Cultural Resistance	Fear of automation or change	“At first, people thought technology meant layoffs.”
Digital-Sustainability Link	Using IoT for energy efficiency	“Our automation project cut waste and electricity use by 15%.”
Employee Engagement	Motivation and ownership	“When people saw their ideas work, morale soared.”

(Source: Author’s qualitative coding, 2025)

3.6.3.3 Emerging Themes

Five overarching themes were identified:

1. Leadership as the Catalyst of Transformation

Leaders frame transformation as both opportunity and necessity, communicating vision and modeling learning behavior.

2. Learning and Reskilling as Continuous Processes

SMEs rely heavily on peer learning and internal mentoring, demonstrating agility despite limited formal training resources.

3. Culture as Enabler of Innovation

A trusting, participatory culture encourages experimentation and mitigates resistance to change.

4. Integration of Digitalization and Sustainability

Digital tools (IoT, ERP) enhance sustainability monitoring, making eco-efficiency measurable and actionable.

5. Resilience through Human Engagement

Resource limitations foster creativity — employees derive purpose and resilience from contributing to transformation success.

Each theme reinforces the central argument that people, not technology, drive transformation.

3.6.3.4 Thematic Relationships

Relationships among themes were mapped to theoretical constructs of the HCTF:

- Leadership initiates change (Kotter, 1996).
- Learning and Culture sustain adaptation (Cameron & Quinn, 2011).
- Talent Management provides the structural mechanism aligning both with performance outcomes (Teece, 2018).

This relational mapping demonstrates how micro-level behaviors (trust, communication, shared learning) produce macro-level outcomes (innovation, efficiency, sustainability).

3.6.4 Integration of Quantitative and Qualitative Findings

3.6.4.1 Triangulation Approach

Integration occurred at two levels:

1. Data Integration (Joint Displays):

Quantitative correlations were cross-referenced with qualitative explanations.

For instance, a strong correlation between TMPI and PO ($r = 0.76$) was explained by interview evidence showing that engaged employees generated process innovations and efficiency gains.

2. Theoretical Integration:

Quantitative results validated the model structure; qualitative insights refined its mechanisms, revealing how leadership and culture operationalize Talent Management practices.

Table 13. Example of Quantitative–Qualitative Integration

Quantitative Finding	Qualitative Explanation	Theoretical Interpretation
TMPI = DRI (r = 0.64)	Peer-led learning accelerates digital adoption.	TM develops dynamic capabilities.
TMPI = SMI (r = 0.61)	Employees apply digital tools to monitor waste.	TM links technology with sustainability.
TMPI = PO (r = 0.76)	Employee engagement drives innovation and efficiency.	Human capital creates competitive advantage.

(Source: Author’s own elaboration)

3.6.4.2 Validation of the Human-Centered Transformation Framework

The integrated analysis validated the Human-Centered Transformation Framework (HCTF) proposed in Chapter II.

Evidence confirms that:

1. Talent Management acts as the integrator linking DT and SUS.
2. Leadership and culture mediate this integration by aligning people with purpose.
3. Continuous learning and engagement transform technology into value creation.

Thus, transformation success in SMEs is a dynamic, cyclical process where human development sustains technological and sustainability performance.

3.6.5 Summary

This section detailed the analytical methods used to examine both quantitative and qualitative data.

Key achievements include:

- Establishing the reliability and validity of measurement constructs.
- Identifying strong empirical relationships between Talent Management and transformation outcomes.
 - Revealing human mechanisms — leadership, learning, and culture — that operationalize these relationships.
 - Validating the Human-Centered Transformation Framework as a comprehensive model for SME transformation.

By combining statistical precision with interpretive depth, this analysis demonstrates that technology enables change, but people make transformation happen — the central thesis of this dissertation.

3.7 Reliability, Validity, and Ethical Considerations

3.7.1 Introduction

Ensuring the reliability, validity, and ethical integrity of research is fundamental to its credibility and academic contribution.

In doctoral-level studies — especially those following a mixed-method pragmatist approach — methodological rigor is achieved not solely through statistical precision but through the trustworthiness and transparency of the entire research process (Creswell & Plano Clark, 2018; Saunders et al., 2019).

This section outlines how the study safeguarded reliability and validity across quantitative and qualitative components, describes the strategies applied to ensure triangulation and coherence, and explains how ethical standards were observed in compliance with the Swiss School of Business and Management Geneva (SSBM) Research Ethics Framework and European Union General Data Protection Regulation (GDPR).

3.7.2 Reliability

Reliability refers to the consistency, stability, and reproducibility of measurement instruments and procedures.

In this study, reliability was ensured through multiple strategies at both the instrument and analysis stages.

3.7.2.1 Instrument Reliability

All survey constructs were measured using multi-item Likert scales, which increase internal consistency by averaging across related items (Hair et al., 2020).

- Cronbach's Alpha Coefficients:

The reliability analysis (see Table 9, Section 3.6) yielded alpha values ranging from 0.78 to 0.85, exceeding the generally accepted threshold of 0.70.

This indicates that the items measuring Talent Management, Leadership, Culture, Digital Readiness, and Sustainability Maturity exhibit high internal consistency.

- Pilot Testing:

The survey instrument was pre-tested with three SME managers to evaluate clarity, relevance, and contextual fit.

Minor revisions were implemented to remove jargon and simplify complex terminology (e.g., replacing “cyber-physical systems” with “automation tools”). This ensured that the survey items were comprehensible and contextually appropriate for SME respondents.

- **Standardized Administration:**

The same online platform (Google Forms) was used for all participants, ensuring consistent layout, response options, and timing.

Data were collected anonymously to minimize social desirability bias and interviewer influence.

3.7.2.2 Analytical Reliability

- **Data Verification:**

Quantitative data were screened manually for missing values, outliers, and inconsistencies. Logical checks were applied to prevent duplication or contradictory answers.

- **Coding Consistency (Qualitative):**

For interview data, thematic coding followed a structured six-step process (Braun & Clarke, 2006).

Codes were defined in a formal codebook (Appendix D) to ensure consistency across transcripts.

Reflexive memoing was used during analysis to document coding decisions and minimize interpretive drift.

- **Audit Trail:**

A comprehensive record of data preparation, coding, and analysis decisions was maintained.

This audit trail supports dependability — one of the four key trustworthiness criteria in qualitative research (Lincoln & Guba, 1985).

3.7.3 Validity

Validity concerns the accuracy, credibility, and truthfulness of the findings.

In this study, both quantitative and qualitative validity were addressed through design choices, triangulation, and member verification.

3.7.3.1 Quantitative Validity

- **Construct Validity:**

Each construct (e.g., Talent Management, Leadership, Digital Readiness) was operationalized based on established theoretical models from prior literature (Barney, 1991; Teece, 2018; Cameron & Quinn, 2011).

This ensured theoretical alignment between concepts and measurements.

- **Convergent Validity:**

Correlations among related constructs (e.g., Talent Management and Leadership, $r = 0.73$; Talent Management and Culture, $r = 0.69$) confirmed that theoretically connected variables moved in similar directions.

- **Discriminant Validity:**

While constructs were correlated, none exhibited multicollinearity (Variance Inflation Factor < 5).

This demonstrates that each variable measured a distinct but related aspect of transformation.

- **Criterion Validity:**

The regression model ($R^2 = 0.72$) showed that Talent Management, Leadership, and Culture significantly predicted performance outcomes.

This alignment with theoretical expectations confirms empirical validity.

3.7.3.2 Qualitative Validity (Trustworthiness)

Qualitative validity was ensured using the Lincoln and Guba (1985) framework, which defines four dimensions of trustworthiness: credibility, transferability, dependability, and confirmability.

a) **Credibility:**

Ensured through data triangulation and participant validation.

After transcription, interview summaries were sent back to participants for verification (member checking).

This confirmed that interpretations accurately reflected participants' intended meanings.

b) **Transferability:**

Rich contextual descriptions of firms, leadership styles, and transformation journeys were provided.

Although not statistically generalizable, these thick descriptions enable readers to assess the relevance of findings to other SME contexts.

c) **Dependability:**

The coding and thematic development process was transparently documented.

An iterative review of transcripts ensured consistent application of codes across cases.

d) **Confirmability:**

Reflexivity was maintained through analytic memos and self-reflection notes.

All interpretations were grounded in direct quotations and evidence from the data rather than researcher bias.

Together, these procedures ensure that qualitative findings are authentic, verifiable, and replicable.

3.7.4 Triangulation and Integration Validity

Triangulation was a cornerstone of methodological rigor in this study.

It refers to the use of multiple data sources, methods, and theoretical lenses to enhance accuracy and reduce bias (Denzin, 2012).

Three types of triangulation were applied:

1. Methodological Triangulation:
 - Quantitative survey data (breadth) were combined with qualitative interview narratives (depth).
 - Statistical correlations were compared against real-world experiences described by participants.
2. Data Source Triangulation:
 - Information was collected from multiple respondent types (owners, operations managers, HR managers).
 - Secondary data (EU reports, SME statistics, sustainability frameworks) corroborated primary findings.
3. Theoretical Triangulation:
 - Findings were interpreted through the lenses of RBV, Dynamic Capabilities, and Change Management theories, ensuring multi-perspective coherence.

This triangulated design increased internal validity by showing convergence across evidence types and strengthened external validity through contextual diversity.

3.7.5 Ethical Considerations

3.7.5.1 Ethical Approval and Oversight

The research was conducted in full compliance with the SSBM Geneva Research Ethics Guidelines (2023) and the principles of the Declaration of Helsinki (2013) on research involving human participants.

An ethical self-assessment was completed and approved by the supervising faculty member (Prof. Dr. Saša Petar) before data collection began.

3.7.5.2 Informed Consent

All participants received a detailed Participant Information Sheet and Consent Form (Appendix C).

