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Mentorship and Experiential Learning in Semiconductor Leadership Development: A Qualitative Phenomenological Study of Leadership Development in Semiconductor Manufacturing Organizations

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Abstract

This qualitative phenomenological study explored how leadership skills are developed within semiconductor manufacturing organizations. Grounded in Transformational Leadership Theory, the study examined how professionals described mentorship, experiential learning, coaching and feedback, communication, and organizational culture as part of their leadership growth. Semi-structured interviews with 10 semiconductor professionals were analyzed using thematic analysis. Findings showed that leadership development occurred less through isolated training events and more through practical workplace experience, mentor guidance, coaching conversations, feedback loops, communication practice, and supportive culture. Mentorship helped participants observe leadership, reflect on difficult situations, and build confidence in their own leadership identity. Experiential learning was described as the strongest source of growth because it required leaders to apply judgment in real work situations involving people, technical pressure, customers, and cross-functional decisions. Coaching and feedback helped participants adjust behavior over time, while communication emerged as essential for listening, framing messages, resolving conflict, and making decisions. Organizational culture either supported or limited development depending on trust, flexibility, psychological safety, and leadership commitment. The study contributes a practical model for semiconductor organizations by showing that effective leadership development requires structured support around real work, not formal training alone.

Keywords

Leadership Development, Semiconductor Manufacturing, Mentorship, Experiential Learning, Coaching and Feedback, Communication, Organizational Culture, Transformational Leadership

1. Introduction

In today's rapidly evolving business environment, effective leadership is recognized as a cornerstone of organizational success. Scholars agree that leadership is no longer viewed as an inherent trait but as a dynamic and learnable skill set that can be cultivated through intentional development efforts (Northouse, 2019; Yukl & Gardner III, 2020). Leaders play a pivotal role in guiding teams, driving innovation, and ensuring long-term sustainability (Bass & Riggio, 2006). As organizations face increasingly complex challenges, including globalization, rapid technological change, and shifting workforce expectations, the demand for leaders who can adapt, embrace diversity, and foster resilience has become more urgent than ever (Avolio et al., 2009; Day & Dragoni, 2015).

Research on leadership development highlights various paradigms that offer unique approaches to enhancing leadership skills. Transformational leadership emphasizes the importance of inspiring and motivating followers to achieve a shared vision, while emotional intelligence emphasizes emotional awareness, empathy, and self-regulation (Bass & Riggio, 2006; Goleman, 1995). Despite the wealth of research on leadership, there remains a significant gap in understanding the most effective methods for developing leadership skills that align with the evolving needs of organizations.

1.1. Problem Statement

The problem addressed in this qualitative study was that, despite the growing demand for skilled leaders in an increasingly complex professional landscape, there is a lack of standardized and effective leadership development methods that address the diverse and evolving needs of modern leaders. Existing development programs yield inconsistent results, and it is not entirely clear which methods, whether mentorship, formal education, experiential learning, coaching and feedback, communication development, or culture-based support, are responsible for the most substantial improvements in leadership effectiveness. This gap is especially important in semiconductor manufacturing, where leaders must balance technical complexity, rapid innovation, customer expectations, global competition, and cross-functional work.

1.2. Purpose Statement

The purpose of this qualitative phenomenological study was to explore how professionals in semiconductor manufacturing organizations experience leadership

development and to determine how mentorship, experiential learning, coaching and feedback, communication, and organizational culture shape leadership growth and effectiveness. The study used semi-structured interviews and thematic analysis to capture participants' lived experiences and interpret those experiences through Transformational Leadership Theory.

1.3. Research Questions

RQ1. How do professionals in the semiconductor industry describe the ways leadership skills are developed?

RQ2. What leadership development practices do participants identify as most useful for improving leadership effectiveness?

RQ3. How does organizational culture influence leadership development in semiconductor manufacturing organizations?

