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Upskilling the Frontline: The Organizational Effects of Supervisor Training in Low-Wage Workplaces

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Abstract

Institutional theory explains organizational responses to external pressures through decoupling between formal adoption and substantive practice, but existing accounts are derived largely from compliance-based interventions in Global North settings. This paper examines how capability-based interventions, defined as those that embed practices in individuals rather than formal structures, reshape the conditions under which decoupling arises. When interventions are enacted through actors situated in the technical core, "policy-practice" decoupling can be attenuated. However, "means-ends" decoupling may emerge when the authority required to convert capability into outcomes is contested. The trade-offs are particularly visible in Global South production contexts, where role-level gender segregation makes supervisory authority socially evaluated rather than presumed by formal title. Moreover, tightly interlinked production practices place coordination at the center of performance evaluations. We test these arguments using a large-scale program that trains and promotes women into first-line supervisory roles in Bangladesh's ready-made garment sector. Using matched within-factory comparisons and high-frequency production data, we estimate effects on operational efficiency, subordinate evaluations of supervisory practice, and working conditions. Lines managed by trained female supervisors operate more efficiently, with gains accumulating over the supervisor's tenure in the position. A gender decomposition reveals that capability investment offsets a substantial evaluative penalty that untrained women supervisors face relative to men, and that intervention effects are concentrated in outcomes dependent on relational coordination. The findings identify how capability-based interventions shift the locus of decoupling and identify the organizational conditions under which transnational governance produces substantive change.

Keywords: managerial capability; CSR; gender; organizational performance; decoupling; relational coordination; global supply chains

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1 Introduction

Gender inequality in organizations persists globally despite decades of intervention. While women have increased their representation at senior executive positions in some contexts, a substantial body of research shows that the primary constraint lies at the transition into first-line management, that is, the point at which authority is first exercised. This “broken rung” (Ellingrud et al., 2025) has been documented across advanced economies, where promotion rates for women lag those of men even when entry into the workforce is comparable (Bertrand, 2018; Cotter et al., 2001; Kleven et al., 2019). These persistent gaps suggest that organizational responses to gender inequality may be only weakly linked to changes in underlying practices, raising the possibility of decoupling between formal commitments and substantive outcomes. Moreover, in many organizational settings, gender inequality in the workforce is not merely a pipeline problem but a deep-rooted tension. In labor-intensive industries in the Global South, women often constitute the majority of the production workforce while remaining largely excluded from all managerial roles, including mid-level supervisory roles. In these contexts, inequality reflects role-level segregation (Reskin, 1993), where access to authority is structured by a boundary that remains out of reach for female workers. This pattern raises a broader theoretical question about how interventions that alter managerial composition translate into organizational practice and performance.

Much of what we know about gender inequality and organizational interventions is derived from Global North contexts, which have seen a significant evolution over the decades (Dobbin & Kalev, 2022). This raises questions about how well these frameworks travel to settings characterized by different institutional conditions and gendered social norms (Phillips and Ranganathan, 2025; George et al., 2016). In many Global South organizations, assumptions that underpin prevailing theories, such as gradual career progression, formally codified gender equality, and disconnect between work policy and day-to-day practice, do not hold. Often expectations of authority are more explicit or hierarchical with organizational roles being sharply segregated by gender (Doering and Thébaud, 2017; Ridgeway, 2011). These differences make the Global South not only an empirical setting but a theoretically generative context for understanding when and how gender-targeted interventions translate into organizational change.

Globally, organizations and policymakers have responded to workplace gender disparities through a range of interventions, including representation-related interventions such as quotas and dis-

closure mandates to more involved capability-building initiatives like training, mentoring and leadership development (Dobbin & Kalev, 2022). However, the effectiveness and sustainability of these interventions remain mixed and context dependent (*ibid.*; Dezsó & Ross, 2012). Some studies link increased female representation in management to improved innovation, governance, or monitoring under specific conditions ((Dezsó & Ross, 2012; Flabbi et al., 2019), while others find weak or null effects, or document resistance that constrains women’s effectiveness in authority roles (Husain et al., 2023; Kunze & Miller, 2017; Rudman & Glick, 1999). A parallel literature shows that many diversity initiatives framed under corporate social responsibility (CSR) practices fail to produce substantive change, often functioning as symbolic responses to external pressure rather than drivers of organizational transformation (Dobbin & Kalev, 2016, 2022; Kalev et al., 2006).

We examine the tradeoff between policy adoption and organizational change in the context of transnationally governed garments supply chains, where interventions aimed at improving labor and gender practices are frequently designed by external actors, multinational firms, international organizations, and NGOs, and implemented within supplier firms operating under different institutional and cultural contexts (Locke, 2013). These interventions can be conceptualized as institutional models that travel across contexts, originating in one setting and implemented in another (S. M. Ansari et al., 2010; Boxenbaum & Jonsson, 2017; Djelic & Sahlin-Andersson, 2006). A central challenge then becomes whether these models are translated into local practice through processes of adaptation and reinterpretation (S. Ansari et al., 2014), or remain decoupled from the routines that govern day-to-day work (Bird et al., 2019). Audit-based regimes generate both forms of decoupling (Meyer & Rowan, 1977) and subsequently identified by Bromley and Powell (2012): policy–practice decoupling, in which formal policies are unevenly implemented, and means–ends decoupling, in which implemented practices remain weakly linked to intended outcomes. However, there is limited evidence on the effectiveness of interventions that act on organizational capability rather than formal structures. These are effectively capability-based initiatives, which seek to alter managerial practices by investing in the skills and roles of individuals rather than enforcing adherence to external standards (McKenzie & Woodruff, 2017).

In our paper, we develop a framework that explains when capability-based interventions produce substantive effects by focusing on three features of organizational settings that jointly shape how such interventions are translated into practice. First, the separation between the locus of

intervention design versus its implementation, facilitates decoupling between externally specified practices and internal operations (Meyer and Rowan, 1977; Bromley and Powell, 2012). Second, role-level gender segregation shapes the legitimacy of authority by placing women into roles where they have been historically absent (Reskin, 1993), increasing the likelihood that evaluations of their authority rely on socially constructed expectations rather than task-relevant information (Doering & Thébaud, 2017; Eagly & Karau, 2002; Ridgeway, 2011). Third, relationally intensive production environments (Gittell, 2002; Gittell, 2016; Ranganathan and Shivaram, 2021; Bechky, 2006) make supervisory effectiveness dependent on ongoing coordination and interaction, rather than on discrete technical decisions (Thompson, 1967; Gittell, 2002; Gittell, 2016). We argue that when these features are present, decoupling shifts from the gap between formal policy and practice to the translation of capability into action within supervisory roles.

Empirically, we study the Gender Equality and Returns (GEAR) program, a capability-based intervention designed to promote experienced female operators into first-line supervisory roles in Bangladesh’s ready-made garment sector. GEAR was developed by international development organizations co-financed by multinational buyers and participating factories to address the gender participation gap at the mid-management level in RMG factories. The program combined approximately 64 hours of classroom instruction in production engineering and relational supervision with a three- to six-month on-the-job trial period, alongside workshops for senior managers intended to support women’s exercise of authority. Our analytic sample covers 27 of the 50 implementing factories. We compare 109 GEAR-trained women supervisors with 127 untrained supervisors identified within the same factories on the basis of supervisory tenure, sector experience, and line responsibilities. The comparison pool includes both men and women, allowing us to distinguish the effects of capability investment from those of gender substitution. Production outcomes are drawn from administrative line-day records covering the 120 days preceding each factory’s survey, while worker-reported outcomes come from interviews with a randomized line-position sample of 963 operators, balanced by gender and linked to specific supervisors.

Our findings show that lines managed by trained female supervisors operate approximately three percentage points more efficiently than matched comparison lines under the same product mix, against a control mean of 56 percent, with a positive association between productivity and tenure of trained supervisors. Trained supervisors underperform during their first year in role, reach

parity after roughly one year, and subsequently outperform comparison supervisors by nine to twelve percentage points beyond two years, consistent with the accumulation of line-specific knowledge. The gender decomposition reveals a distinct evaluative mechanism. Untrained female supervisors are rated between 0.26 and 0.50 standard deviations below male supervisors across leadership, career support, respectful treatment, and willingness to engage in production tasks, with similar gaps in working conditions. Trained women, by contrast, are evaluated at parity with men across all indices, and differ significantly from untrained women, indicating that capability investment offsets the evaluative penalty associated with entry into previously male-typed roles. Finally, relationally intensive supervisory practices such as communication, support, and engagement exhibit larger improvements than technical competence with worker-reported effects appearing early in the supervisor’s tenure. This contrasts with operational gains, which build more gradually as supervisors accumulate experience. These patterns are consistent with the argument that capability-based interventions operate through the enactment of role-based practices and the translation of authority into coordinated action, rather than through formal adoption alone.