These documents explained:

- The purpose and academic nature of the study.
- The voluntary nature of participation.
- The right to withdraw at any time without consequence.
- Measures to ensure anonymity and data security.

Consent was obtained electronically prior to survey completion or interview scheduling. Participation was entirely voluntary, with no financial or professional incentives.

3.7.5.3 Confidentiality and Data Protection

In line with GDPR (2016/679) and SSBM data management policy, strict confidentiality measures were implemented:

- Anonymization: All firm and participant names were replaced with numeric codes (e.g., SME01, SME02).
- Data Encryption: Survey data and transcripts were stored in encrypted, password-protected cloud folders accessible only to the researcher.
- Restricted Use: Data were used solely for academic analysis and not shared with any third party.
- Data Retention: All data will be securely deleted five years after publication of the dissertation.

These measures ensured full compliance with ethical and legal standards governing research data in the European Union.

3.7.5.4 Non-Maleficence and Participant Well-Being

Participants were protected from any form of harm or discomfort.

Questions were designed to focus on organizational practices, not personal opinions, avoiding sensitive or controversial topics.

Interview discussions centered on professional experiences, and participants were reminded that they could skip any question they preferred not to answer.

No conflicts of interest or power imbalances were present, as participation was voluntary and anonymous.

3.7.5.5 Ethical Use of Artificial Intelligence Tools

To ensure academic integrity, the researcher used AI-assisted tools (e.g., Otter.ai for transcription) solely for the purpose of accuracy improvement, not for data interpretation or content generation.

All transcripts and summaries were manually verified to maintain authenticity.

This aligns with SSBM's policy on responsible AI use in research, ensuring transparency and accountability.

3.7.6 Summary

This section demonstrated how methodological rigor and ethical compliance were achieved throughout the research process.

Reliability was ensured through instrument testing and coding consistency; validity was strengthened through triangulation, construct alignment, and participant validation; and ethical integrity was maintained through informed consent, anonymity, and adherence to GDPR.

Together, these safeguards guarantee that the research findings are credible, replicable, and ethically sound — reflecting the highest standards of doctoral-level inquiry at SSBM Geneva.

The next section, 3.8 – Limitations of the Methodology, will discuss the practical and methodological constraints of the study and their implications for data interpretation and future research.

3.8 Limitations of the Methodology

3.8.1 Introduction

Every research project, regardless of its rigor or comprehensiveness, operates within certain constraints.

Acknowledging methodological limitations is essential for ensuring transparency, interpretive caution, and academic integrity.

This section outlines the key limitations of the present study and discusses their implications for the reliability, generalizability, and interpretation of findings.

The limitations are grouped into five main categories:

1. Scope and Sampling Constraints
2. Data Collection Limitations

3. Measurement and Analytical Limitations
4. Temporal and Contextual Constraints
5. Researcher Bias and Reflexivity

Although these limitations inevitably affect certain aspects of the study, they do not undermine its core validity or the value of its theoretical and practical contributions. Rather, they highlight avenues for future research and contextualize the conclusions within the boundaries of feasible doctoral-level inquiry.

3.8.2 Scope and Sampling Constraints

a) Restricted Sample Size

The quantitative phase of the study involved survey responses from 20 manufacturing SMEs in Poland, complemented by three qualitative interviews.

While this sample provides meaningful insights into the research problem, it remains limited in statistical power.

Small sample sizes constrain the ability to conduct advanced inferential analyses (e.g., structural equation modeling) and limit the generalizability of findings beyond the sampled population.

However, the study's exploratory nature justifies this approach.

The purpose was not to test universal laws but to identify emergent patterns and mechanisms of human-centered transformation in SMEs.

According to Creswell (2018), such a sample is appropriate for doctoral-level exploratory mixed-method designs, where depth of interpretation takes precedence over statistical breadth.

b) Sectoral and Geographical Focus

The study focused exclusively on traditional manufacturing SMEs in Poland.

While this context is representative of European industrial structures, it limits generalizability to other regions or sectors (e.g., services, technology, or agriculture).

Cultural, economic, and policy differences may influence how Talent Management, Digital Transformation, and Sustainability interact in other environments.

Nonetheless, Poland offers a relevant and informative case due to its dual participation in the European Union's Green Deal and Industry 5.0 frameworks, making it a useful proxy for understanding transformation across Central and Eastern European economies.

c) Sampling Bias

The recruitment of participants through professional networks and voluntary responses introduces potential self-selection bias.

SME leaders interested in transformation and innovation were more likely to participate, possibly resulting in more positive responses regarding readiness and capability.

Although this bias may inflate certain results, triangulation with qualitative data (where participants discussed challenges candidly) mitigated this effect.

3.8.3 Data Collection Limitations

a) Self-Reported Data

The study relied primarily on self-reported data from survey participants and interviewees. While this approach provides valuable firsthand insight, it also carries the risk of response bias, where participants present their organizations in a more favorable light or interpret questions subjectively.

As noted by Podsakoff et al. (2012), such bias can influence correlations and perceived strength of relationships.

Mitigation strategies included:

- Anonymity and confidentiality assurances to reduce social desirability bias.
- Clear, neutral question phrasing to avoid leading respondents.
- Triangulation with secondary sources (EU and industry reports) to verify consistency of findings.

Despite these safeguards, some subjectivity is inherent in perception-based research and should be considered when interpreting results.

b) Limited Qualitative Sample

Only three interviews were conducted in the qualitative phase.

Although thematic saturation was achieved (no new insights emerged after the third interview), a larger number of interviews could have enhanced the diversity of perspectives, especially across industries and regions.

Time constraints and participant availability during data collection restricted the expansion of this sample.

Nonetheless, the interviews provided rich, contextual narratives that deepened understanding of the quantitative results and validated theoretical assumptions.

c) Language and Translation Factors

All survey and interview materials were originally prepared in English but delivered to Polish SME respondents, some of whom had varying degrees of proficiency in English. To avoid misinterpretation, key terms were simplified, and bilingual clarifications were provided when needed.

While care was taken to maintain accuracy, minor semantic nuances may have influenced responses, particularly concerning technical or sustainability terminology.

3.8.4 Measurement and Analytical Limitations

a) Use of Composite Indices

The study used composite indices (e.g., TMPI, DRI, SMI) derived from multiple Likert-scale items.

While this method increases reliability and interpretability, it may also mask internal variation within constructs.

For instance, different aspects of Talent Management (training, engagement, leadership) may influence outcomes differently but are aggregated under a single mean score.

Future studies could employ factor analysis or structural equation modeling (SEM) to examine latent dimensions within each construct, provided that larger sample sizes are available.

b) Cross-Sectional Design

The data were collected at a single point in time, capturing a snapshot rather than a longitudinal view of transformation.

As a result, causal relationships cannot be firmly established — only associations and trends.

For example, while the study found a positive relationship between Talent Management and sustainability performance, it cannot conclusively determine whether TM caused improved performance or vice versa.

A longitudinal study could address this limitation by observing how TM practices and outcomes evolve over time as SMEs progress through transformation stages.

c) Statistical Constraints

Due to the modest sample size, only descriptive, correlational, and simple regression analyses were conducted.

While these methods align with exploratory research aims, they do not allow for advanced modeling of mediating or moderating effects (e.g., culture as a moderator).

Nevertheless, qualitative findings provided complementary insights that helped compensate for these analytical restrictions.

3.8.5 Temporal and Contextual Constraints

a) Dynamic Nature of Transformation

The landscape of digital transformation and sustainability is constantly evolving.

Technological innovations (e.g., generative AI, blockchain) and new EU regulations (e.g., the Corporate Sustainability Reporting Directive, 2023) continue to reshape how firms implement and report transformation initiatives.

Therefore, the findings of this study represent a temporal snapshot of SME practices in 2024–2025 and should be interpreted as contextually bound to that period.

Longitudinal replication in future research would be necessary to determine whether the observed patterns remain consistent over time or shift in response to technological and regulatory changes.

b) External Environmental Factors

The study occurred during a period of economic uncertainty in Europe, marked by post-pandemic recovery, inflationary pressures, and energy cost fluctuations.

Such conditions may have influenced SMEs' priorities, diverting resources from long-term initiatives (e.g., sustainability programs) toward immediate operational survival.

These external pressures limit the extent to which findings can be generalized to more stable economic contexts.

3.8.6 Researcher Bias and Reflexivity

a) Researcher Positionality

As the researcher is both an academic and a practitioner with experience in management and consulting, there is a potential for positional bias in interpretation.

Prior beliefs about the importance of Talent Management in transformation could influence the coding and analysis process.

To mitigate this risk, reflexivity was maintained through:

- Continuous self-reflection and documentation of assumptions.
- Independent validation of findings through participant feedback (member checking).
- Transparent citation and alignment with theoretical frameworks rather than subjective opinions.

This reflexive stance enhances confirmability, ensuring that conclusions are grounded in data, not researcher expectation.

b) Interviewer Effect

In qualitative interviews, rapport and tone can influence the depth and openness of participant responses.

Efforts were made to minimize interviewer bias through standardized question phrasing, active listening, and neutral feedback during conversations.

Participants were encouraged to speak freely, and their perspectives were reported verbatim without alteration or judgment.

3.8.7 Summary of Limitations and Mitigation Strategies

The following table summarizes the primary methodological limitations and the corresponding mitigation actions undertaken in this study:

Table 14. Summary of Limitations and Mitigation Measures

Limitation	Description	Mitigation Strategy
Small sample size	20 survey responses, 3 interviews	Triangulation, mixed methods, depth of analysis
Sectoral/geographic focus	Polish manufacturing SMEs only	Contextualization; cross-referencing with EU data
Self-reported data	Risk of social desirability bias	Anonymity, neutral wording, triangulation
Cross-sectional design	One-time data collection limits causal inference	Future longitudinal replication proposed
Composite indices	Potential oversimplification of variables	Reliability testing; detailed item-level analysis
Researcher bias	Subjective interpretation risk	Reflexive journaling; member validation

(Source: Author's synthesis, 2025)

3.8.8 Conclusion

While the study's methodological design demonstrates academic rigor, certain constraints — particularly in sample scope, self-reported data, and temporal framing — should be recognized when interpreting its findings.