The five developmental factors reported in the abstract were aligned with these questions. Mentorship and experiential learning addressed RQ1; coaching and feedback and communication addressed RQ2; and organizational culture addressed RQ3.

1.4. Theoretical Foundation

Transformational Leadership Theory was the theoretical framework for this study. The framework provided a structure for understanding how leadership behaviors develop and how leaders apply those behaviors in real organizational settings. Idealized influence relates to how leaders model values, credibility, and ethical behavior. Inspirational motivation relates to how leaders communicate vision and encourage commitment. Intellectual stimulation relates to how leaders challenge assumptions, support innovation, and promote problem-solving. Individualized consideration relates to how leaders mentor, coach, and support the growth of others (Bass & Riggio, 2006).

2. Literature Review

2.1. Mentorship and Individualized Consideration

Mentorship is widely recognized as a powerful tool for leadership development. Mentoring relationships provide both career-related and psychosocial support, helping leaders navigate complex organizational landscapes and develop critical skills (Allen & Eby, 2007). Mentorship aligns with the individualized consideration dimension of transformational leadership because a mentor provides personalized guidance, feedback, encouragement, and developmental support. Strong mentoring relationships can help protégés gain organizational insight and build confidence in their leadership identity, although effectiveness depends on trust, structure, and mentor-protégé fit (Allen et al., 2006; Ragins & Kram, 2007).

2.2. Experiential Learning and Intellectual Stimulation

Experiential learning is acquiring knowledge through direct experience, reflec-

tion, and application. Kolb (1984) described experiential learning as "a process whereby knowledge is created through the transformation of experience" (p. 38). Stretch assignments, job rotations, action learning projects, and cross-functional responsibilities give leaders opportunities to solve real problems and adapt in real time. However, experience alone is not enough. Without feedback and time for reflection, leaders may remain in trial-and-error learning rather than translate experience into meaningful behavioral change (DeRue & Wellman, 2009).

2.3. Coaching, Feedback, and Communication

Coaching and feedback provide individualized opportunities for leaders to examine behavior, receive honest input, set goals, and make adjustments over time. Communication is also central to leadership effectiveness because leaders must listen, frame messages, give feedback, guide difficult conversations, and create understanding across technical and organizational boundaries. These developmental factors complement mentorship and experiential learning by converting reflection and feedback into changed leadership behavior (Ladegard & Gjerde, 2014; Liu et al., 2023).

2.4. Organizational Culture and the Semiconductor Context

Organizational culture encompasses the shared values, beliefs, and practices that shape behavior within an organization (Schein, 2010). In leadership development, culture determines whether learning is encouraged or constrained. Trust, psychological safety, flexibility, and developmental support can help leaders grow through experience, while rigid processes, fear of mistakes, and weak managerial commitment can limit growth. These issues are especially important in semiconductor organizations, where technical complexity, rapid technology cycles, global competition, and talent-pipeline challenges increase the need for leaders who can guide people as well as solve technical problems (McKinsey & Company, 2024).

Overall, the literature shows that leadership development is strongest when formal learning, developmental relationships, experience, reflection, and feedback work together. A classroom program may provide useful language and structure, but it does not replace the learning that occurs when leaders face real responsibility and receive support while they grow (Day & Dragoni, 2015).

The semiconductor industry provides a distinctive setting for examining these ideas. Leadership pipelines have often emphasized technical performance and operational expertise, but contemporary leaders are also expected to communicate across disciplines, develop people, support innovation, and manage organizational change. Because much of this knowledge is contextual and learned in daily work, mentorship, stretch assignments, coaching, feedback, communication practice, and supportive culture are especially relevant in semiconductor manufacturing (McKinsey & Company, 2024).