Our paper makes four contributions by integrating multiple strands of literature that have largely developed in parallel and, as a result, offer an incomplete account of how capability-based interventions translate into organizational outcomes. First, it extends institutional accounts of decoupling by showing that capability-based interventions shift the locus of decoupling from the boundary between formal policy and practice to the individuals that embody key managerial capabilities in organizations (Bromley & Powell, 2012; Meyer & Rowan, 1977). This dynamic of decoupling highlights how translation, rather than adoption alone, becomes the central mechanism through which externally designed interventions affect organizational outcomes (S. M. Ansari et al., 2010; Boxenbaum & Jonsson, 2017). Second, it advances research on gender and organizations by distinguishing between inequality in the professional pipeline to role-level segregation (Cotter et al., 2001; Reskin, 1993). Our results show that investment in managerial capability can mitigate legitimacy deficits when individuals enter roles from which they have been historically excluded (Doering & Thébaud, 2017; Eagly & Karau, 2002; Ridgeway, 2011). Third, it contributes to the study of global supply chains and transnational private regulation by demonstrating how the effectiveness of externally driven interventions depends on the interaction between institutional design and local organizational conditions (Amengual et al., 2020; Bartley, 2007, 2018). Fourth, it identifies relationally intensive production environments as a

key boundary condition for the translation of capability into performance, showing that the effects of capability-based interventions are concentrated in domains where authority is enacted through ongoing coordination and interaction (Bechky, 2006; Gittell, 2002, 2016; Ranganathan & Shivaram, 2021). Finally, the paper positions Global South organizational contexts, especially those subject to transnational governance initiatives (Bartley, 2007, 2018; Donaghey & Reinecke, 2018; Kourula et al., 2019) as sites for theory generation by exposing boundary conditions of prevailing institutional accounts and by showing how variation in implementation conditions shapes the translation of organizational practices (George et al., 2016; Phillips & Ranganathan, 2025).

The remainder of the paper proceeds as follows. Section 2 develops the theoretical framework and derives the respective hypotheses. Section 3 describes the empirical context and institutional setting. Sections 4 and 5 outline the data and empirical strategy. Section 6 presents the results while section 7 discusses implications of the findings for theory and practice, and Section 8 concludes.

2 Theoretical Framing

Transnational efforts to shape labor, gender, and managerial practices in global supply chains are often organized through corporate social responsibility (CSR) and private-governance initiatives. These models are designed, financed, or legitimated by Global North buyers, international organizations, and civil society actors, but subsequently enacted within supplier firms operating under different institutional and production conditions (Banerjee, 2008; Bartley, 2018; Djelic & Sahlin-Andersson, 2006; Scherer & Palazzo, 2011). This transnational separation underscores a central concern of decoupling theory (Bromley & Powell, 2012; Meyer & Rowan, 1977), in which the formal adoption of compliance systems generates legitimacy while remaining only weakly connected to the organizational routines and production practices that structure day-to-day work (Bird et al., 2019; Distelhorst & Locke, 2018; Locke, 2013).

Decoupling is especially salient in supply chains because the actors who design interventions are distinct from those who implement them. Local managers retain discretion over production, promotion, and labor control while addressing cost, throughput, and delivery pressures that may conflict with the social objectives advanced by external stakeholders. The misalignment of external design with local incentives and constraints, creates scope for formal adoption with-

out substantive integration (Malesky & Taussig, 2017). The pattern is well documented across private labor governance initiatives like codes of conduct, audit regimes, and certification systems, which induce formal compliance while producing uneven effects on workplace practices and worker outcomes (Amengual et al., 2020; Distelhorst & Locke, 2018; Locke, 2013). Audit-based regimes generate both forms of decoupling subsequently identified by Bromley and Powell (2012): policy–practice decoupling, in which formal policies are unevenly implemented, and means–ends decoupling, in which implemented practices remain weakly linked to intended outcomes. Outcomes depend on how interventions are implemented within organizations. The capacity of external private actors to govern shapes the stringency of enforcement practices (Pierce & Toffel, 2013), while internal structures within supplier firms determine whether legitimacy demands are incorporated into labor practices or kept separate from core production routines (Bird et al., 2019). Therefore, a central issue is whether these interventions are enacted in practice beyond just formal adoption.

Capability-based interventions therefore can differ from compliance-based interventions in both their mechanism and their implications for organizational change. In emerging-market settings, such as in the Global South, the value of firm resources is shaped by institutional context and how those resources are deployed within the firm (Taussig & Delios, 2015). Compliance-based interventions act on the firm from outside, specifying codified standards and monitoring whether they are formally observed while leaving the firm’s internal resource base unchanged. Conversely, capability-based interventions act directly on the firm’s human resource base by developing skills in individuals situated inside its technical core. A large literature on management practices establishes that this resource base is itself a primary driver of firm performance: variation in managerial capability shapes productivity, effort, retention, and learning through the organization of day-to-day work (Adhvaryu, Murathanoglu, & Nyshadham, 2023; Bandiera et al., 2020; Bloom & Van Reenen, 2007; Hoffman & Tadelis, 2021; Lazear et al., 2015). From this perspective, interventions that build supervisory capability and place trained individuals into operational roles should improve performance by altering what supervisors are able to do. However, since externally developed models are enacted through local actors and embedded in the conditions under which those actors work (S. M. Ansari et al., 2010; Djelic & Sahlin-Andersson, 2006), the conditions under which transferred capability is recognized as authority and translated into organizational outcomes remain underexplored.

Gendered cultural norms shape the capability-building process by determining whether newly

trained supervisors are recognized as legitimate occupants of supervisory roles, and therefore whether capability-based interventions are enacted in practice or remain decoupled, as often observed in compliance-driven initiatives. Research on gender-targeted organizational practices shows that formal equality policies, diversity initiatives and representation-oriented reforms often produce uneven effects, with outcomes depending on implementation conditions, accountability structures and the organizational support available to those entering authority roles (Castilla & Benard, 2010; Dobbin & Kalev, 2016; Kalev et al., 2006). The performance consequences of female leadership are institutionally contingent, varying with the extent to which women's authority is normatively and organizationally supported (Dezső & Ross, 2012; Flabbi et al., 2019; Zhang, 2020), which implies that gender-targeted capability-building cannot be treated as a generic training intervention.

Capability-building interventions both expand managerial capability and reassign authority, making their effects contingent on how that authority is evaluated within the receiving organization raising. This dependence is particularly consequential in labor-intensive Global South production settings. Much of the organizational literature on gender inequality has been developed in Global North contexts, where inequality is commonly conceptualized as a pipeline problem in which women enter organizations but become less represented at successive levels of hierarchy (Bertrand, 2018; Cotter et al., 2001). In many export-manufacturing settings, however, the structure of inequality differs. Women may constitute a large share of the production workforce while remaining largely excluded from supervisory authority, producing role-level segregation rather than gradual attrition (Heath & Mobarak, 2015; Kabeer, 2004; Macchiavello et al., 2026). This structural difference brings into view assumptions embedded in pipeline-based theories of managerial capability and gender diversity, including assumptions of formal equality, gradual career progression, and prior exposure to women in authority roles (George et al., 2016; Phillips & Ranganathan, 2025; Tsui, 2007). The legitimacy of women's authority therefore becomes the locus where capability-based interventions either mitigate or reproduce decoupling, since authority is not only formally assigned but socially evaluated.

Theories of role congruity and status characteristics predict that women entering male-typed authority roles face evaluative disadvantage when expectations of competence and legitimacy are shaped by gendered beliefs (Eagly & Karau, 2002; Heilman, 2012; Ridgeway, 2011). Role-level segregation therefore creates a distinctive decoupling risk for capability-based interventions. The translation of capability into outcomes depends on whether supervisory authority is both

supported from above and recognized from below. From above, managers may formally adopt the intervention while hesitating to promote, assign, or empower women supervisors in ways that provide real operational discretion. From below, workers may question or resist the authority of women supervisors, limiting their ability to coordinate work. In both directions, capability may be present yet remain weakly connected to outcomes because the authority required to enact it is contested. Capability-building can mitigate this constraint by providing observable evidence of competence, but its effectiveness depends on whether such evidence is sufficient to shift how authority is evaluated within the organization (Doering & Thébaud, 2017; Ridgeway, 2011).

These dynamics are most consequential in production environments where supervisory authority is enacted through ongoing interaction rather than formal oversight alone. In such settings, the recognition of authority depends on the supervisor’s ability to coordinate work, communicate effectively, and manage interdependent tasks in real time. We therefore expect the effects of capability-based interventions to be most visible in domains where supervisory capability is directly enacted and observed, a condition that is especially pronounced in relationally interdependent production systems (Bechky, 2006; Gittell, 2002, 2016; Thompson, 1967).

2.1 Capability, Compliance, and the Limits of Decoupling

The two-tiered labor governance structure reintroduces the notion of “decoupling,” a central problem in institutional theory. Meyer and Rowan (1977) argue that organizations respond to institutional pressures by adopting formal structures while insulating their technical core, thereby maintaining legitimacy without disrupting operations. Empirical evidence for decoupling under compliance-based labor governance is well established. Audit-based regimes generate both policy-practice and means-end decoupling subsequently identified by Bromley and Powell (2012). In global supply chains, these patterns arise because compliance regimes operate at a distance from the technical core of the firm (Meyer & Rowan, 1977; Thompson, 1967). They specify standards to be implemented locally, but do not directly alter the capabilities or routines through which production is organized (Amengual et al., 2020; Distelhorst & Locke, 2018; Locke, 2013).