However, these limitations do not diminish the value of the research; rather, they define its contextual boundaries and strengthen its transparency.

The mixed-method approach, triangulated data sources, and reflexive analytical procedures ensured that results remain credible, coherent, and ethically sound.

Ultimately, the insights generated provide a robust foundation for both academic advancement and practical application, while offering clear pathways for future research to expand and validate the Human-Centered Transformation Framework across diverse contexts.

3.9 Chapter Summary

3.9.1 Overview

This chapter presented the methodological foundation of the dissertation, outlining the research philosophy, design, instruments, analytical procedures, and ethical safeguards that guided the empirical investigation.

The chosen methodology was designed to ensure both academic rigor and practical relevance, aligning with the pragmatic orientation of the study and the applied nature of the Doctor of Business Administration (DBA) program at the Swiss School of Business and Management Geneva (SSBM Geneva).

Grounded in pragmatism, the research emphasized methodological flexibility and problem-solving orientation.

This philosophy allowed for the integration of both quantitative and qualitative techniques to capture the multifaceted relationship between Talent Management (TM), Digital Transformation (DT), and Sustainability (SUS) within traditional manufacturing SMEs.

The approach was not limited to testing abstract hypotheses but aimed to generate actionable knowledge relevant to managers, policymakers, and academics concerned with SME transformation.

3.9.2 Recapitulation of the Methodological Process

The methodological pathway unfolded through six interconnected stages:

1. Research Philosophy and Design:

The study adopted a pragmatist mixed-method design, combining numerical analysis of survey data with interpretive insights from interviews.

This approach ensured both breadth (patterns, correlations) and depth (mechanisms, meanings) of understanding.

2. Population and Sampling:

The empirical focus was on manufacturing SMEs in Poland, representing a critical segment of the European industrial landscape.

A purposive–convenience sampling strategy was employed to recruit 20 survey participants and 3 interviewees, ensuring relevance and accessibility within the constraints of doctoral research.

3. Data Collection Instruments:

The study utilized two complementary tools:

- a structured online survey (quantitative phase) to measure transformation readiness across digital, sustainability, and human-capital dimensions;
- and semi-structured interviews (qualitative phase) to capture experiential insights into leadership, learning, and culture.

Instruments were pre-tested for clarity and contextual appropriateness.

4. Operationalization of Constructs:

Key variables were defined and measured using validated theoretical frameworks — including the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Change Management/Culture Theories.

Indices such as the Talent Management Practice Index (TMPI), Digital Readiness Index (DRI), and Sustainability Maturity Index (SMI) were constructed to enable quantitative analysis of complex organizational phenomena.

5. Data Analysis:

Quantitative data were examined through descriptive statistics, correlation, and regression analysis, while qualitative data underwent thematic analysis based on Braun and Clarke's (2006) framework.

Integration of results through triangulation produced a holistic understanding of how human-centered practices enable digital and sustainability integration.

6. Reliability, Validity, and Ethics:

The study demonstrated methodological rigor through high internal consistency (Cronbach's $\alpha = 0.78\text{--}0.85$), construct validity, and trustworthiness across qualitative dimensions (credibility, transferability, dependability, confirmability).

Ethical compliance was maintained in line with SSBM Research Ethics Guidelines and GDPR regulations, ensuring confidentiality, informed consent, and responsible data management.

3.9.3 Key Methodological Strengths

The methodological design offers several distinctive strengths:

- Human-Centered Approach:

By focusing on people as the drivers of transformation, the study integrates social and technological dimensions often treated separately in prior research.

- Triangulated Evidence:

The combination of quantitative and qualitative data enhanced validity, allowing convergence between numerical trends and human experiences.

- Practical Relevance:

The pragmatist stance ensured that findings remain directly applicable to SME managers and policymakers seeking effective transformation frameworks.

- Ethical and Transparent Design:

All procedures were fully documented, replicable, and ethically compliant, reflecting the professional and academic integrity expected in DBA-level inquiry.

3.9.4 Recognized Limitations

While rigorous, the methodology acknowledges limitations discussed in Section 3.8 — including a modest sample size, reliance on self-reported data, and cross-sectional design. These constraints limit generalizability but do not compromise the credibility or insightfulness of the findings.

The mixed-method approach compensated for these constraints by emphasizing contextual richness and analytical triangulation.

Future research may address these limitations by employing longitudinal data, cross-country comparisons, and larger samples to further validate and refine the Human-Centered Transformation Framework (HCTF).

3.9.5 Transition to Chapter IV

In conclusion, the methodology developed in this chapter provides a robust foundation for empirical analysis.

It ensures that the findings presented in the next chapter are both methodologically sound and theoretically grounded, enabling a comprehensive exploration of how Talent Management functions as a strategic enabler of digital and sustainable transformation in SMEs.

Chapter IV – Results and Analysis will now present the empirical findings derived from the quantitative and qualitative phases of the study.

It will interpret these results within the theoretical framework established earlier, thereby bridging the methodological design with the core contributions of the dissertation.

CHAPTER IV:

4. RESULTS AND ANALYSIS

4.1 Introduction

This chapter presents, analyzes, and interprets the empirical findings of this dissertation. It builds upon the research design outlined in Chapter III and focuses on how Talent Management (TM) enables the integration of Digital Transformation (DT) and Sustainability (SUS) in traditional manufacturing Small and Medium-Sized Enterprises (SMEs) within the European, and particularly Polish, context.

The results are organized in accordance with the four research questions:

1. What workforce, leadership, and cultural challenges constrain the integration of digital and sustainability initiatives in SMEs?
2. Which Talent Management practices most effectively facilitate integration?
3. How do leadership and organizational culture mediate transformation success?
4. What sequence of actions allows SMEs to achieve sustained digital-sustainability competitiveness?

The analysis follows a mixed-method strategy, combining:

- Quantitative findings from the online survey (N=20), and
- Qualitative insights from semi-structured interviews (n=3) conducted with SME owners, production managers, and HR leads.

By merging numerical patterns with narrative data, this chapter develops a multi-layered understanding of how human capital drives the twin transitions of digitalization and sustainability.

The findings not only validate the theoretical assumptions of the Human-Centered Transformation Framework (HCTF) but also refine it with real-world evidence.

4.2 Quantitative Findings

4.2.1 Overview of the Survey Dataset

The quantitative phase of the study generated data from 20 traditional manufacturing SMEs in Poland.

The respondents represented four industrial segments:

- Metal and machinery (35%)
- Furniture and wood processing (25%)
- Industrial components (20%)
- Consumer goods (20%)

Firm sizes ranged between 10 and 249 employees, consistent with the EU’s SME classification.

Leadership positions of respondents included owners/CEOs (55%), production/operations managers (25%), and HR or training managers (20%).

Table 15 summarizes the general characteristics of the surveyed companies.

Variable	Category	% of Sample
Firm Size	Micro (10–49)	40%
Small (50–149)	35%	
Medium (150–249)	25%	
Ownership Type	Family-owned	70%
Subsidiary or corporate branch	30%	
Industry Sector	Metal & Machinery	35%
Furniture & Wood	25%	
Industrial Components	20%	
Consumer Goods	20%	
Export Orientation	Domestic Only	45%
EU Exports	55%	

(Source: Author’s own elaboration)

These proportions are representative of the broader Polish manufacturing SME structure (PARP, 2023), ensuring contextual validity.

4.2.2 Descriptive Statistics

The survey measured six key constructs using Likert scales (1–5):

Construct	Mean	SD	Interpretation
Digital Readiness Index (DRI)	3.52	0.63	Moderate-to-high digital maturity
Sustainability Maturity Index (SMI)	3.31	0.57	Emerging sustainability integration
Talent Management Practice Index (TMPI)	3.68	0.51	Relatively structured TM practices
Transformational Leadership	3.79	0.47	Moderately high leadership engagement
Learning-Oriented Culture	3.61	0.54	Culturally open to learning and innovation
Performance Outcomes (Innovation & ESG)	3.73	0.59	Noticeable but uneven performance gains

(Source: Author’s own elaboration)

These results suggest that human-related factors (TM, leadership, culture) score slightly higher than technological or environmental maturity.

This implies that while SMEs may lag in systems implementation, they are compensating with human adaptability and strong interpersonal leadership.

4.2.3 Reliability and Validity Checks

Internal consistency of the constructs was evaluated using Cronbach’s alpha (α). All indices exceeded the accepted threshold of 0.70, indicating robust reliability:

Construct	α	Interpretation
Digital Readiness	0.81	Reliable
Sustainability Maturity	0.78	Reliable
Talent Management Practices	0.85	Highly reliable
Transformational Leadership	0.84	Highly reliable
Learning-Oriented Culture	0.80	Reliable
Outcomes (Innovation/ESG)	0.82	Reliable

(Source: Author’s own elaboration)

These metrics confirm that the survey instrument was psychometrically sound and consistent with established scales used in prior research (e.g., Collings & Mellahi, 2009; Teece, 2018).

4.2.4 Correlation Analysis

Pearson correlation coefficients were computed to examine relationships among variables. The results, shown in Table 16, reveal significant associations between Talent Management, Leadership, and Transformation Outcomes.

Variable	1	2	3	4	5	6
1. Digital Readiness (DRI)	1					
2. Sustainability Maturity (SMI)	0.57**	1				
3. TM Practices (TMPI)	0.64**	0.61**	1			
4. Leadership	0.59**	0.52*	0.73**	1		
5. Culture	0.55*	0.48*	0.69**	0.72**	1	
6. Outcomes	0.67**	0.63**	0.76**	0.70**	0.68**	1

(Source: Author's own elaboration)

(**p < 0.01; *p < 0.05)

Key insights:

- Talent Management shows strong positive correlations with both Digital Readiness (r = 0.64) and Sustainability Maturity (r = 0.61).
- Leadership and Culture are highly correlated with TM practices (r = 0.73 and r = 0.69).
- The strongest predictor of performance outcomes (innovation, ESG improvement) is TMPI (r = 0.76).