Transformational Leadership Theory connects these development methods to observable leadership behaviors. Individualized consideration is reflected when

mentors and coaches provide guidance suited to another person's needs. Intellectual stimulation is reflected when experiential assignments require leaders to question assumptions, solve unfamiliar problems, and encourage new approaches. Inspirational motivation becomes visible when leaders communicate purpose and help teams understand how technical work connects with broader organizational goals. Idealized influence is reinforced when leaders model credibility, responsibility, and constructive behavior under pressure (Bass & Riggio, 2006).

Taken together, the literature suggests that effective leadership development is not a one-size-fits-all process. Mentorship, experiential learning, coaching, communication, and organizational culture perform different but complementary functions. Mentorship provides relational guidance; experience provides application; coaching and feedback support adjustment; communication enables leadership action; and culture determines whether learning is encouraged or constrained. This study adds to the literature by placing those ideas inside the semiconductor-manufacturing context, where leaders often move from technical credibility into people leadership without a fully standardized development path. That context matters because the industry is facing a growing talent gap and must make better use of the people it already has, not only by hiring more talent but also by developing leaders who can retain, coach, and grow technical teams. The present study therefore examined participant experiences across all five factors while retaining particular attention to mentorship and experiential learning as the central pathways through which semiconductor professionals described leadership growth.

3. Method

3.1. Research Design

This study followed a qualitative descriptive phenomenological design informed by Husserl (1931), Moustakas (1994), and Braun and Clarke (2006). Phenomenology privileges participants' lived experiences and subjective interpretations, allowing leadership development to be explored through the meaning leaders ascribe to their growth (Finlay, 2002). The approach was consistent with a constructivist-interpretivist epistemology in which knowledge emerges through interpretation of participant accounts (Schwandt, 2000; Lincoln & Guba, 1985). The descriptive phenomenological approach guided attention to the shared meaning of leadership-development experiences, while thematic analysis provided a transparent process for moving from interview transcripts to codes and themes.

3.2. Sampling and Recruitment

Purposive sampling was used to recruit participants with direct and information-rich leadership-development experiences in semiconductor organizations (Patton, 2015). Snowball sampling complemented recruitment by allowing eligible participants and professional contacts to identify other professionals who met the study criteria (Noy, 2008). Eligibility required semiconductor-industry experience and experience with leadership responsibilities or leadership-development prac-

tices such as mentorship, experiential learning, coaching, feedback, or formal leadership education. The final sample contained 10 professionals representing engineering, management, and technical-leadership roles. Leadership levels included entry manager, mid-level manager, senior manager, and experienced manager or executive roles. Participants represented small-, medium-, and large-sized semiconductor organizations, including manufacturing and equipment-related contexts. Their industry experience ranged from 4 to 40 years.

3.3. Interview Procedures, Ethics, and Saturation

Primary data consisted of semi-structured interviews lasting 60 to 90 minutes. Interviews were conducted in person or through secure videoconference. The interview guide used open-ended questions aligned with the research questions and asked participants to describe leadership-development programs, effective methods, challenges, organizational culture, work environment, mentorship, experiential learning, formal education, and the approach that had the greatest impact. The guide was reviewed for alignment with the purpose statement and research questions before interviews began. It was also designed to elicit detailed accounts while allowing participants to speak in their own words rather than forcing them into predetermined categories. Interviews were audio-recorded with participant consent and transcribed verbatim. Participants provided informed consent, were informed that participation was voluntary, and could withdraw. Pseudonyms were used to protect confidentiality. Data collection ended when later interviews repeated the same core ideas about mentorship, experiential learning, feedback, communication, and culture and no substantially new theme was emerging from the participant accounts. The study was approved as exempt research under 45 CFR 46.101 by Aspen University.