A separate body of research provides a strong positive prior for interventions that do alter the firm’s internal resource base. Variation in management practices explains substantial dif-

ferences in productivity, profitability, and survival across firms and countries (Bandiera et al., 2020; Bloom & Van Reenen, 2007). Within firms, supervisors and managers have measurable value-added, shaping worker productivity, effort allocation, retention, and learning through the organization of day-to-day work (Adhvaryu, Nyshadham, & Tamayo, 2023; Bender et al., 2018; Bertrand & Schoar, 2003; Hoffman & Tadelis, 2021; Lazear et al., 2015). Evidence from management-training and consulting interventions shows that capability constraints can be relaxed through structured interventions, particularly where firms lack systematic managerial practices (Bloom et al., 2013; Bruhn et al., 2018; Iacovone et al., 2022). This literature implies that interventions targeting managerial capability should improve operational outcomes when they affect the actors who organize production.

Capability-based transnational interventions differ from compliance-based interventions in the mechanism through which they seek to generate change. Rather than specifying practices to be adopted, they invest in the skills of actors who occupy operational roles. Training and promotion place capability inside the technical core, where it is enacted through role performance. This perspective aligns with research on organizational routines and practice, which emphasizes that organizational outcomes are produced through enacted behavior rather than formal structures alone (Feldman & Pentland, 2003; Levinthal & Rerup, 2006). The literature primarily examines the efficacy of compliance-based interventions, where governance operates through externally specified standards and verification mechanisms. Under such arrangements, firms can maintain the appearance of conformity while preserving non-conforming practices in domains that are difficult to observe (Boxenbaum & Jonsson, 2017; Egels-Zandén, 2007; Esbenshade, 2004; MacLean & Behnam, 2010; Short et al., 2016). The resulting pattern is consistent with means-ends decoupling where organizational activity expands through audits, reporting, and training without commensurate improvements in substantive firm-level outcomes (Distelhorst & Locke, 2018; LeBaron et al., 2017).

The compliance-capability distinction has significant implications for decoupling. When practices are embodied in individuals performing operational roles, the gap between formal adoption and practice depends less on symbolic compliance and more on whether those individuals are able to apply their capabilities in day-to-day work. Capability-based interventions are therefore less readily classified as purely symbolic adoption given that they sustain results through ongoing work activities (Bromley & Powell, 2012; Canales, 2014; Hallett, 2010). At the same time, capability does not automatically translate into performance. Evidence from management

interventions shows substantial heterogeneity in outcomes, reflecting variation in organizational context, implementation, and complementarities with existing practices (Adhvaryu, Nyshadham, & Tamayo, 2023; Bandiera et al., 2020; Bloom et al., 2013; Bruhn et al., 2018). Amengual et al. (2020) describe this as a “missing middle” Amengual et al., 2020, p. 818: the absence of organizational capabilities needed to translate external pressure into sustained improvements in worker outcomes.

Compliance regimes often require local managers to absorb costs associated with external standards, such as reporting requirements or constraints on labor practices, while benefits accrue to external stakeholders. Capability-based interventions, by contrast, can be structured so that their proximate effects coincide with operational outcomes that local managers already value, including throughput, coordination, quality, and retention. Research on management practices suggests that such alignment increases the likelihood that interventions affect core organizational routines (Bandiera et al., 2020; Bloom et al., 2013; Ranganathan & Shivaram, 2021). Following S. M. Ansari et al. (2010), the carrier of the institutional intervention shifts from organizational structures to individual actors embedded in the production process.

These mechanisms suggest that capability-based interventions alter the conditions under which decoupling occurs. The risk of policy–practice decoupling is reduced because the intervention is enacted within the technical core, but the risk of means–ends decoupling remains if capability is not translated into effective role performance. Newly acquired capabilities may fail to translate into outcomes if they are misaligned with task demands, undermined by local organizational conditions, or unsupported by complementary incentives. Research on frontline implementation highlights this contingency: local actors can adapt, reinterpret, or dilute externally designed interventions depending on their incentives and identities (Canales, 2014; Doering & Wry, 2022). The locus of decoupling therefore shifts from the boundary between formal structures and practice to the role itself, where the embodiment of capability depends on organizational conditions and authority relations. Capability-based programs are more likely to produce substantive effects when their outcomes align with local managerial interests, such as productivity, coordination, and worker supervision, because these outcomes are both valued and actionable within the firm. In such cases, the means of the intervention (capability-building) and its ends (organizational performance and worker experience) are more likely to remain coupled.

The baseline expectation for H1 follows from the reduction of the policy-practice decoupling:

when trained supervisors are placed into operational roles, capability-based interventions should affect outcomes that local management values and that supervisors can directly influence, particularly production-line performance.

Hypothesis 1 (H1): *Capability-based interventions that promote trained supervisors into operational roles improve performance in the production processes they oversee, relative to comparable supervisors within the same organizational environment.*

The translation of capability into operational performance is also likely to unfold over time. Resistance by managers and/or subordinates to breaking gender norms takes time to diminish, and training does not provide the full stock of local operational knowledge required to manage production effectively. Supervisors must learn line-specific constraints, product variation, worker capabilities, and bottleneck dynamics. Learning-by-doing models predict that performance improves as actors accumulate role-specific experience and refine routines through repeated problem solving (Argote, 2012; Benkard, 2000; Lazear et al., 2015). This process is particularly relevant for newly promoted supervisors, for whom early tenure involves both learning production processes and establishing operational authority. Accordingly, the performance effects of capability-based interventions should strengthen with supervisor tenure, as trained supervisors accumulate experience and convert capability into operational value.

Hypothesis 2 (H1a): *The operational performance effects of capability-based interventions strengthen with supervisor tenure, as trained supervisors accumulate role-specific experience.*

2.2 Gender Segregation and the Legitimacy of Representation

Capability must be enacted through authority to affect organizational outcomes. Formal promotion confers positional authority, but its effectiveness depends on whether that authority is supported by managers above and recognized by workers below. This condition is especially consequential when capability-based interventions promote women into roles from which they have historically been excluded, as role-level gender segregation reinforces expectations about who is appropriate for positions of authority (Charles & Grusky, 2004; Doering & Thébaud, 2017; Reskin, 1993; Ridgeway, 2011).

Research on gender inequality in organizations has often conceptualized inequality as a pipeline problem, in which women’s representation declines across successive hierarchical transitions

(Bertrand, 2018; Cotter et al., 2001; Kleven et al., 2019). The structure differs in many labor-intensive production settings in the Global South. Women may constitute a large share of the production workforce while remaining largely excluded from supervisory authority, producing a form of role-level gender segregation at the boundary between production work and supervision (Charles & Grusky, 2004; Heath & Mobarak, 2015; Kabeer, 2004; Macchiavello et al., 2026; Reskin, 1993). In such settings, the transition into supervision is not simply a step along a career ladder but a crossing of a gendered authority boundary, where the legitimacy of the role is socially evaluated and cannot be assumed from formal promotion alone (Doering & Thébaud, 2017; Eagly & Karau, 2002; Ridgeway, 2011).

In labor-intensive manufacturing sectors in the Global South, large female operator workforces coexist with overwhelmingly male supervisory hierarchies, producing role-level segregation, where women are largely absent from supervisory positions despite dominating the lower tiers of the production hierarchy (Heath & Mobarak, 2015; Kabeer, 2004; Macchiavello et al., 2026). Here, inequality is not primarily the result of attrition across grades of professional progression but of a boundary at the point of entry into the supervisory management role. This pattern aligns with sociological accounts of occupational sex-typing, in which roles become associated with gender identities that resist individual-level counterexamples (Charles & Grusky, 2004; Reskin, 1993). Importantly, in this setting, segregation operates within the same production unit, compressing the boundary between worker and supervisor onto the factory shop floor.

Role-level segregation creates legitimacy challenges in two directions. The first concerns legitimacy from above. Factory owners, production managers, and human resource managers control selection, assignment, mentoring, and evaluation in supplier firms (Bamberger & Pratt, 2010; Macchiavello et al., 2026). They may formally adopt gender-targeted interventions while withholding the organizational support required for women supervisors to exercise authority in practice. Such withholding can arise when decision-makers view women as less suited to supervisory roles, anticipate resistance from peers or workers, or treat promoted women as symbolic evidence of compliance rather than as full occupants of the role (Bromley & Powell, 2012; Eagly & Karau, 2002; Hallett, 2010; Heilman, 2012; Kanter, 1977; Williams, 1995). Under these conditions, capability may be present but not fully authorized.