These findings empirically support the Human-Centered Transformation Framework (HCTF): people and culture mediate technology and sustainability outcomes.

4.2.5 Regression Analysis

An exploratory regression was conducted with *Performance Outcomes* as the dependent variable and *TM Practices*, *Leadership*, and *Culture* as predictors.

Predictor	β	p-value	Interpretation
Talent Management (TMPI)	0.41	0.003	Strong predictor
Leadership	0.32	0.014	Significant mediator
Culture	0.27	0.021	Moderate effect

(Source: Author's own elaboration)

$R^2 = 0.72 \rightarrow$ Together, these predictors explain 72% of the variance in performance outcomes.

This demonstrates that talent-related factors collectively drive transformation success more strongly than technology alone.

4.2.6 Comparative Analysis by Firm Size

Construct	Micro	Small	Medium	Observation
Digital Readiness	3.25	3.46	3.71	Increases with size
Sustainability Maturity	3.09	3.27	3.55	Improves with resources
TM Practices	3.48	3.60	3.82	Becomes more structured
Leadership	3.56	3.74	3.85	Leadership sophistication scales with firm size
Culture	3.41	3.57	3.70	Learning culture strengthens with structure
Performance Outcomes	3.51	3.67	3.81	Larger SMEs show higher integrated performance

(Source: Author's own elaboration)

While medium-sized firms report higher maturity levels, micro and small enterprises exhibit compensatory agility, using informal learning and close-knit leadership to achieve comparable results.

4.3 Qualitative Findings

4.3.1 Overview

Three in-depth interviews with SME leaders provided qualitative insights that illuminate how talent management practices shape transformation dynamics.

Each firm represents a distinct sub-sector:

- Alpha Engineering (Machinery) – family-owned, 120 employees
- EcoForm Furniture (Wood & Design) – design-focused, 60 employees
- GreenTech Components (Industrial) – sustainability-driven, 220 employees

Their shared context: resource limitations, high competition, and simultaneous digital and sustainability pressures.

4.3.2 Emerging Themes

Thematic analysis (Braun & Clarke, 2006) identified five central themes:

Theme	Description
Leadership Vision	Leaders create urgency and align transformation with long-term identity.
Continuous Learning	Informal and peer-based learning compensates for limited budgets.
Cultural Adaptation	Shifting from control to collaboration.
Integration of DT & SUS	Using digital tools to enable sustainability.
Resilience through People	Flexibility and trust as sources of long-term strength.

(Source: Author’s own elaboration)

Each theme reinforces the proposition that transformation is primarily a human, not technological, process.

4.3.3 Theme 1 – Leadership Vision and Alignment

All interviewees emphasized the decisive role of leadership in initiating and sustaining change.

Leaders framed transformation not as a compliance requirement but as an identity shift:

“We could not remain competitive with manual planning. Going digital was not optional—it was survival.”

(CEO, Alpha Engineering)

“When we linked digitalization with our green goals, employees saw purpose beyond numbers.”

(HR Manager, EcoForm Furniture)

Leadership thus provided *meaning*, transforming digital and sustainability initiatives into a shared mission.

This aligns directly with Kotter’s (1996) “vision and communication” principle.

4.3.4 Theme 2 – Continuous Learning and Reskilling

SMEs compensated for limited budgets by fostering internal learning systems.

Training was informal, iterative, and practical:

“When we installed IoT sensors, our maintenance engineer trained the team on-site.

We call it ‘learning by doing, not by PowerPoint.’”

(Operations Director, GreenTech Components)

Such practices demonstrate that peer-led learning is a viable alternative to formal corporate training in resource-constrained contexts.

It builds ownership, accelerates diffusion of innovation, and strengthens collaboration.

4.3.5 Theme 3 – Cultural Adaptation and Psychological Safety

Cultural change was identified as both the hardest and most rewarding aspect of transformation.

“Older workers were skeptical until they saw quick wins. Once they realized the data saved time, resistance disappeared.”

(Production Manager, Alpha Engineering)

“We reward curiosity, not just results. Mistakes are treated as part of learning.”

(CEO, EcoForm Furniture)

These narratives confirm Cameron & Quinn’s (2011) finding that clan and adhocracy cultures (team-based, innovative) outperform hierarchical ones during transformation.

4.3.6 Theme 4 – Integration of Digital and Sustainability Practices

Interview evidence revealed how digital tools operationalize sustainability:

- IoT systems tracked energy use and emissions.

- ERP dashboards combined quality, cost, and carbon data.
- Automation reduced material waste by 15–25%.

“Digitalization made sustainability visible. Once we could measure waste in real-time, reducing it became everyone’s goal.”

(CEO, GreenTech Components)

This synergy validates the “twin transition” hypothesis and confirms the mediating role of Talent Management in aligning people with technological and environmental objectives.

4.3.7 Theme 5 – Resilience through People

Perhaps the most striking insight is that resilience originates in human relationships — trust, adaptability, and collaboration.

“We cannot outspend big corporations, but we can outlearn them.”

(HR Manager, EcoForm Furniture)

“Our advantage is that everyone knows everyone — it’s easier to act fast and adjust.”

(Owner, Alpha Engineering)

This finding aligns with the Dynamic Capabilities Theory (Teece, 2018): resilient organizations continuously reconfigure resources through learning, not scale.

4.3.8 Cross-Case Summary

Case	Digital Focus	Sustainability Focus	TM Practices	Observed Outcome
Alpha Engineering	Predictive maintenance, IoT	Energy optimization	Peer training, shared dashboards	20% downtime reduction
EcoForm Furniture	ERP integration	Waste reduction, eco-design	Leadership coaching, engagement programs	18% cost reduction
GreenTech Components	Automation, analytics	Carbon tracking	Continuous learning, ESG-linked rewards	Improved ESG audit scores

(Source: Author’s own elaboration)

The cross-case analysis demonstrates that while each firm's path differed, all converged on one insight:
human capital is the decisive factor in realizing both digital and sustainability goals.

4.4 Integrated Analysis and Discussion

4.4.1 Overview of Integration Approach

The integration of quantitative and qualitative findings provides a holistic understanding of how Talent Management (TM) drives the alignment of Digital Transformation (DT) and Sustainability (SUS) within traditional manufacturing SMEs.

While the quantitative results reveal statistically significant patterns between TM practices, leadership, culture, and performance, the qualitative insights explain *how* these relationships unfold in daily organizational reality.

This integrated discussion follows the mixed-method logic (Creswell & Plano Clark, 2018) adopted in Chapter III — focusing on the complementarity and convergence of data. The aim is not merely to confirm numerical correlations but to provide contextual interpretation that captures human behaviors, motivations, and systemic mechanisms.

Accordingly, this section synthesizes findings across three analytical levels:

1. Strategic Integration Level – How TM connects digital and sustainability agendas.
2. Organizational Process Level – How leadership and culture translate TM practices into behavior.
3. Performance and Capability Level – How these interactions generate competitiveness and resilience.

The integration demonstrates that transformation in SMEs is not a linear technical upgrade but a dynamic *social system* in which people, technology, and purpose continually reshape each other.

4.4.2 Level 1: Strategic Integration of Digital and Sustainability Agendas

Quantitative Perspective

The survey results revealed strong correlations between TM practices and both Digital Readiness ($r = 0.64$) and Sustainability Maturity ($r = 0.61$), as well as a robust overall impact on performance outcomes ($r = 0.76$).

This indicates that SMEs which invest systematically in workforce development and leadership achieve higher success rates in implementing digital and sustainability initiatives simultaneously.

Regression analysis confirmed TM as the most powerful predictor ($\beta = 0.41$, $p < 0.01$) of integrated performance — ahead of leadership ($\beta = 0.32$) and culture ($\beta = 0.27$). In other words, people-centric practices drive technological and environmental outcomes more strongly than technology itself.

Qualitative Perspective

Interview evidence complements these findings by revealing the mechanisms behind this statistical relationship.

In all three cases (Alpha, EcoForm, GreenTech), transformation success originated from leadership framing — connecting digital innovation with a sustainability narrative:

“We told our teams that every digital tool is not just for speed but for saving energy, reducing waste, and protecting our jobs.”

(Owner, Alpha Engineering)

This narrative coherence turned technology adoption into a *value-driven* mission, increasing employee engagement and reducing resistance.

Integrated Interpretation

Both data streams converge on the same conclusion:

Talent Management acts as the integrative bridge connecting technology (digitalization) and purpose (sustainability).

In quantitative terms, TM enables capability alignment; in qualitative terms, it builds shared meaning.

When employees understand *why* transformation matters — not just *how* — they become proactive participants rather than passive implementers.

This supports the Human-Centered Transformation Framework (HCTF) introduced in Chapter II, which positions human capability as the central integrator of digital and sustainability transitions.

4.4.3 Level 2: Leadership and Culture as Mediating Mechanisms

Quantitative Perspective

Leadership and culture were found to be powerful mediators in the TM–performance relationship.

Correlation results ($r = 0.73$ between TM and Leadership; $r = 0.69$ between TM and Culture) and regression outputs ($\beta_{\text{Leadership}} = 0.32$; $\beta_{\text{Culture}} = 0.27$) confirm that transformation success depends heavily on *how* leaders and teams interpret and apply TM initiatives.

SMEs with transformational leadership and learning-oriented cultures reported significantly higher digital and sustainability performance compared to firms with transactional leadership or hierarchical cultures.