3.4. Data Analysis and Coding Reliability

Analysis combined descriptive phenomenological attention to lived experience with Braun and Clarke's (2006) six-phase thematic-analysis framework. First, transcripts were read repeatedly for familiarization. Second, open coding identified meaningful units related to leadership development. Third, related codes were clustered into provisional categories. Fourth, provisional themes were reviewed across participant accounts for internal coherence and distinction from other themes. Fifth, themes were defined and named to capture their central meaning. Sixth, the themes were reported with interpretations and supporting participant quotations. To strengthen coding reliability, the researcher maintained a codebook, recorded coding decisions in analytic memos, and revisited earlier transcripts after the main categories became clearer. Peer debriefing was used to question whether selected quotations actually supported each theme. The goal was not to remove the interpretive nature of qualitative analysis, but to make the movement from raw interview language to final themes visible and consistent. The resulting theme-development sequence moved from mentorship and coaching

codes to leadership support and the mentorship theme; experiential learning and trial-and-error codes to development methods and the experiential-learning theme; coaching and feedback-loop codes to growth mechanisms and the coaching-and-feedback theme; communication and active-listening codes to leadership skills and the communication theme; and supports-development and hinders-development codes to organizational context and the organizational-culture theme. Themes were then interpreted alongside the transformational-leadership dimensions without replacing the inductive thematic results.

3.5. Trustworthiness

Several procedures supported credibility and dependability. Participants were given an opportunity to review transcripts and provide clarifications or elaborations through member checking (Birt et al., 2016; Lincoln & Guba, 1985). Reflexive journaling and memoing documented the researcher's assumptions and interpretations, including beliefs about experiential learning, and supported bracketing of prior expectations (Finlay, 2002; Tufford & Newman, 2012). An audit trail documented coding decisions, theme development, journal entries, and peer-debriefing discussions. Peer review and debriefing were used to challenge interpretations and refine themes. Triangulation with relevant leadership-development scholarship and industry reports supported contextual interpretation. These steps are important because qualitative analysis must show how the researcher moved from participant accounts to defensible themes rather than simply presenting polished conclusions. Together, member reflection, reflexive memoing, peer review, and the audit trail enhanced credibility, dependability, and transparency (Nowell et al., 2017).

4. Findings

The findings are organized by research question. Each section follows a consistent structure: the research question is stated, the themes answering the question are interpreted, and participant quotations are provided as supporting evidence. Five themes were identified across the 10 interviews: mentorship, experiential learning, coaching and feedback, communication, and organizational culture.

4.1. Research Question 1: Ways Leadership Skills Are Developed

RQ1 asked: How do professionals in the semiconductor industry describe the ways leadership skills are developed? Two themes answered this question: mentorship as a practical and relational form of development and experiential learning as the strongest source of leadership growth.

Theme 1: Mentorship as a Practical and Relational Form of Development

Participants defined mentorship in different ways. For Participant RC, mentorship was formal and tied to a specific senior leader. RC explained that he had been mentored by his vice president and still reached out to him when he got stuck, especially when he needed help thinking through strategy or budget planning for

future projects. RC believed a significant part of his leadership growth came from that relationship. For others, mentorship was less formal and more about guidance that happened naturally over time.

Participant ST described the closest person he had to a mentor as a senior staff engineer who "walked me through projects that he had nothing to do with." ST also paid attention to the way this person approached problem solving and dealt with people. He remembered learning how to let others "do things their own way" while keeping them "on a scientific track." Participant SM said that mentors helped him "look holistically to a situation." SM also said those conversations reminded him that "we are all humans. We are engineers and everything, but besides that, we are also human beings."

Participant JK said that one-to-one mentoring, along with observing strong leaders around him, had a major influence on his leadership style because he was able to "adopt things which are relevant." Participant BK said mentorship had shaped him "a lot," and that he learned "good pieces from everyone" and tried to "put the puzzle" together in his own way. These accounts show mentorship as a relational mechanism through which participants observed leadership, received contextual guidance, reflected on behavior, and formed an individual leadership identity.

Several participants also described mentorship as a way to avoid feeling isolated when taking on larger responsibilities. Instead of treating leadership as something they had to figure out alone, they used mentors as sounding boards for difficult decisions, people issues, and organizational judgment. This added a practical layer to mentorship because the value was not only emotional support; it was also having someone experienced enough to help them slow down, think through consequences, and choose a better path.