The second challenge concerns legitimacy from below. Supervisory authority depends on workers accepting instructions, feedback, discipline, and coordination as legitimate. Theories of role

congruity and status characteristics predict that women entering male-typed authority roles face evaluative disadvantage because gendered expectations shape assessments of competence, legitimacy, and appropriate behavior (Eagly & Karau, 2002; Heilman, 2012; Ridgeway, 2011; Ridgeway & Correll, 2004). Empirical work shows that such expectations become attached to occupational roles and affect the authority granted to subsequent role occupants. Doering and Thébaud (2017) demonstrate that the gender-typing of managerial roles shapes compliance with managers' directives, indicating that authority is not only a formal attribute of a position but also a socially evaluated relationship. These two sources of constraint jointly define a bilateral legitimacy problem. Weak managerial support from above limits assignment quality, discretion, mentoring, and the organizational backing required to implement production decisions. Weak worker recognition from below undermines compliance with instructions and reduces the effectiveness of coordination. In both directions, capability may be built without being enacted as effective authority, and means–ends decoupling re-emerges within the role itself: capability is built but is not converted into outcomes because the authority required to enact it is contested (Bromley & Powell, 2012). Doering and Thébaud (2017) show that the gender of initial role occupants shapes the perceived authority of the role itself, with persistent effects on subsequent occupants. This suggests that entry into segregated roles is not only an individual-level challenge but also a process through which roles acquire gendered meanings. At the same time, individuals often face ambiguity in interpreting gender-based disadvantage, limiting their ability to respond strategically (Doering et al., 2023). These mechanisms imply that role-level segregation generates a legitimacy deficit that is both structural and difficult to resolve through unstructured learning on the job.

Capability-building can mitigate this legitimacy deficit by making competence more observable. Training provides role-specific skills and behavioral scripts that can be enacted in daily interactions, including communication, feedback, and conflict management (Avolio et al., 2009; Bandura, 1977; Blume et al., 2010; Lacerenza et al., 2017). These behaviors generate task-relevant information about supervisory competence, which can reduce reliance on gendered expectations in evaluating authority (Ridgeway, 2011; Ridgeway & Correll, 2004). This mechanism is consistent with status characteristics theory, which predicts that diffuse status beliefs play a greater role in evaluation when task-relevant information is limited, and that their influence diminishes as performance-relevant evidence becomes available (Berger et al., 1972; Ridgeway, 2011; Ridgeway & Correll, 2004).

Capability-building interventions that equip individuals with role-specific skills, by making those skills observable in practice, can provide alternative signals that substitute for stereotypical inference (Ely et al., 2011; Lacerenza et al., 2017). This information mechanism is particularly relevant under role-level segregation, where entrants lack prior opportunities to establish credibility.

H2 specifies the conditions under which capability investment can offset the contestation of authority that leads to means-end decoupling. Subordinate evaluations provide a direct test of this mechanism. Worker-supervisor interactions are ongoing assessments of authority under conditions of task-relevant observation. If capability-building reduces the legitimacy deficit, trained women supervisors should receive more favorable subordinate evaluations than otherwise comparable untrained women supervisors.

Hypothesis 3 (H2): *Capability-based interventions reduce the legitimacy deficit faced by women entering supervisory roles. Trained women supervisors receive more favorable subordinate evaluations than comparable untrained women supervisors and narrow the evaluative gap relative to male supervisors.*

2.3 Relational Coordination and the Concentration of Capability Effects

Production systems vary in the extent to which performance depends on coordination across interdependent tasks. In settings characterized by sequential and reciprocal interdependence, the output of one worker or station depends on the timely and accurate performance of others, making coordination a central condition of performance (Thompson, 1967). Labor-intensive garment production exemplifies such interdependence: disruptions arising from bottlenecks, quality problems, worker absence, or interpersonal conflict propagate across the production line and affect aggregate output (Gittell, 2016; Ranganathan & Shivaram, 2021).

Supervisory capability in these environments is enacted through the integration and coordination of interdependent tasks rather than through monitoring alone (Adler et al., 1999; Bechky, 2006; Gittell, 2002; Okhuysen & Bechky, 2009; Thompson, 1967). Supervisors influence outcomes by reallocating tasks, resolving bottlenecks, communicating priorities, addressing quality problems, and sustaining worker engagement. Relational coordination theory establishes that performance in interdependent systems depends on communication, shared goals, shared knowledge, and mutual respect among actors whose tasks are linked (Gittell, 2002, 2016). Empirical

studies of production work confirm that managerial influence operates through practices embedded in ongoing interaction. In garment manufacturing, managers affect worker productivity through direct engagement in subordinate tasks, including hands-on problem solving and workflow management (Ranganathan & Shivaram, 2021). Research in complex work settings further demonstrates that effective task integration is achieved through role enactment and interaction rather than through formal structures alone (Bechky, 2006).

The relational character of supervisory work links Hypothesis 4 to the legitimacy mechanism developed in Section 2.2. Frequent interaction generates task-relevant information about supervisory competence, reducing reliance on diffuse status beliefs in evaluation (Ridgeway, 2011; Ridgeway & Correll, 2004). Status characteristics theory predicts that the influence of generated expectations declines as performance-relevant information becomes available (Heilman, 2012; Ridgeway, 2011; Ridgeway & Correll, 2004). Repeated observation of competent role performance increases the likelihood that supervisory authority is recognized on the basis of enacted capability rather than inferred from social categories. Relational interdependence is therefore not only a feature of the production system but a condition under which capability investment can be translated into recognized authority.

Relational Domain Concentration

Supervisory skill – and hence, capability-based interventions – should matter the most for outcomes that depend directly on supervisory coordination of interdependent work. Operational outcomes such as line efficiency are responsive to coordination because production flow depends on the timely resolution of bottlenecks and quality problems (Ranganathan & Shivaram, 2021; Thompson, 1967). Subordinate-reported outcomes such as communication, guidance, respectful treatment, and willingness to assist with production tasks reflect the supervisor’s role in coordinating interdependent work and so are likewise responsive (Gittell, 2002, 2016). Outcomes less proximate to supervisory coordination should be less responsive to capability investment because the channel through which the intervention operates is not engaged.

Hypothesis 4 (H3): *The effects of capability-based interventions are concentrated in outcomes that depend directly on relational coordination in interdependent production.*

Temporal Sequencing Across Outcome Types

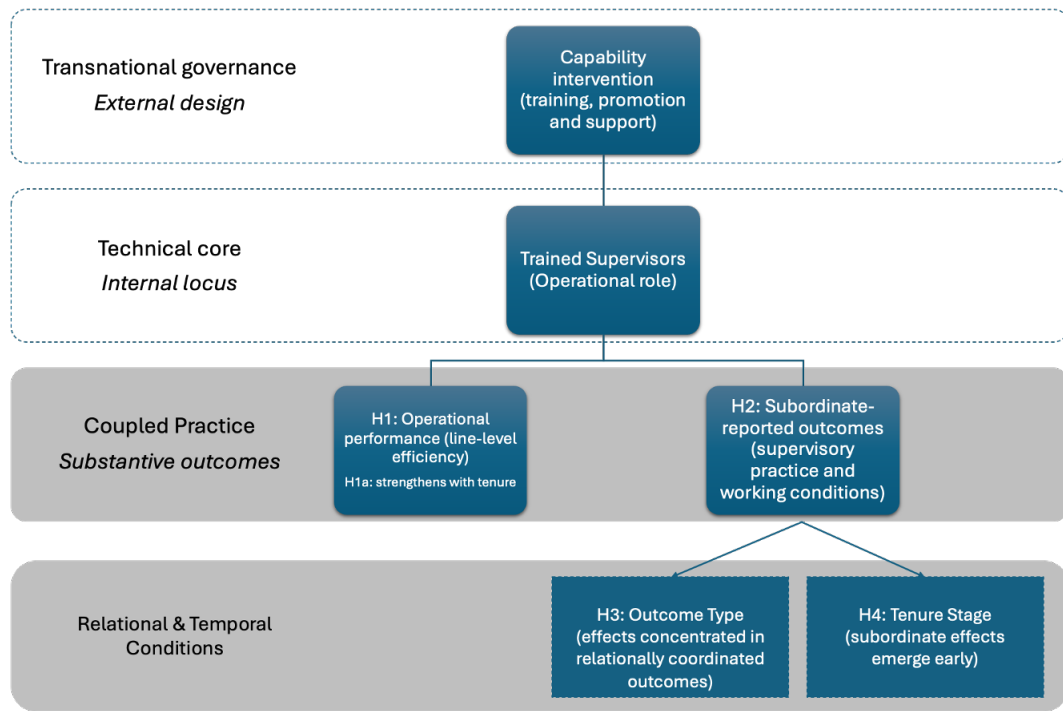
Outcomes within the relational-coordination domain differ in the speed at which capability is translated into observable change. Operational performance depends on the accumulation of role-specific knowledge, including line-level constraints, worker capabilities, and bottleneck dynamics. Improvements in production performance therefore emerge gradually, as supervisors gain experience and refine routines through repeated problem-solving (Argote, 2012; Benkard, 2000; Lazear et al., 2015). This logic underwrites the tenure-based sub-claim in Hypothesis 2. Subordinate-reported assessments of supervisory practice follow a different temporal profile. Workers observe communication, feedback, fairness, and coordination behaviors from the outset of the supervisory relationship. The behavioral scripts acquired through training can be transferred into role performance in domains such as communication, coaching, and conflict management before line-specific operational knowledge has been accumulated (Bandura, 1977; Blume et al., 2010; Lacerenza et al., 2017). Subordinate-reported outcomes therefore provide a mechanism-proximal measure of capability enactment, available earlier in tenure than the operational outcomes through which the same capability is eventually expressed in production performance.