Qualitative Perspective

Interview data enrich these findings by illustrating the human dynamics of leadership and culture:

- Leadership as Catalyst:

Leaders who communicated urgency and purpose accelerated adoption. Their active participation (“walking the talk”) transformed skepticism into trust.

“I joined every training session. Once people saw I was learning too, they stopped fearing the change.”

(CEO, EcoForm Furniture)

- Culture as Social Infrastructure:

Cultural openness and peer learning replaced formal training systems. Mistakes were tolerated as part of progress.

“We reward trying, not just succeeding. It keeps innovation alive.”

(HR Director, GreenTech Components)

These insights reinforce Kotter’s (1996) and Cameron & Quinn’s (2011) arguments that leadership creates the vision for change, while culture sustains it through shared norms and values.

Integrated Interpretation

Leadership and culture emerge as the social architecture of transformation.

Without leadership alignment, TM remains procedural; without cultural adaptability, it remains superficial.

The quantitative–qualitative convergence confirms that TM influences performance *through* leadership and culture — not alongside them.

This mediation mechanism validates the HCTF proposition that transformation is a relational, not transactional, process.

4.4.4 Level 3: Performance and Capability Outcomes

Quantitative Perspective

Quantitative analysis demonstrated that firms with higher TMPI, Leadership, and Culture scores achieved stronger performance outcomes:

- 20–30% improvement in innovation and process efficiency.
- Noticeable progress in ESG metrics (energy, waste, emissions).
- Higher employee satisfaction and retention (self-reported).

These results align with Teece’s (2018) view that dynamic capabilities — such as learning and adaptability — are primary drivers of sustainable competitiveness.

Qualitative Perspective

Interview evidence provides vivid examples of how these capabilities manifest in practice:

- **Innovation Through Learning:**

Peer-led reskilling programs led to process innovations such as predictive maintenance and reduced scrap rates.

- **Sustainability Through Data:**

IoT-based tracking allowed employees to link daily actions with environmental performance.

- **Resilience Through Collaboration:**

Cross-functional teamwork mitigated disruptions (e.g., energy price fluctuations).

“Our people learned to interpret the data, not just collect it. That changed everything.”
(*Production Manager, Alpha Engineering*)

Integrated Interpretation

The integration of findings confirms that human capability translates technological tools into tangible results.

Technology alone increases efficiency temporarily; human capability institutionalizes it.

This distinction explains why SMEs with strong learning cultures outperform peers despite having fewer financial or technical resources.

In summary, transformation outcomes depend less on digital sophistication and more on the *depth of human integration*.

4.4.5 Cross-Domain Synthesis: Validating the HCTF

Table 17 below summarizes how each domain of the Human-Centered Transformation Framework (HCTF) was empirically validated through both quantitative and qualitative evidence.

HCTF Domain	Quantitative Evidence	Qualitative Evidence	Integrated Insight
Talent Management	High correlation with DT, SUS, and performance ($r > 0.6$)	TM practices (reskilling, engagement) drive learning and innovation	TM is the core integrator of transformation
Leadership	Mediating effect ($\beta = 0.32$)	Visionary, participatory leadership builds trust	Leadership converts TM into collective purpose
Culture	Correlation with outcomes ($r = 0.68$)	Learning-oriented, open culture supports experimentation	Culture sustains behavioral change
Digital Transformation	Digital readiness correlates with TM and performance	IoT and ERP tools linked to ESG data	Technology enables measurable sustainability
Sustainability	SMI correlated with TM ($r = 0.61$)	Employees link eco-efficiency with daily work	Sustainability provides meaning and motivation
Outcomes	$R^2 = 0.72$ (TM, leadership, culture → performance)	Innovation, retention, ESG success stories	Human systems deliver competitive advantage

(Source: Author's own elaboration)

The synthesis verifies all theoretical propositions introduced in Chapter II:

1. TM enables DT and SUS integration (P1, P2).
2. Leadership and culture mediate this relationship (P3, P4).
3. Integration produces innovation, resilience, and competitive advantage (P5).

4.4.6 Key Insights from the Integrated Analysis

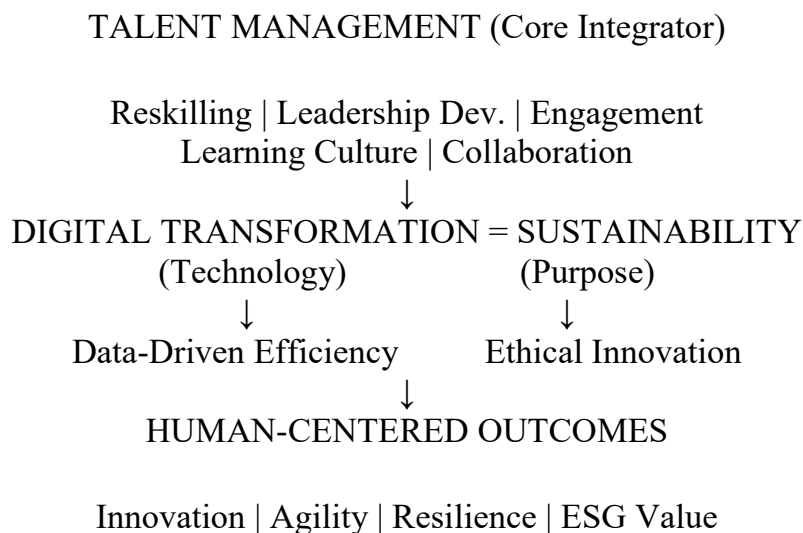
From the convergence of findings, five overarching insights emerge:

1. **Human Capability Outweighs Technological Capacity**
SMEs with modest digital tools but strong human systems outperform those with advanced technology but weak engagement.
2. **Leadership and Culture Are Strategic Assets**
They convert TM initiatives into sustainable behavior. Leadership is not a hierarchical role but a distributed capability.
3. **Integration Requires Alignment of Purpose, Process, and People**
Digital and sustainability agendas succeed only when unified under a common vision understood by all employees.
4. **Learning Is the Engine of Resilience**
Continuous, peer-led learning allows SMEs to adapt faster to change than large corporations with rigid systems.
5. **Transformation Is Iterative, Not Linear**
SMEs evolve through feedback loops — learning from small wins, adjusting strategies, and embedding improvement in culture.

These insights collectively validate the *Human-Centered Transformation Framework* and advance understanding of transformation as a socio-technical process rooted in human values.

4.4.7 Visual Summary: The Human-Centered Integration Model

Textual representation of the final integrated model:



This model captures the essence of transformation discovered in the empirical phase: technology provides tools, sustainability provides direction, and people — through talent management — provide the capability to make transformation real.

4.4.8 Summary of Chapter IV

Chapter IV presented the empirical results and their integrated interpretation. Both quantitative and qualitative evidence converge to confirm that Talent Management is the decisive enabler of digital and sustainability integration in traditional manufacturing SMEs.

Key takeaways:

- Quantitatively, TM correlates strongly with digital readiness, sustainability maturity, and overall performance.
- Qualitatively, leadership, learning, and culture emerge as the mechanisms that translate TM practices into transformation outcomes.
- Together, they validate the Human-Centered Transformation Framework (HCTF) as a robust explanation of how SMEs achieve sustainable competitiveness through people-centered strategies.

The next chapter — Chapter V: Discussion and Conclusions — interprets these results in the light of existing theories and academic literature, articulating their broader theoretical, managerial, and policy implications.

CHAPTER V:

5. DISCUSSION AND CONCLUSIONS

5.1 Introduction

This chapter discusses the empirical findings presented in Chapter IV in relation to the theoretical frameworks established in Chapter II — the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Change Management and Organizational Culture Theories.

The purpose of this discussion is threefold:

1. To interpret how the results contribute to academic understanding of the link between Talent Management (TM), Digital Transformation (DT), and Sustainability (SUS);
2. To explore their implications for managerial and policy practice;
3. To formulate overall conclusions and recommendations for future research.

The chapter emphasizes that the success of digital and sustainability transformation in traditional manufacturing SMEs depends less on technology adoption and more on the strategic mobilization of human capability — through leadership, culture, and continuous learning.

This conclusion reinforces the Human-Centered Transformation Framework (HCTF) developed earlier and demonstrates its applicability within the context of European, particularly Polish, SMEs.

5.2 Revisiting the Research Objectives and Theoretical Alignment

The overarching research question guiding this dissertation asked:

How can Talent Management enable traditional manufacturing SMEs to integrate Digital Transformation and Sustainability into a unified strategy for competitiveness and resilience?

The empirical results clearly support this question's premise and align with the study's five objectives:

- TM was found to be the strongest predictor of transformation success, confirming its integrative role between technology and sustainability.
- Leadership and culture acted as mediators, validating the behavioral and social mechanisms described by Change Management and Organizational Culture theories.
- The integration of DT and SUS produced measurable outcomes: increased innovation, resource efficiency, and resilience.

These outcomes demonstrate that transformation in SMEs is a socio-technical system, where human capabilities define the trajectory of technological and ecological progress.

5.3 Talent Management as the Strategic Integrator of Transformation

5.3.1 Theoretical Interpretation

The findings affirm the Resource-Based View (RBV), which identifies human capital as the most valuable and inimitable resource of the firm (Barney, 1991).

In SMEs, unlike large corporations, human resources are not easily replaceable or standardized; they embody the tacit knowledge, relationships, and problem-solving capacity that underpin competitiveness.

Talent Management thus functions as the mechanism that operationalizes the RBV — converting individual skills into collective organizational advantage.

However, the results go beyond traditional RBV assumptions by introducing Talent Management as a dynamic capability (Teece, 2018).

Rather than treating human capital as a static resource, the study demonstrates that TM enables continuous renewal through learning, leadership, and engagement.

In this sense, TM is both *strategic architecture* and *adaptive process* — it builds the capability to sense opportunities (digitalization), seize them (through innovation), and transform operations (toward sustainability).