Theme 2: Experiential Learning as the Strongest Source of Leadership Growth

Experiential learning was described as the point where leadership became real. Although Participant JK had completed a six-month leadership program, JK said the "actual leadership development method" comes from "real-time experience" and from being "engaged hands-on" with team members and customers. JK compared leadership to racing and said that unless someone sits in the driver's seat, that person cannot really understand the experience.

Participants also connected experiential learning to trial and error. Participant IV explained that different employees respond differently to the same feedback and that this understanding came through experience. Participant YG described working in a lean environment where multiple responsibilities created opportunities to learn by doing rather than only hearing about leadership in meetings. Across these accounts, real situations required judgment, adaptation, conflict management, and decision-making under pressure. Experience became developmental when participants had opportunities to reflect and apply what they learned.

This theme was consistent across participants because they repeatedly returned

to moments where leadership had to be practiced rather than described. The strongest learning happened when they had to manage unclear expectations, technical urgency, team needs, and customer pressure at the same time. In those situations, leadership development was not abstract. It was visible in how they responded, how they communicated, and how they reflected afterward.

4.2. Research Question 2: Practices Most Useful for Leadership Effectiveness

RQ2 asked: What leadership development practices do participants identify as most useful for improving leadership effectiveness? Two themes answered this question: coaching and feedback as ongoing adjustment mechanisms and communication as a leadership skill that had to be learned.

Theme 3: Coaching and Feedback as Ongoing Adjustment Mechanisms

Coaching and feedback were discussed in relation to improvement of behavior over time. Participant SM said regular feedback from colleagues and direct reports showed that leadership training had produced a "shift in mindset" from handling tasks to motivating people. SM also said that he now regularly asks, "how am I performing" and whether there is anything he needs to improve. Participant RC said the most useful growth came through "honest and straightforward discussion" with managers "in private" about leadership.

Participant BK described being paired with a partner during leadership training and meeting every two weeks for eight weeks. During the meetings, BK discussed attendance problems, conflict, low motivation, "successes and even failures," and then developed a "strategy" for the failures. These accounts show coaching and feedback as iterative mechanisms that helped participants examine behavior, make sense of setbacks, and identify deliberate adjustments rather than treating development as a one-time intervention.

The value of feedback was strongest when it was specific and safe enough for participants to accept. Participants did not describe useful feedback as public criticism or generic encouragement. They described it as direct, private, and tied to actual situations. That distinction matters because coaching and feedback worked best when they helped leaders understand what to change and gave them enough trust to try a different behavior the next time.

Theme 4: Communication as a Leadership Skill That Had to Be Learned

Communication emerged as a theme because participants connected leadership challenges to the way messages were delivered, received, or misunderstood. Participant JK said communication "is essential" in leadership roles. Participant RM said communication becomes "crucial" when a leader conveys a message to a group because unclear messages may be understood in completely different ways.

Listening was one of the most common parts of communication mentioned by participants. Participant SM said he had to remind himself to "listen actively and be an attentive listener instead of just wanting to respond." After training, SM learned to "listen first 20 minutes" and let others speak before responding. Partic-

ipant RM connected communication to decision-making and warned that being too authoritarian causes leaders to "lose good people." RM favored collaborative discussion that allows the "best information" to emerge before a decision is made. These findings show communication as a learned practice involving listening, message framing, feedback, collaborative sense-making, and decisive action.

Participants also treated communication as more than speaking clearly. They connected it to patience, listening, timing, and respect for the knowledge of others. This was especially important in technical environments where people may have different levels of detail, urgency, or ownership over a problem. The participant accounts showed that communication became a leadership skill when it helped people understand the problem, contribute honestly, and move toward a decision together.