Hypothesis 5 (H4): *The effects of capability-based interventions on subordinate-reported supervisory practice and working conditions emerge earlier in supervisor tenure than their effects on operational performance.*

Our theoretical framework specifies the conditions under which capability-based interventions mitigate decoupling and produce substantive rather than ceremonial change. The framework proceeds as illustrated in Figure 1. We first theorize capability-based intervention as a distinct institutional form and derive expectations for operational performance and tenure-based learning. The separation between external intervention design and local implementation creates the conditions under which transnational regimes generate decoupling. By embedding policy through the actors situated inside the technical core, capability-based intervention mitigates policy-practice decoupling and produces operational effects that strengthen as trained actors accumulate role-specific experience (H1, H1a). We then analyze how role-level segregation and gendered cultural norms structure the legitimacy of authority from above and below, shaping whether trained actors are supported and recognized as authority holders. When authority is contested, means–ends decoupling can arise within the role itself, as individuals may possess

the relevant capabilities but be unable to translate them into outcomes. Capability investment can offset the legitimacy deficit faced by individuals entering authority roles from previously excluded groups, observable in evaluations by those subject to the new authority (H2). Finally, we show how relationally intensive production environments, in which performance depends on ongoing coordination among interdependent actors, condition the timing and concentration of intervention effects: effects on relational outcomes are concentrated in outcomes that depend on relational coordination (H3) and emerge earlier than effects on outcomes that depend on accumulated operational knowledge (H4).

Figure 1: Theoretical Framework



3 Context

Bangladesh’s ready-made garment (RMG) sector combines high female labor force participation at the production level with persistent gender stratification at the first level of management. The sector generated USD 47 billion in exports in 2023, accounting for over 80 percent of total export earnings (BGMEA, 2024), and employs more than four million workers, the majority of whom are women (ILO, 2020). Women hold only five percent of line-supervisor positions (Macchiavello et al., 2026). This creates a context where both the allocation of managerial talent and the institutional conditions shaping its deployment are salient (Locke, 2013; Bartley,

2007).

Near-parity at entry alongside sharp under-representation at first promotion reflects the “broken rung” pattern documented in other economies (McKinsey & Company & LeanIn.Org, 2023) and is particularly visible in this setting given the scale of the female production workforce. This gap is not solely a function of skills but reflects institutional constraints, including gender norms around authority and leadership (Heath and Mobarak, 2015, Macchiavello et al., 2026), limited access to training, and organizational practices that restrict women’s advancement (Barrientos, 2019). These features make the setting theoretically informative for examining how gender-targeted interventions interact with local institutional environments, particularly where baseline assumptions of gender equality embedded in many organizational practices do not hold.

The sector is embedded in transnational governance structures shaped by multinational buyers, who use corporate social responsibility frameworks to influence labor standards and gender equity (Amengual, 2010; Distelhorst & Locke, 2018; Locke, 2013). These structures act as carriers of organizational practices originating in the Global North and implemented in supplier firms in the Global South (Czarniawska, Joerges, et al., 1996; Sahlin & Wedlin, 2008). The setting therefore provides a context in which to examine how traveling templates are translated into local organizational environments and how implementation conditions shape their effectiveness.

3.1 Line-based production and the supervisory role

Garment production is organized around lines of 30 to 60 sewing-machine operators, each performing a discrete task in assembling a garment. Output flows sequentially, so line-day efficiency is jointly determined by all operators, as disruptions at any station affect downstream output (Adhvaryu, Nyshadham, & Tamayo, 2023). Pace is set by Standard Minute Value (SMV), an engineering measure of task time. Efficiency is calculated as standard minutes produced divided by attended minutes and typically ranges between 45 and 70 percent in our sample.

Each line is managed by a first-line supervisor who allocates operators, balances the line, addresses quality and machine issues, manages absenteeism, and provides coaching (Uckat & Woodruff, 2019). Production is interlinked (Bird et al., 2019), so disruptions at any station propagate quickly across the line. The supervisor is the point at which disruptions are absorbed or amplified. The role is also relational. Capabilities are exercised through continuous interaction rather than discrete decisions, so supervisory authority is constructed through re-

peated exchange.

Interlinked production and relational exercise make supervisory effectiveness central to performance and sensitive to legitimacy. The workforce is predominantly female while the supervisory hierarchy has historically been male, reflecting persistent role-level segregation (Heath & Morarak, 2015; Macchiavello et al., 2026). Authority is therefore exercised across a gendered relational interface that is proximate and continuously observed. Gender stereotypes are most salient in the domain where capability matters for performance (Heilman, 2012; Ridgeway, 2011). This intersection makes the setting theoretically relevant for studying capability-based interventions targeted at female supervisors.

3.2 The GEAR Program

The Gender Equality and Returns (GEAR) program is a CSR-aligned intervention designed to promote experienced female operators into first-line supervisory roles combined technical and relational (soft-skills) capacity-building. The program was developed by the International Finance Corporation (IFC) and the International Labour Organization (ILO) under the Better Work Bangladesh and co-financed by multinational buyers and local factories. This multi-actor governance structure, in which a transnational template is implemented by supplier factories, reflects contemporary supply-chain CSR (Distelhorst & Locke, 2018; Locke, 2013).

GEAR was implemented across 50 factories between 2019 and 2022. Of 490 enrolled participants, 441 completed training, 303 were promoted, and 203 remained in post at follow-up. The program combined approximately 64 hours of classroom instruction over ten days, covering production-engineering content (e.g., line balancing, quality control, efficiency calculation) and relational content (communication, leadership, conflict resolution), followed by a three- to six-month on-the-job trial as a trainee supervisor, alongside workshops for senior managers intended to build organizational support for female supervisory authority. Full details of factory characteristics, candidate selection, curriculum, program timeline, and participation data are provided in program report (see the technical report by Better Work Bangladesh and International Finance Corporation (2025)). This scale and structure allow us to compare trained female supervisors to observationally similar counterparts within the same production environment.

Two features distinguish the intervention. GEAR is capability-based, embedding practices in trained individuals rather than codifying them in formal rules, in contrast to audit-based CSR

approaches (Bird et al., 2019; Distelhorst & Locke, 2018; Locke, 2013). GEAR also builds on the Work-Progression and Productivity Toolkit (WPT), which piloted the program that became GEAR (Uckat & Woodruff, 2019). The design of the WPT project allowed for measuring outcomes only for a period of six months following the training.

This setting allows examination of capability-based gender-targeted interventions where the focal role is tightly interlinked with the process process and relationally exercised, institutional conditions reflect persistent gender stratification, and the intervention is implemented as a transnational template through multi-actor governance.

4 Data and Measures

The empirical setting combines administrative production records with original survey data collected from supervisors, workers, and managers across 27 garment factories. Administrative data provide high-frequency line-level measures of output, efficiency, and attendance, which are linked to the supervisors managing each production line. Survey data capture supervisor characteristics, treatment status, and worker-reported assessments of supervisory practices and working conditions. The resulting dataset is structured at multiple levels, connecting supervisor attributes and behaviors to both objective production outcomes and worker experiences.

The sample includes trained supervisors who participated in the intervention and a matched group of comparison supervisors within the same factories, enabling within-factory comparisons under common organizational conditions. Key outcome variables include line-level efficiency, defined as the ratio of standard minutes produced to attended labor minutes, and worker-reported indices of supervisory practice capturing leadership quality, career support, respectful treatment, and engagement in production tasks. A composite WCI summarizes workers' reported shop-floor environment. Control variables account for product complexity, line-level learning, and supervisor and worker characteristics.

5 Empirical Strategy

The empirical strategy estimates the effects of capability-based managerial training on production outcomes, worker-reported supervisory practice, and working conditions, and tests three predictions derived from the theoretical framework. Identification rests on within-factory com-

parisons between supervisors who participated in the GEAR program and observationally similar supervisors who did not. Comparing supervisors who operate under common production technologies, buyer relationships, and managerial regimes absorbs unobserved heterogeneity at the factory level and isolates differences in supervisory practice attributable to the intervention. The bundled nature of the intervention shapes interpretation. GEAR combines capability-building with role assignment (promotion into first-line supervision), so the pooled treatment coefficient captures the joint effect of training and promotion rather than training alone. Disentangling the two components requires the gender decomposition described in Section 5.3, which compares trained women with untrained women and with male supervisors to separate the contribution of capability-building from the contribution of representation.