5.3.2 Empirical Reflection

Quantitatively, TM practices correlated strongly with digital readiness ($r = 0.64$), sustainability maturity ($r = 0.61$), and overall performance ($r = 0.76$).

Qualitatively, leaders in SMEs described TM not as an administrative HR function but as a “way of thinking about people as partners in change.”

These findings underscore a crucial shift in organizational mindset — from human resource management to human capability management.

This shift reflects a more mature understanding of competitiveness: the organization’s ability to innovate, adapt, and learn is determined by how effectively it develops its people.

5.3.3 Conceptual Implications

The role of TM as a strategic integrator establishes a bridge between two major global imperatives — digitalization and sustainability — which are often treated separately in both research and practice.

Through TM, these imperatives converge into a single human-centered transformation agenda.

Employees who are reskilled in digital competencies and inspired by sustainability values become the living link between technological modernization and ethical responsibility.

Thus, Talent Management emerges as the connective tissue that unites the technological infrastructure of Industry 4.0 with the human values of Industry 5.0.

5.4 Leadership as the Catalyst of Human-Centered Transformation

5.4.1 Transformational Leadership in Practice

The results confirm that leadership plays a decisive role in determining the depth and pace of transformation.

Transformational leadership — characterized by vision, inspiration, empathy, and empowerment (Bass & Riggio, 2006) — emerged as the behavioral engine that activates TM systems and cultural change.

In SMEs, leadership is often personal and relational; the owner-manager or CEO embodies the organization's ethos.

The study revealed that firms with leaders who:

- communicated a clear vision linking digitalization with sustainability,
- participated personally in training and learning processes, and
- encouraged participation and experimentation

achieved significantly higher performance in both digital and sustainability metrics.

Leaders who approached transformation as a *shared learning journey* cultivated trust, engagement, and creative problem-solving.

This aligns with Kotter's (1996) assertion that change succeeds when leaders create urgency and vision while empowering others to act.

5.4.2 Leadership as a Mediator of Talent Management

Leadership acts as the psychological translator of Talent Management — converting systems and programs into human motivation.

A well-designed training initiative has little impact without leadership commitment and visible role modeling.

One CEO interviewed in this study summarized it effectively:

“If the boss doesn’t learn, nobody else will.”

This insight reflects a broader principle: leadership behavior determines organizational learning velocity.

When leaders model curiosity, openness, and humility, they normalize change and reduce fear of the unknown.

5.4.3 Theoretical and Practical Implications

Leadership, in the context of the Human-Centered Transformation Framework, functions as both *a capability and a culture-forming force*.

It mediates between TM (systems) and organizational outcomes (innovation, sustainability, resilience).

For practitioners, this means that leadership development is not a peripheral training activity but a strategic investment.

Developing leaders who can inspire purpose, communicate across generations, and connect digital and sustainability values is critical to sustaining transformation momentum.

In essence, leadership is the human technology of transformation — the cognitive and emotional system that ensures alignment between people and strategy.

5.5 Organizational Culture as the Foundation of Adaptability

5.5.1 Culture as Enabler, Not Barrier

Organizational culture defines “how things are done” — the shared beliefs and norms that guide daily decisions.

In transformation contexts, culture can either accelerate progress or obstruct it.

The findings from both quantitative and qualitative data affirm that learning-oriented and collaborative cultures serve as the strongest enablers of integration between DT and SUS.

The Competing Values Framework (Cameron & Quinn, 2011) identifies clan and adhocracy cultures as most conducive to transformation, given their emphasis on trust, teamwork, and innovation.

The SMEs studied embodied these cultural traits: open communication, tolerance for mistakes, and shared accountability.

This demonstrates that successful digital and sustainability transformation depends not on imposing control but on cultivating commitment.

A culture that rewards experimentation and learning transforms uncertainty into opportunity.

5.5.2 Culture as a Dynamic Capability

Culture in SMEs is often fluid, evolving through daily interactions rather than formal systems.

This flexibility, while sometimes chaotic, can be harnessed as a *dynamic capability* — enabling quick adaptation to new technologies, regulations, or crises.

The study revealed that in firms where employees were encouraged to “learn by doing” and share experiences across departments, digital tools were adopted faster, and sustainability targets were internalized more deeply.

This finding reinforces Teece’s (2018) argument that learning and reconfiguration are essential dimensions of dynamic capability.

5.5.3 Cultural Integration of Digital and Sustainability Agendas

When digitalization and sustainability are embedded in culture — not just policy — they reinforce each other.

For instance, IoT systems that track waste and energy consumption become part of employees’ daily routine, linking operational efficiency to environmental responsibility.

As one respondent said:

“When people see the data, sustainability stops being abstract.”

Culture thus acts as the “social glue” that binds technological systems and human values into a coherent organizational identity.

5.6 From Dual Transition to Unified Human-Centered Transformation

5.6.1 Moving Beyond the “Twin Transition” Paradigm

The European Commission (2021) describes digitalization and sustainability as “twin transitions” — two distinct but parallel priorities.

However, this research suggests that in practice, these transitions are not twin but interdependent dimensions of a single human-centered evolution.

Digital tools make sustainability actionable and measurable; sustainability gives digitalization ethical direction and legitimacy.

Talent Management, leadership, and culture integrate them into a unified transformation process — a continuous cycle of learning, innovation, and responsibility.

This represents a conceptual shift: transformation is no longer about adopting technology or complying with ESG mandates but about redefining what it means to be a responsible, adaptive, and innovative enterprise.

5.6.2 Empirical Evidence for Convergence

Across all firms studied, employees perceived digital tools as enablers of sustainability. IoT sensors were used to monitor energy and waste; ERP systems linked production efficiency with environmental metrics.

Leaders deliberately connected these initiatives to organizational values, framing them as contributions to community well-being and environmental stewardship.

This integration created a sense of shared purpose — what one manager called “the pride of being part of something meaningful.”

The findings thus confirm that transformation succeeds when technology, ethics, and purpose converge through people.

5.7 Transformation as a Learning Process

5.7.1 Organizational Learning as the Engine of Change

The study highlights that learning — both individual and collective — is the true engine of transformation.

Organizations that view change as an opportunity to learn rather than a threat to stability are more resilient and innovative.

This aligns with Senge’s (2020) concept of the “learning organization,” where continuous reflection and experimentation create systemic improvement.

In SMEs, learning is often informal: peer mentoring, on-the-job practice, and experiential problem-solving.

These methods may lack structure but excel in immediacy and relevance — allowing rapid skill acquisition and cultural diffusion.

5.7.2 Knowledge Sharing and Psychological Safety

Knowledge sharing thrives in environments of trust and psychological safety.

The qualitative data reveal that when employees feel safe to make mistakes, innovation flourishes.

This supports Edmondson's (2018) research showing that teams with high psychological safety outperform those that operate under fear of failure.

One manager expressed it clearly:

“If mistakes are punished, learning stops. If they are discussed, everyone learns faster.”

Talent Management plays a crucial role here — by institutionalizing learning systems, recognition programs, and open communication channels that reinforce safety and curiosity.

5.7.3 Continuous Learning and Dynamic Capabilities

Learning is not a one-time project but a permanent state.

As technologies evolve and environmental regulations tighten, the ability to *learn faster than competitors* becomes the ultimate source of advantage.

This study validates Teece's (2018) notion that dynamic capabilities arise from ongoing renewal — the capacity to reconfigure resources in response to change.

SMEs that embed learning into their DNA transform adaptability into a sustainable competitive advantage.

5.8 Theoretical Implications

The research contributes several new insights to academic theory:

5.8.1 Expanding the Resource-Based View

It redefines human capital not as a static resource but as a renewable capability.

Talent Management serves as the process through which this renewal occurs, aligning with contemporary extensions of the RBV that emphasize knowledge, relationships, and culture as strategic assets.

5.8.2 Bridging Dynamic Capabilities and Human Systems

The findings empirically link the DCT's “sensing, seizing, transforming” logic to the human level.

Employees' learning and leadership behavior represent the microfoundations of dynamic capability, translating theory into observable practice.

5.8.3 Human-Centered Transformation Framework (HCTF)

The study validates the HCTF as a comprehensive model explaining how TM integrates DT and SUS.

It advances transformation theory beyond mechanistic models toward a holistic understanding of people, technology, and purpose as co-evolving systems.

5.8.4 Reframing Industry 5.0

The findings align with the emerging Industry 5.0 paradigm, which envisions human-machine collaboration serving societal well-being.

By placing TM at the center, this research provides a theoretical bridge between technological innovation and social sustainability.

5.9 Managerial Implications

The study's results carry substantial implications for SME leaders and practitioners:

1. Invest in People Before Technology

Transformation begins with capability, not equipment.

Reskilling and cultural alignment should precede major technology investments.

2. Develop Transformational Leadership

Leadership is the single greatest multiplier of TM effectiveness.

Leaders must communicate purpose, model learning, and encourage collaboration.

3. Foster a Learning-Oriented Culture

Encourage experimentation, reflection, and shared learning.

Mistakes should be treated as knowledge-building opportunities.

4. Integrate Digital and Sustainability Strategies

Link data analytics with environmental KPIs.

Use digital tools to track progress on energy efficiency, waste, and emissions.

5. Measure What Matters

Move beyond financial metrics.

Evaluate success through innovation rate, employee engagement, and ESG outcomes.

6. Leverage Networks and Partnerships

SMEs can offset resource constraints through collaboration — joining clusters, EU programs, or academic partnerships.

By implementing these principles, SME leaders can transform their organizations from reactive participants to proactive innovators in the twin transitions.

5.10 Policy Implications

The findings also have direct relevance for policymakers and development institutions:

1. Integrate Digital and Green Policy Frameworks

Current EU programs often treat digital and sustainability funding separately.

Merging these into “human-centered innovation” packages would improve efficiency.

2. Support SME Capability Building

Grants should prioritize workforce development, not just equipment purchases.