4.3. Research Question 3: Influence of Organizational Culture

RQ3 asked: How does organizational culture influence leadership development in semiconductor manufacturing organizations? One theme answered this question: organizational culture as the factor that supported or limited development.

Theme 5: Organizational Culture as an Enabler or Barrier

Participant JK described a company culture focused on "developing future leaders" with a "distinct communication pathway" for that purpose. Participant ST described a collaborative environment that was "more tolerant of mistakes." After both critical reactors failed, ST expected "the roof to blow off," but senior leadership responded, "yeah, we've seen this before. We can fix this." ST emphasized that there was "no stomping, no heads rolling." This response showed how psychological safety and constructive treatment of failure can create conditions for responsibility and learning.

Participants also identified cultural barriers. Participant YG said limited flexibility can make it harder for people to be efficient, innovative, or quick to learn because "you can't just go and do something." Participant RS explained that when the leader above does not value development, new leaders have fewer opportunities to grow. Other accounts pointed to bureaucracy, approvals, funding barriers, and lack of preparation before employees entered leadership roles. Participant BK provided a contrasting example of a vice president who researched school options for a relocating manager's children and created a spreadsheet to help. BK said such support would have "tremendously motivated" him. Together, these accounts show culture through daily behavior, trust, flexibility, support, treatment of mistakes, and the degree to which leaders invest in other people's development.

The culture theme was also important because it explained why the same leadership-development method could work well in one setting and fail in another. A stretch assignment, mentoring relationship, or training program was more useful when the surrounding culture gave people time, trust, and support to learn. When the culture was overly rigid or when managers did not value development, participants described fewer chances to practice leadership in a meaningful way.

5. Discussion

The findings show that leadership development in semiconductor manufacturing is a practical, relational, and context-dependent process. Participants did not describe leadership growth as the product of a single training class or formal program. Instead, leadership developed through mentoring relationships, direct workplace experience, coaching conversations, feedback, communication practice, and the culture of the organization. The five themes also connect to Transformational Leadership Theory. Mentorship and coaching reflected individualized consideration because participants learned through guidance and personal feedback. Experiential learning reflected intellectual stimulation because participants were challenged to solve problems, make decisions, and grow through difficult situations. Communication connected to inspirational motivation because leaders had to frame meaning and encourage action. Organizational culture reinforced idealized influence because leaders modeled how people, mistakes, responsibility, and development were treated.

The findings also extend prior leadership-development research by showing how these common development mechanisms behave in a highly technical manufacturing environment. Prior literature argues that experience, feedback, mentoring, and support work best in combination, and the participants in this study described that same pattern in practical terms. What is more specific to this study is the way technical pressure shaped the leadership-development process. Participants were not only learning how to manage people; they were learning how to lead when equipment, process issues, schedules, customer needs, and cross-functional decisions were all moving at the same time. In that setting, leadership development became less about learning a fixed style and more about learning judgment, timing, communication, and trust.

5.1. Discussion of RQ1

The answer to RQ1 is that semiconductor professionals describe leadership skills as developing through relational learning and hands-on experience. Mentorship helped participants make sense of leadership through modeling, advice, and reflection, while experiential learning required them to practice leadership in real conditions. This finding supports prior research that treats mentorship as more than career advice and experience as more than time spent on the job. The participants showed that both only become developmental when they include reflection, trust, and feedback. Together, the findings suggest that leadership development should include intentional developmental relationships and challenging assignments supported by reflection and feedback.

5.2. Discussion of RQ2

The answer to RQ2 is that coaching, feedback, and communication were most useful when they directly changed how participants interacted with people. Coaching and feedback increased self-awareness and supported behavioral adjust-

ment. Communication practice strengthened listening, message framing, feedback conversations, collaborative decision-making, and the ability to address difficult situations. This is important because technical leaders may be promoted for problem-solving ability, but their effectiveness as leaders depends on whether they can convert technical judgment into clear direction, respectful dialogue, and useful feedback for others.