5.1 Productivity outcomes (H1, H1a)

For line-day production outcomes, the estimating equation is:

$$Y_{lft} = \alpha + \beta \text{Trainee}_{lf} + \theta \text{Tenure}_{lf} + \lambda X_{lft} + \gamma' Z_{lf} + \delta_t + Y_{0lft} \varepsilon_{lft}, \quad (1)$$

where Y_{lft} denotes line-day efficiency or absenteeism for line l in factory f on day t . Trainee_{lf} equals one if line l is supervised by a GEAR-trained supervisor. Tenure_{lf} measures supervisory experience in months, capturing learning-by-doing (Benkard, 2000). X_{lft} contains time-varying production controls, principally style complexity (mean SMV) and cumulative days producing the same style (Levitt et al., 2013). Z_{lf} contains supervisor-level covariates: age, education, sector experience, prior factories, and marital status. Day fixed effects δ_t absorb shocks common across factories on a given date. We use an ANCOVA specification, controlling for the average value of the outcome variable (Y_{0lft} , which is more efficient than fixed effects when intertemporal correlation is low, as is the case with line-level efficiency (McKenzie, 2012). Standard errors are clustered at the line level, which is the relevant level closest to the unit of treatment (Abadie et al., 2017). The consequences for factory-level clustering is discussed in Section 5.5.

The coefficient β in Equation 1 provides the primary test of H1: capability-based interventions improve outcomes locally coupled to managerial objectives. A positive and significant β indicates that lines managed by trained supervisors achieve higher efficiency under the same production conditions and product mix. To test whether capability effects accumulate with role experience (H1a), an interacted specification adds $\text{Trainee}_{lf} \times \text{Tenure}_{lf}$.

5.2 Worker-reported supervisory practice and working conditions (H2, H3 and H4)

For worker-reported outcomes, the estimating equation is:

$$Y_{isf} = \alpha + \beta \text{Trainee}_{sf} + \theta \text{Tenure}_{sf} + \gamma' X_i + \eta' Z_{sf} + \delta_f + \varepsilon_{isf}, \quad (2)$$

where Y_{isf} denotes a standardised supervisor-quality index (Leadership Quality, Career Support, Respectful Treatment, Subordinate Scut Work, or Technical Competence) or the Working Conditions Index, reported by worker i for supervisor s in factory f . X_i contains worker-level controls (age, gender, education, factory tenure, family characteristics). Z_{sf} contains supervisor-level controls. Factory fixed effects δ_f absorb institutional differences across factories, including HR practices and buyer compliance systems. In contrast to the production data, we do not have pre-treatment measures of the dependent variables, so ANCOVA is not an option.

Standard errors are clustered at the supervisor level because each supervisor is evaluated by multiple workers (Abadie et al., 2017). The Working Conditions Index serves as a locally-coupled outcome under H1 alongside production efficiency, since worker-experienced conditions are an immediate consequence of supervisory practice and a proximate input to engagement and retention (Kossek et al., 2014). The supervisor-quality indices serve as the primary outcomes for H2 and H3.

5.3 Gender decomposition (H2)

The pooled treatment coefficient β in Equations 1 and 2 confounds the effect of training with the effect of being a female supervisor in a previously male-typed role. The gender decomposition addresses this by re-estimating both equations with the comparison group disaggregated by gender:

$$Y = \alpha + \beta_T \text{Trainee} + \beta_F \text{FemaleComp} + \theta \text{Tenure} + \text{controls} + \varepsilon, \quad (3)$$

where FemaleComp equals one for non-trained female supervisors and zero for non-trained male supervisors, who form the omitted category. Trained women enter through Trainee.

The decomposition produces three quantities of theoretical interest. The contrast β_T (trained

women relative to untrained men) recovers the joint effect of training and gender substitution reported in the pooled specification. The contrast β_F (untrained women relative to untrained men) isolates the gender-substitution effect: what occurs when a woman replaces a man in a previously male-typed role without capability-building. The difference $\beta_T - \beta_F$ isolates the marginal contribution of capability-building, holding gender constant.

The decomposition provides the test of H2. If subordinate evaluations of untrained female supervisors are lower than evaluations of male supervisors ($\beta_F < 0$ on relational supervisor-quality outcomes), the data are consistent with a legitimacy deficit at the role-level boundary, as predicted by role congruity and status characteristics theories ((Eagly & Karau, 2002; Heilman, 2012; Ridgeway, 2011)). If the deficit is offset or reversed for trained women ($\beta_T \geq 0$), capability investment offsets the legitimacy deficit faced by women entering male-typed roles. The contrast $\beta_T - \beta_F$ provides a direct estimate of the offset.

The decomposition is feasible because the comparison-supervisor pool contains both men and women, with women representing approximately 24 percent of comparison supervisors. The female comparison group is small but is selected on the same factory-internal criteria as the male comparison group (supervisory tenure, sector experience, role responsibilities).

5.4 Relational versus technical outcomes (H3)

H3 predicts that intervention effects are concentrated in outcomes that depend on relational coordination rather than on individual technical execution. The test is conducted within the worker-reported supervisor-quality indices by comparing the trainee coefficient across outcome categories that vary in their reliance on supervisor-worker interaction. Four indices (Leadership Quality, Career Support, Respectful Treatment, Subordinate Scut Work) load primarily on the relational dimension while technical competence loads on the single technical dimension.

In the first specification, we re-estimates Equation 2 separately for each outcome and report the trainee coefficient by outcome category, yielding a descriptive comparison of effect magnitudes across the relational-technical distinction.

In the second specification, we stack the worker-outcome data and estimates as below:

$$Y_{iosf} = \alpha + \beta_R(\text{Trainee}_{sf} \times \text{Relational}_o) + \beta_T(\text{Trainee}_{sf} \times \text{Technical}_o) + \mu_o + \text{controls} + \varepsilon_{iosf}, \quad (4)$$

where o indexes outcome category, Relational_o and Technical_o are indicators for outcome type, and μ_o are outcome fixed effects. The contrast $\beta_R - \beta_T$ tests H3 directly: a positive and significant difference indicates that intervention effects are concentrated in relational outcomes, consistent with the prediction that capability investment in relational supervision matters more for performance than capability investment in technical supervision in tightly interlinked, gender-stratified production environments.

5.5 Identifying assumptions and robustness

Identification of β in Equations 1 and 2 rests on the assumption that, conditional on observed characteristics and within-factory comparisons, treated and comparison supervisors would have exhibited similar outcome trajectories in the absence of the intervention. Two features of the design support this assumption. Within-factory comparisons absorb unobserved heterogeneity in production technology, buyer relationships, and managerial systems. The comparison-supervisor pool was constructed by factory management at the time of fieldwork using pre-specified criteria (supervisory tenure, sector experience, role responsibilities), reducing scope for endogenous selection of comparators that would correlate with outcomes.

There are two possible threats to identification which remain despite our econometric specifications. The first is supervisor-line assignment: factory management determines which supervisor manages which line, and assignment may correlate with line characteristics that also affect productivity. The production specification controls for product complexity, cumulative learning, supervisor-level covariates and, crucially, baseline efficiency levels; balance statistics for supervisor and line characteristics are reported in Section 6.1. The second is selection into GEAR participation. Trainees were selected by factory-level advisory committees against eligibility criteria detailed in Better Work Bangladesh and International Finance Corporation (2025), so the matching was based on ex-ante observables.

To address residual selection on observables, the principal robustness analysis implements propensity-score matching. A logit model estimates each supervisor’s probability of GEAR exposure as a function of pre-treatment characteristics (tenure, age, education, factory tenure, prior factories) within-factory; trainees are matched one-to-many to comparison supervisors on the propensity score using a caliper of 0.1 standard deviations, with bias correction following Abadie and Imbens (2011). Average treatment effects on the treated are estimated as outcome

differences between trainees and matched comparators, with standard errors clustered at the factory level.

6 Results

The results address the predictions developed in Section 2. We start with the basic descriptive statistics in Section 6.1. Section 6.2 evaluates whether the intervention produces effects on outcomes locally coupled to managerial interests, focusing on operational efficiency (H1, H1a). Section 6.3 evaluates whether capability investment offsets the legitimacy deficit faced by women entering male-typed supervisory roles, distinguishing effects on trained women from untrained counterparts, and specifically male ones (H2). Section 6.4 evaluates whether intervention effects concentrate in outcomes that depend on relational coordination, comparing across worker-reported indices that vary in their relational content (H3, H4).

6.1 Descriptives

Table 1 reports balance statistics for the supervisor sample. Trainees and comparison supervisors are similar on most observable characteristics, with three exceptions intrinsic to the design. Trainees are female by construction, while the comparison group is approximately one-quarter female. Trainees are slightly younger (27.1 versus 29.3 years, $p < 0.01$) and have longer factory tenure (6.1 versus 3.7 years, $p < 0.01$) but slightly shorter time in supervisory positions (1.8 versus 2.3 years, $p < 0.10$). Educational attainment, marital status, and household composition are statistically indistinguishable between groups. The pattern of differences is consistent with the program’s eligibility criteria, which prioritized internal candidates with substantial production experience for advancement into first-line supervision.