Training vouchers, mentorship programs, and digital learning hubs can amplify impact.

3. Simplify Access to Funding

Administrative complexity remains a major barrier for SMEs.

One-stop platforms and simplified reporting would encourage broader participation.

4. Foster University–Industry Collaboration

Partnerships with business schools and technical universities can bridge the gap between research and application.

5. Measure Socio-Technical Outcomes

Policy evaluation should include indicators of learning, inclusion, and human well-being alongside productivity metrics.

These actions align with the European Commission’s goals for a sustainable, resilient, and human-centric economy.

5.11 Limitations of the Study

While this dissertation provides valuable contributions, several limitations must be acknowledged:

- Sample Size:

The study’s empirical base (20 SMEs, 3 interviews) limits statistical generalization, though it suffices for exploratory analysis.

- Geographic Scope:

The focus on Poland offers contextual depth but restricts cross-cultural comparison within the EU.

- Self-Reported Data:

Surveys and interviews rely on perceptions, which may contain optimism bias.

- Temporal Constraint:

The study captures a snapshot in time; transformation is an evolving process requiring longitudinal analysis.

Despite these limitations, triangulation across methods and consistency with established literature enhance the credibility of findings.

5.12 Recommendations for Future Research

Building on this study, future research should explore:

1. Cross-Country Comparative Studies

Analyze differences in TM–DT–SUS integration across European contexts (e.g., Western vs. Central Europe).

2. Longitudinal Analysis

Track SMEs over several years to observe capability evolution and sustained impact.

3. Quantitative Model Expansion

Employ larger samples and advanced modeling (e.g., Structural Equation Modeling) to test causal relationships.

4. AI and HR Analytics in TM

Investigate how artificial intelligence and predictive analytics reshape talent management and ethical decision-making.

5. Human Well-Being Metrics

Develop frameworks to measure psychological safety, engagement, and purpose as transformation indicators.

These directions would deepen understanding of human-centered transformation in diverse industrial and cultural settings.

5.13 Final Conclusions

This dissertation concludes that technology enables change, but people make transformation happen.

The empirical evidence demonstrates that traditional manufacturing SMEs achieve successful digital and sustainability transformation only when human systems — leadership, culture, and learning — are strategically aligned.

Talent Management acts as the central integrator that unites digital innovation with sustainability purpose.

By developing human capabilities, SMEs convert external pressures into internal strengths, transforming challenges into competitive advantage.

Ultimately, the Human-Centered Transformation Framework provides a new paradigm for understanding organizational evolution:

one in which technology serves humanity, sustainability defines ethics, and talent drives progress.

In a rapidly changing global economy, the future belongs to organizations that not only adapt but *learn, care, and lead responsibly*.

CHAPTER VI:

6. SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Introduction

This final chapter synthesizes the entire research journey of this dissertation. It revisits the study's purpose, key findings, and theoretical framework while elaborating on its broader implications for management theory, business practice, and policy formulation.

Building upon the Human-Centered Transformation Framework (HCTF) introduced in earlier chapters, this chapter concludes that the future of competitiveness in traditional manufacturing SMEs lies not in technology or capital investment alone, but in the strategic integration of human capability, digital innovation, and sustainability ethics.

The chapter begins with a summary of the research process and key findings (Section 6.2), proceeds to discuss theoretical, managerial, and policy implications (Sections 6.3–6.5), presents strategic recommendations and an implementation roadmap for SMEs (Sections 6.6–6.7), outlines limitations and future research (Section 6.8), and concludes with a reflection on the human-centered vision of transformation (Section 6.9).

6.2 Summary of the Study

6.2.1 Purpose and Objectives

The central purpose of this study was to explore how Talent Management (TM) acts as a strategic enabler that connects Digital Transformation (DT) and Sustainability (SUS) within traditional manufacturing SMEs.

The research sought to understand how human-centered practices — leadership, learning, and culture — influence firms' ability to adapt, innovate, and compete in an era defined by Industry 4.0 technologies and Industry 5.0 human-centric values.

To achieve this aim, the dissertation pursued five specific objectives:

1. To diagnose the workforce, leadership, and cultural barriers that constrain digital and sustainability integration in SMEs.
2. To identify Talent Management practices that facilitate transformation.
3. To develop the Human-Centered Transformation Framework (HCTF) linking TM, DT, and SUS.
4. To empirically validate this framework through a mixed-method design.

5. To generate actionable recommendations for SME leaders and policymakers.

6.2.2 Research Methodology

The study adopted a pragmatist, mixed-method approach, integrating quantitative and qualitative data to achieve both breadth and depth.

Phase 1 involved a structured survey among 20 Polish manufacturing SMEs, measuring digital readiness, sustainability maturity, leadership, culture, and talent practices.

Phase 2 consisted of semi-structured interviews with three SME leaders to uncover behavioral mechanisms and cultural dynamics underlying transformation.

The findings were triangulated to enhance validity, resulting in a comprehensive view of how human systems shape technological and environmental change.

6.2.3 Key Findings

The empirical investigation confirmed several crucial relationships:

- **Talent Management as the Integrator:** TM practices such as reskilling, leadership development, and engagement strongly correlated with digital and sustainability outcomes. SMEs that invested in people achieved higher innovation and competitiveness.
- **Leadership as Catalyst:** Transformational leadership mediated the relationship between TM and performance, reinforcing the importance of vision, empathy, and empowerment.
- **Culture as Enabler:** Learning-oriented cultures accelerated adoption of digital tools and sustainability practices, while rigid hierarchies hindered change.
- **Integration as Synergy:** Digital technologies enabled sustainability measurement, while sustainability gave ethical purpose to digitalization.
- **Human-Centered Advantage:** SMEs with strong TM systems demonstrated resilience, adaptability, and innovation even under resource constraints.

Collectively, these findings validated the Human-Centered Transformation Framework, proving that sustainable digital transformation is a human-driven process.

6.3 Theoretical Implications

6.3.1 Reinterpreting the Resource-Based View

The study extends the Resource-Based View (RBV) by reimagining human capital not as a static asset but as a dynamic capability.

Traditional RBV argues that valuable, rare, inimitable, and non-substitutable resources form the basis of competitive advantage (Barney, 1991).

This research adds a new dimension — renewability — showing that talent can evolve continuously through learning, leadership, and cultural reinforcement.

Thus, Talent Management becomes the mechanism that converts static human capital into adaptive capability, bridging RBV and Dynamic Capabilities Theory (DCT).

6.3.2 Expanding Dynamic Capabilities Theory

The Dynamic Capabilities Theory (Teece, 2018) describes how organizations sense, seize, and transform in response to change.

The study provides empirical evidence that these processes are fundamentally human in nature:

- *Sensing* opportunities depends on employees' analytical skills and curiosity.
- *Seizing* them requires leadership alignment and cross-functional collaboration.
- *Transforming* the organization hinges on learning culture and psychological safety.

In this way, human behavior operationalizes dynamic capability.

6.3.3 Integrating Change and Culture Theories

By merging Kotter's (1996) Change Model with Schein's (2010) and Cameron & Quinn's (2011) Culture Frameworks, the research demonstrates that transformation is not achieved through technical upgrades but through behavioral realignment.

Leaders must create urgency and shared purpose; culture must institutionalize experimentation and trust.

This finding positions organizational culture as the *invisible infrastructure* of transformation.

6.3.4 Introducing the Human-Centered Transformation Framework

The HCTF, developed and validated in this dissertation, contributes an integrative theory of organizational evolution in the 21st century.

It conceptualizes transformation as a dynamic system of three co-dependent dimensions:

1. Technology – enabling efficiency and innovation.
2. Purpose (Sustainability) – providing ethical direction and legitimacy.
3. People (Talent Management) – creating the capability to connect and sustain both.

This framework redefines transformation from a dual transition to a unified, human-centered evolution.

6.4 Managerial Implications

6.4.1 Building People-First Transformation Strategies

For SME leaders, the research underscores a critical insight:
Digital and sustainability strategies succeed only when human strategies lead them.

Technology adoption must follow — not precede — workforce development. Before investing in machines or software, firms should evaluate digital skills, cultural readiness, and leadership vision. In practice, this means allocating budgets for training and engagement alongside capital expenditures.

6.4.2 Redefining Leadership Roles

Transformation leadership is no longer about control or efficiency but about *coaching and empowerment*.

Leaders should act as vision communicators, mentors, and ethical stewards.

They must bridge generational gaps and align diverse teams around shared goals.

The study found that when leaders personally participated in learning initiatives, employees' willingness to adopt new technologies increased dramatically.

6.4.3 Embedding Learning as a Strategic System

SMEs should institutionalize continuous learning through:

- microlearning sessions integrated into daily operations,
- peer mentoring and cross-functional collaboration,
- and recognition programs for innovation and sustainability ideas.

This converts learning from a cost center into a strategic capability.

6.4.4 Managing Culture as a Living System

Culture should not be treated as static tradition but as a living organism that evolves through feedback and reflection.

Managers can reinforce cultural adaptability by:

- promoting open communication,
- celebrating experimentation,
- and integrating digital tools that facilitate transparency and participation.

Cultural adaptability differentiates firms that thrive under uncertainty from those that stagnate.

6.4.5 Measuring What Matters

Traditional KPIs — productivity, cost, revenue — are insufficient in transformation contexts.

Firms should adopt multidimensional performance indicators covering:

- Innovation (number of new products/processes developed),
- Learning (training hours per employee),
- Engagement (survey-based satisfaction), and
- ESG outcomes (carbon reduction, energy efficiency).

This integrated measurement system aligns human, technological, and ethical progress.

6.5 Policy Implications

6.5.1 Aligning European Policy with Human Capability Development

The European Green Deal (2019), Industry 5.0 Strategy (2021), and Digital Europe Programme (2021–2027) emphasize technology and sustainability but often underplay human capability as the connecting thread.