5.3. Discussion of RQ3

The answer to RQ3 is that organizational culture acted as either an enabler or a barrier. Trust, flexibility, psychological safety, support, and constructive responses to mistakes expanded opportunities for leadership growth. Bureaucracy, limited autonomy, weak managerial commitment, and insufficient preparation constrained development even when formal programs were available. The strongest point from the participant accounts is that culture was experienced in ordinary actions, not only in official values. How leaders reacted to failure, whether they made time for development, and whether they trusted people with responsibility shaped whether leadership growth felt real or only theoretical.

5.4. Contribution of the Study

The contribution of this study is practical and contextual. It brings leadership-development concepts that are often discussed broadly into the semiconductor-manufacturing environment, where leadership is shaped by technical complexity, fast execution cycles, customer expectations, and pressure to develop talent internally. The findings suggest that semiconductor organizations should not rely only on formal classes or assume that strong engineers automatically become strong leaders. A stronger model is to combine mentoring, stretch assignments, coaching, feedback, communication development, and a culture that gives people room to learn. This contribution is useful because it turns leadership development from a general idea into a set of conditions that semiconductor organizations can actually design and support.

6. Limitations of the Study

Several limitations should be considered when interpreting the findings. First, the study was qualitative and based on interviews with 10 professionals in the semiconductor industry. The sample provided meaningful insight but is not intended to represent every semiconductor organization or leadership role. Second, the study relied on participants' personal reflections, which were based on memory, perception, and individual experience; recall bias may therefore have influenced how events were described. Third, researcher interpretation may have influenced coding and theme development despite reflexive memoing, peer review, and an audit trail. Finally, the findings were shaped by the specific context of semiconductor manufacturing and may apply most directly to similar high-technology or manufacturing environments.

7. Implications for Professional Practice

The findings suggest that semiconductor organizations should treat leadership development as an ongoing system rather than a one-time training activity. Formal programs can provide frameworks and shared language, but leadership growth becomes meaningful when learning is tied to real work, mentoring, coaching, communication practice, and feedback. Organizations should design leadership-development systems that combine structured learning with stretch assignments, guided reflection, feedback from managers and peers, and intentional mentoring relationships. New and emerging leaders should be given real responsibility, but that responsibility should be paired with coaching so that employees are not left to learn only through pressure or mistakes. Senior leaders should model learning behavior and create conditions in which people can ask questions, recover from mistakes, receive honest feedback, and take on meaningful responsibility. For semiconductor organizations, this is not only a leadership issue; it is also a talent-retention and execution issue because better-developed leaders are more likely to keep technical teams engaged and focused during complex work.

8. Recommendations for Future Research

Future research should continue examining leadership development in semiconductor manufacturing and other high-technology industries. A larger study with participants from more organizations, regions, and leadership levels could determine whether the same themes appear across a broader group. Longitudinal research could examine how mentoring relationships, rotational assignments, coaching, communication development, and organizational culture influence leadership behavior over time. Additional research could also compare leaders who came from highly technical roles with leaders who entered management through business or operations pathways. Another useful direction would be to study how direct managers and senior leaders influence the transfer of leadership learning into everyday practice, because the findings from this study suggest that support from the leader above can either open or close development opportunities.

9. Conclusion

This study explored how leadership skills are developed within semiconductor manufacturing organizations. The findings showed that leadership development is not simply the result of formal training. Participants described leadership growth as shaped by mentorship, real workplace experience, coaching and feedback, communication practice, and organizational culture. The central conclusion is that leadership development in semiconductor manufacturing works best when it is practical, relational, and supported by culture. Formal education can provide structure, but leaders grow most when they have mentors, real responsibilities, honest feedback, communication practice, and room to learn from experience.

The human side of the finding is simple: people become better leaders when someone guides them, when they are trusted with meaningful work, when feedback is honest, and when the organization gives them enough safety to learn instead of only perform.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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