6.2 Capability and Operational Performance

Table 2 reports estimates of the H1 specification on line-day efficiency. Column 1 reports the main effect from Equation 1. The coefficient on trainee status is 0.030 (s.e. 0.022), implying that lines managed by trained supervisors operate approximately 3 percentage points more efficiently than lines managed by matched comparison supervisors, against a control mean of 0.56. Column 2 introduces an indicator for female non-trainees, allowing the trainee coefficient to be interpreted relative to male supervisors. Trained women operate lines 5.4 percentage points

Table 1: Balance: Supervisor Characteristics

Variable	(1) Comparison		(2) Trainee		(1)-(2) Pairwise t-test	
	N	Mean/(SE)	N	Mean/(SE)	N	Mean difference
Age	127	29.260 (0.475)	109	27.138 (0.409)	236	2.122***
Female=1	127	0.236 (0.038)	109	1.000 (0.000)	236	-0.764***
Married=1	127	0.890 (0.028)	109	0.817 (0.037)	236	0.073
Youngest Child Age	86	4.648 (0.410)	72	6.991 (0.509)	158	-2.342***
HH Size	127	1.323 (0.156)	109	1.275 (0.159)	236	0.048
Tot Children	115	1.061 (0.076)	95	1.021 (0.073)	210	0.040
Tot Fact Worked	127	2.614 (0.180)	109	1.284 (0.123)	236	1.330***
Fact Tunure (Yrs)	127	3.661 (0.285)	109	6.108 (0.309)	236	-2.447***
Supervisor Tunure (Yrs)	127	2.256 (0.199)	109	1.849 (0.119)	236	0.407*
Last Month's salary	127	21174.205 (289.718)	109	19347.798 (227.683)	236	1826.407***
Primary Educ or less	127	0.031 (0.016)	109	0.073 (0.025)	236	-0.042
Sec Educ or less	127	0.370 (0.043)	109	0.431 (0.048)	236	-0.061
SSC Pass	127	0.551 (0.044)	109	0.450 (0.048)	236	0.102
HSC Pass	127	0.024 (0.014)	109	0.046 (0.020)	236	-0.022

Sig. Codes: ***: 0.01, **: 0.05, *: 0.1. Note that number of obs is lower for children related variables as the question was restricted to individuals who had children. Acronyms: SSC=Secondary School Certificate; HSC=Higher School Certificate.

more efficiently than male supervisors ($p < 0.05$), and untrained female supervisors operate lines 9.9 percentage points more efficiently than male supervisors ($p < 0.01$). A Wald test of equality between the two female coefficients does not reject the null ($p = 0.07$). Columns 3 and 4 report robustness to log transformation and factory-level clustering of standard errors. The trainee coefficient remains positive across specifications, with the magnitude on the standardized outcome (Column 4) corresponding to roughly 0.07 standard deviations.

The pattern observed is consistent with H1, implying that capability investment in actors situated inside the technical core produces measurable gains in outcomes that local managers monitor closely. The magnitude is comparable to managerial value-added effects documented in personnel economics for closely supervised production work (Bloom & Van Reenen, 2007;

Lazear et al., 2015) and to supervisor-level effects reported by Adhvaryu, Nyshadham, and Tamayo (2023) in the same sector. Two readings of the gender decomposition in Column 2 are consistent with H1. Capability investment becomes coupled to operational outcomes when embodied in supervisors who exercise authority over production lines, irrespective of how those women reach the role. Untrained women who reach supervisory positions through internal promotion are also positively selected on competence, and their performance reflects this selection rather than contradicting the *H1* mechanism.

Column 7 of Table 4 reports estimates on the Working Conditions Index (WCI). Operators working under trained supervisors report WCI scores 0.268 standard deviations higher than operators working under matched comparison supervisors ($p < 0.01$). The WCI is constructed from agreement-format items capturing role clarity, voice, fairness, advancement opportunity, schedule predictability, and recovery opportunities. The WCI improvement provides a second outcome locally coupled to the intervention under H1, distinct from the supervisor-comparison evidence used to test H2.

Effects on line-level absenteeism are directionally consistent with H1 but imprecisely estimated. Coefficients on trainee status range from -0.0025 to 0.0029 across specifications and do not reach conventional significance levels. Factory absenteeism records contain noise from temporary worker substitutions and inconsistent reporting across establishments, which we treat as attenuating precision rather than introducing systematic bias.

Table 3 reports H1a estimates on the tenure trajectory of operational effects. Column 1 introduces the Trainee $\times$ Tenure interaction. The main trainee coefficient becomes negative (-0.040 , n.s.), and the interaction is positive and significant (0.003 per month, $p < 0.05$). The implied trajectory $\beta_1 + \beta_2 \cdot \text{Tenure}$ begins below comparison supervisors at low tenure, reaches parity at approximately 13 months, and surpasses comparison supervisors thereafter. Columns 2–5 confirm the pattern non-parametrically. Trainees in the first year underperform comparison supervisors by 7.6 percentage points ($p < 0.05$); the gap closes in months 13–24; trainees outperform by 9.3 percentage points in months 25–36 ($p < 0.05$) and by 12.0 percentage points beyond 37 months ($p < 0.05$). Figure 2 plots the bucket-level coefficients. The trajectory supports H1a, which predicts that operational effects strengthen as trained supervisors accumulate role-specific knowledge of line constraints, product variation, worker capabilities, and bottleneck dynamics (Benkard, 2000; Levitt et al., 2013). Comparable catch-up dynamics are reported by

Macchiavello et al. (2026) in a randomized trial of female supervisors in this industry.

Table 2: H1:Trainee Effect on Line Efficiency

H1: Trainee Effect on Line Efficiency				
	(1)	(2)	(3)	(4)
	Baseline	vs. Female Comp	Log Efficiency	Std. Eff (Fact Cl.)
Trainee Status	0.030 (0.022)	0.054** (0.023)	0.087 ⁺ (0.054)	0.070 (0.065)
Tenure (mos)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	-0.000 (0.002)
Learning (Style x Line)	0.022*** (0.003)	0.023*** (0.003)	0.065*** (0.009)	0.110*** (0.022)
Female non-trainee		0.099*** (0.023)		
Observations	8548	8548	8519	8548
R^2	0.246	0.264	0.144	0.091
Control Mean	0.56	0.56	-0.71	0.06
p (Trainee = Comp Fem)		0.069		

Standard errors in parentheses

Unit of observation: line-day. Outcomes are measured over the 120-day window pre-survey.

Column 1 (Baseline): trainee main effect on winsorised line efficiency, controlling for supervisor tenure, style-line learning, SMV, baseline efficiency, and supervisor characteristics; date fixed effects; standard errors clustered at the line level.

Column 2 (vs. Female Comp): adds an indicator for non-trainee female supervisors; the bottom row reports the p-value from a Wald test of equality between the trainee coefficient and the non-trainee-female coefficient.

Column 3 (Log Efficiency): replaces the dependent variable with the natural log of efficiency to downweight outliers.

Column 4 (Std. Eff): standardises efficiency within factory and clusters standard errors at the factory level.

Line weights applied throughout. * p<0.10, ** p<0.05, *** p<0.01.

⁺ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 3 reports the share of female supervisors across participating factories before and after program implementation. The proportion of factories with no female supervisors fell from 9.4 to zero percent. The proportion with at least 25 percent female supervisors rose from 7.5 to 22.6 percent. Several factories promoted women beyond the program cohort. Trained women themselves achieved concrete career advancement: approximately half were promoted following training; about 40 percent were retained in supervisory roles at follow-up; salary data show trainees earning approximately 40 percent more than operators and reaching parity with non-trained supervisors. The pattern is consistent with research on the diffusion of organizational practices, in which embedded individuals serve as carriers of new routines that are subsequently adopted more broadly (S. M. Ansari et al., 2010). The intervention's effects extend across the

Table 3: H1a:Trainee x Supervisor Tenure

	Linear	Trainee Effect by Tenure Bucket			
	(1)	(2)	(3)	(4)	(5)
	Linear Int.	≤ 12 mo	13–24 mo	25–36 mo	37+ mo
Trainee Status	-0.040 (0.037)	-0.076** (0.033)	0.030 (0.051)	0.093** (0.044)	0.120** (0.050)
Tenure (mos)	-0.000 (0.001)				
Trainee x Tenure (mos)	0.003** (0.001)				
Learning (Style x Line)	0.023*** (0.003)	0.022*** (0.005)	0.024*** (0.005)	0.036*** (0.006)	0.019** (0.007)
Observations	8548	3457	1862	1876	1353
R^2	0.256	0.346	0.370	0.310	0.274
Control Mean	0.56	0.56	0.59	0.54	0.55

Standard errors in parentheses

Unit of observation: line-day. Outcome is winsorised line efficiency over the 120-day window pre-survey.

Column 1 (Linear Interaction): full sample with Trainee x Tenure (continuous, in months). The interaction coefficient tests whether the trainee effect rises with tenure; in this column the Trainee coefficient reports the effect evaluated at zero months of tenure.

Columns 2-5 (Tenure Buckets): the trainee effect estimated separately within each twelve-month tenure bucket. The pattern of coefficients across columns 2-5 traces the non-parametric tenure profile shown in Figure H1a.