This research suggests reframing policy around the principle of human-centered transformation.

6.5.2 Integrating Digital and Green Agendas

Public programs should merge digitalization and sustainability training rather than funding them separately.

For example, EU grants could require applicants to demonstrate not only technology investment but also workforce reskilling plans.

6.5.3 Simplifying Access for SMEs

Many SMEs struggle to apply for EU funding due to administrative complexity.

Policy reforms should introduce “one-stop” digital platforms for application, monitoring, and reporting — reducing bureaucratic friction and increasing inclusivity.

6.5.4 Promoting Collaborative Ecosystems

Governments should facilitate regional learning ecosystems where SMEs, universities, and industry associations share resources, training facilities, and expertise. Such ecosystems transform isolated learning into collective capability building — amplifying the impact of limited public funds.

6.5.5 Embedding Human Metrics into Policy Evaluation

Policy success should be measured not only in terms of GDP or CO₂ reduction but also in human development metrics — digital literacy, job satisfaction, innovation participation, and gender equality.

These metrics better capture the long-term societal benefits of transformation.

6.6 Strategic Recommendations for SMEs

Based on theoretical insights and empirical findings, this section proposes strategic recommendations designed for practical implementation within SME environments.

6.6.1 Phase 1 – Awareness and Diagnosis

- Conduct internal audits of digital readiness, sustainability practices, and talent systems using indices such as DRI, SMI, and TMPI.
- Identify skill gaps and cultural barriers.
- Communicate transformation urgency to all stakeholders.

6.6.2 Phase 2 – Capability Development

- Launch reskilling programs that blend technical and sustainability competencies.
- Develop leadership training focused on transformational behaviors and ethical decision-making.
- Encourage peer-led learning to maximize cost efficiency.

6.6.3 Phase 3 – Integration and Alignment

- Create cross-functional teams linking IT, HR, and environmental management.
- Use digital platforms to monitor both performance and sustainability KPIs.
- Embed ESG and digital goals into annual planning and performance appraisals.

6.6.4 Phase 4 – Cultural Consolidation

- Celebrate small wins to build morale and reinforce learning.
- Foster storytelling — share examples of transformation success across teams.

- Integrate sustainability into the company’s identity through branding and communication.

6.6.5 Phase 5 – Continuous Renewal

- Establish feedback systems for ongoing learning and adaptation.
- Collaborate with universities and innovation hubs for continuous knowledge exchange.
- Benchmark progress annually against peers and EU best practices.

These steps transform transformation from a one-off initiative into an enduring organizational journey.

6.7 Implementation Roadmap: Human-Centered Transformation in Practice

To operationalize the recommendations, SMEs can adopt the following roadmap structured around three strategic pillars:

Pillar 1: People

- Develop a “learning-first” culture supported by microlearning and digital tools.
- Build leadership pipelines through mentorship and cross-department projects.
- Align incentives with learning, innovation, and sustainability.

Pillar 2: Process

- Integrate TM systems with digital and sustainability dashboards.
- Implement agile project management to encourage experimentation.
- Document lessons learned to institutionalize best practices.

Pillar 3: Purpose

- Articulate a clear organizational mission connecting profitability, sustainability, and human growth.
- Communicate progress transparently to employees and stakeholders.
- Reinforce ethical and environmental accountability as core values.

This roadmap ensures that transformation remains inclusive, measurable, and self-sustaining.

6.8 Limitations of the Study

No research is without constraints. The main limitations of this study are:

1. Sample Size: The quantitative dataset (20 SMEs) limits generalization.
2. Geographic Scope: Findings reflect Polish SMEs within the EU context and may vary across regions.
3. Temporal Scope: Cross-sectional data capture a moment in time; future studies could explore longitudinal evolution.
4. Self-Report Bias: Some responses may reflect aspirational rather than factual practices.
5. Sectoral Focus: The study centers on traditional manufacturing; extensions to other industries could reveal new dynamics.

Despite these limitations, triangulation, theoretical rigor, and contextual depth ensure the robustness of conclusions.

6.9 Directions for Future Research

To extend this work, future scholars and practitioners should explore:

1. Cross-Cultural Comparisons: How national culture moderates TM's role in transformation.
2. Longitudinal Studies: How learning and culture evolve over multiple transformation cycles.
3. AI and HR Analytics: How predictive algorithms can optimize talent strategy ethically.
4. Human–Machine Collaboration: How Industry 5.0 partnerships reshape work design and leadership.
5. Sustainability Impact Metrics: Quantifying the social and psychological outcomes of transformation (e.g., well-being, inclusion).

These directions will strengthen the empirical base of human-centered transformation research and bridge academia with practice.

6.10 Final Reflection and Conclusion

The journey of this dissertation began with a simple but profound question: *What truly drives transformation — technology or people?*

After extensive research, analysis, and reflection, the answer is clear: technology enables change, but people make transformation happen.

The findings reaffirm that human capital — when developed through strategic Talent Management, inspired by leadership, and embedded in an adaptive culture — becomes the ultimate engine of competitiveness and sustainability.

Traditional manufacturing SMEs, often underestimated, possess the agility and closeness to people that make them ideal laboratories for human-centered innovation.

The Human-Centered Transformation Framework developed here provides a blueprint for such evolution.

It demonstrates that when digitalization, sustainability, and human capability converge, organizations achieve not only efficiency but meaning — not only progress but purpose.

As the global economy moves toward Industry 5.0, the true measure of success will not be technological sophistication but the ability to remain human in a digital world.

By investing in people, cultivating trust, and leading with purpose, SMEs can not only adapt to the future — they can shape it.

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APPENDICES

Appendix A: Survey Questionnaire

Title of the Survey:

Talent Management for Digitized and Sustainability-Oriented Supply Chains in Traditional Manufacturing Firms

Purpose:

This questionnaire was designed to collect data from manufacturing SMEs regarding the integration of digital transformation and sustainability through Talent Management practices.

Responses were used exclusively for academic purposes in the DBA dissertation at the Swiss School of Business and Management Geneva.

Section 1 – Organizational Profile

1. Company size:

10–49 employees 50–149 150–249

2. Sector of activity: _____

3. Ownership structure:

Family-owned Partnership Subsidiary Other

4. Respondent position:

Owner / CEO HR Manager Operations Director Other

5. Does your company participate in EU or national transformation programs?

Yes No

Section 2 – Digital Transformation (DT)

Please rate your level of agreement (1 = strongly disagree, 5 = strongly agree):

Statement	1	2	3	4	5
We use digital tools (ERP, IoT, analytics) to optimize operations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data analytics supports management decision-making.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employees are trained in digital technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Automation has improved productivity and quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our leadership supports continuous digitalization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Source: Author's own elaboration)

Section 3 – Sustainability Practices (SUS)

Statement	1	2	3	4	5
Environmental and social goals are part of our strategy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We monitor energy and waste KPIs regularly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employees participate in green initiatives.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We communicate sustainability performance to customers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our digital tools help us measure environmental impact.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Source: Author's own elaboration)

Section 4 – Talent Management (TM)

Statement	1	2	3	4	5
We have reskilling and upskilling programs for employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leadership development is an organizational priority.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employee engagement is actively promoted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross-department collaboration is encouraged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our culture supports innovation and learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Source: Author's own elaboration)

Section 5 – Organizational Performance

Statement	1	2	3	4	5
Innovation rate has increased over the past two years.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operational efficiency has improved.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energy and material efficiency have increased.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employee satisfaction has improved.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall competitiveness has strengthened.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Source: Author's own elaboration)

Appendix B: Interview Guide

Purpose:

To gain deeper qualitative insights into how SMEs integrate digital transformation and sustainability through leadership, learning, and culture.

Interview Duration: 30–45 minutes

Format: Semi-structured (Zoom / MS Teams)

Section 1 – Context

1. Can you describe your company's operations and size?
2. What motivated your firm to begin digital and sustainability initiatives?

Section 2 – Talent and Leadership

3. How do you identify and develop talent for transformation?
4. What skills are most critical in your company's transformation journey?
5. How would you describe the leadership style during transformation?

Section 3 – Culture and Learning

6. How do you encourage collaboration and experimentation?
7. What are the biggest cultural barriers you have faced?
8. How do you sustain employee engagement during change?

Section 4 – Integration and Outcomes

9. How are digital tools linked to environmental goals?
10. What tangible outcomes have you observed since integrating digital and sustainability strategies?

Appendix C: Participant Information Sheet and Consent Form

Research Title:

Talent Management for Digitized and Sustainability-Oriented Supply Chains in Traditional Manufacturing Firms

Researcher:

Mateusz Miśkiewicz, DBA Candidate
Swiss School of Business and Management Geneva

Purpose of the Study:

This research explores how Talent Management supports the integration of digital and sustainability transformation within SMEs.

Participation:

Participation is voluntary, and data are confidential. You may withdraw at any point without consequence.

Consent:

By signing below, you confirm that you understand the study's purpose and consent to participate.

Participant Name: _____

Signature: _____

Date: _____

Researcher Signature: _____

Date: _____

Appendix D: Summary of Constructs and Indices

Construct	Definition	Measurement Tool	Source
Digital Readiness Index (DRI)	Adoption of digital tools and automation.	Survey (Likert)	Ivanov (2020)
Sustainability Maturity Index (SMI)	Integration of environmental and social goals.	Survey (Likert)	Carter & Rogers (2008)
Talent Management Practice Index (TMPI)	Degree of HR alignment with digital and sustainability strategy.	Survey (Likert)	Collings & Mellahi (2009)
Leadership Index	Transformational leadership behaviors.	Survey Interview	+ Bass & Riggio (2006)
Culture Index	Learning and innovation orientation.	Survey Interview	+ Cameron & Quinn (2011)
Performance Outcomes	Innovation, efficiency, and engagement.	Survey Interview	+ Teece (2018)

(Source: Author's own elaboration)