All specifications include style-line learning, SMV, baseline efficiency, supervisor characteristics, date fixed effects, and standard errors clustered at the line level. Line weights applied throughout. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

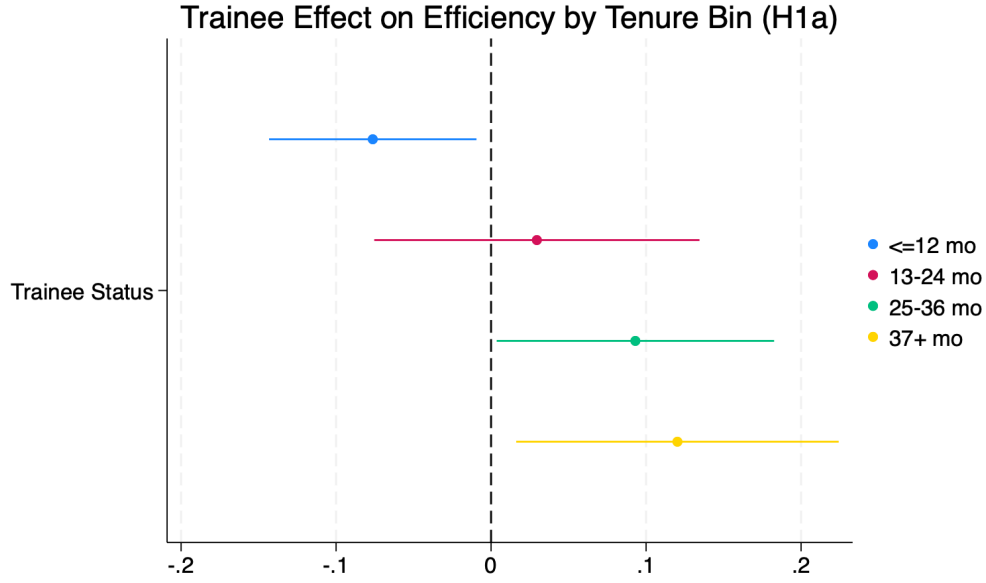
operational core, the worker-experience environment, and the organizational career structure in ways consistent with H1 rather than ceremonial adoption.

6.3 Capability and the Legitimacy of Authority

Table 4, Panel B, reports estimates of the gender decomposition on six worker-reported supervisor-quality indices and the WCI. The H2 test compares two coefficients: the coefficient on trained women relative to male supervisors (β_T) and the coefficient on untrained female supervisors relative to male supervisors (β_F). The legitimacy-deficit logic developed in Section 2.2 predicts $\beta_F < 0$ (untrained women face evaluative disadvantage in male-typed supervisory roles) and $\beta_T \geq 0$ (capability investment offsets the disadvantage by providing observable competence signals).

The central H2 finding is that untrained female supervisors are evaluated significantly less

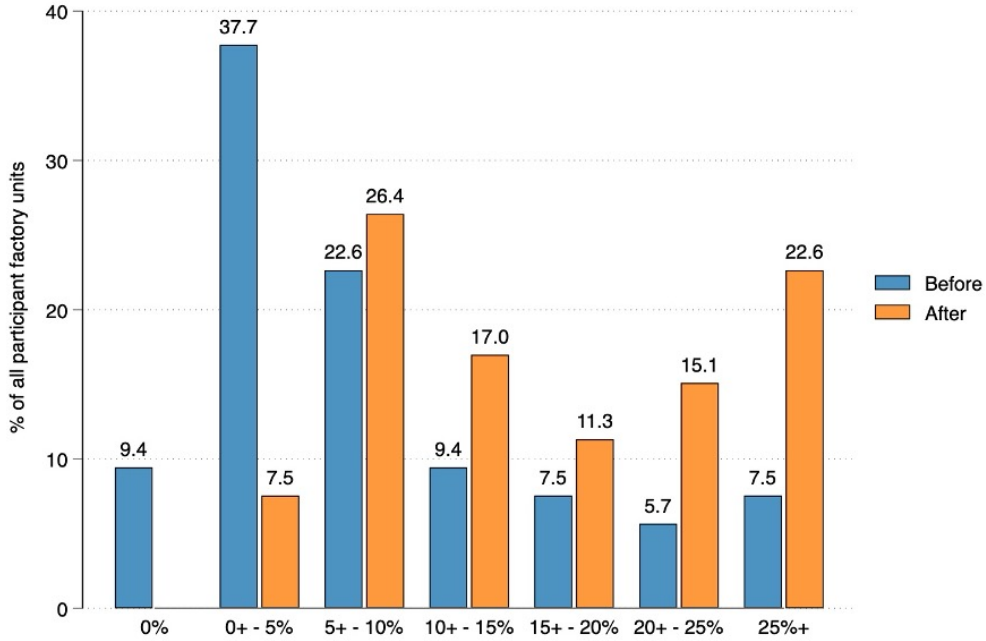
Figure 2: Effects of Training by Supervisor Tenure Profile



favorably than male supervisors on every relational index. The penalty is -0.503 SD on the supervisor composite index ($p < 0.01$), -0.375 SD on leadership ($p < 0.01$), -0.392 SD on career support ($p < 0.01$), -0.488 SD on respectful treatment ($p < 0.01$), and -0.263 SD on subordinate scut work ($p < 0.05$). The penalty extends to the WCI (-0.401 SD, $p < 0.01$). At parity on observable supervisory tenure, factory experience, and demographic characteristics, untrained women supervisors are systematically rated lower than men by the operators they supervise. The magnitudes are large relative to typical effect sizes in supervisor-evaluation research (Paterson et al., 2016) and consistent with role congruity theory (Eagly & Karau, 2002; Heilman, 2012) and status characteristics theory (Ridgeway, 2011), both of which predict that women entering male-typed authority roles face evaluative disadvantage when task-relevant information is limited.

The second pattern, on trained women, shows the offset predicted by H2. Across all five indices and the WCI, trained women are rated at parity with male supervisors. The trainee coefficient ranges from -0.096 SD on leadership to 0.149 SD on subordinate scut work, with no contrast reaching conventional significance. Wald tests of equality between the trainee and untrained-female coefficients reject the null at $p < 0.01$ for every index (Table 4, Panel B, bottom row). The legitimacy-offset logic does not require that trained women rate above men, only that capability investment closes the gap untrained women face. The data are consistent with that

Figure 3: Changes in Proportion of Female Supervisors Before and After GEAR



prediction across every outcome.

The empirical specification and survey wording strengthen the credibility of our results. The comparison is within-factory since factory fixed effects absorb institutional differences in human resource practices, buyer compliance regimes, and organizational culture, isolating within-factory variation in supervisory practice from cross-factory selection. The supervisor-quality indices use comparative wording that anchors operator responses to a within-factory benchmark. The penalty on untrained women and the offset for trained women operate against a shared reference point, making the asymmetry between the two coefficients informative about the intervention rather than about cross-factory differences.

The asymmetry between the two coefficients is substantively large. Across the relational supervisor-quality indices, the gap between untrained women and trained women ranges from 0.41 to 0.62 SD. Effects of this magnitude indicate that capability investment carries substantial weight in shaping how authority is enacted and evaluated under role-level segregation. Table 6 introduces a Trainee $\times$ Tenure interaction in the worker-reported specifications. The interaction coefficient is small (-0.000 to -0.004) and not significantly different from zero in any column. The legitimacy offset operates from low tenure rather than accumulating through subsequent learning, consistent with the H4 sub-prediction that subordinate-reported effects emerge earlier

in tenure than the operational effects through which the same capability is eventually expressed in production performance.

Without the gender decomposition, an aggregate analysis would observe that trained women perform at parity with male supervisors on subordinate evaluations and conclude that the intervention produces no relative gain on worker-reported outcomes. The decomposition reveals that parity is achieved through capability investment that offsets a systematic evaluative penalty, rather than through trained women matching the prevailing benchmark from a position of equality. The result speaks directly to the legitimacy-deficit account developed in Section 2.2, which states that women without targeted capability investment face evaluative disadvantage in male-typed supervisory roles, and capability investment is the mechanism through which the disadvantage is offset (Doering & Thébaud, 2017; Doering et al., 2023).

Table 4: H2:Trainee Effect on Worker-Reported Managerial Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Sup. Index	Leadership	Tech. Comp.	Career	Treatment	Sub-Scut	WCI
<i>Panel A: Main Trainee Effect</i>							
Trainee Status	0.286*** (0.074)	0.158** (0.075)	0.134* (0.080)	0.200*** (0.065)	0.238*** (0.074)	0.327*** (0.066)	0.268*** (0.067)
Tenure (mos)	0.004** (0.002)	0.004** (0.002)	0.005** (0.002)	0.003+ (0.002)	0.001 (0.002)	0.002 (0.002)	0.003+ (0.002)
Observations	963	963	963	962	940	962	962
Control Mean	-0.12	-0.06	-0.04	-0.08	-0.09	-0.15	-0.11
<i>Panel B: Gender Decomposition</i>							
Trainee Status	-0.055 (0.104)	-0.096 (0.103)	-0.086 (0.115)	-0.066 (0.099)	-0.093 (0.097)	0.149 (0.106)	-0.004 (0.098)
Female non-trainee	-0.503*** (0.109)	-0.375*** (0.117)	-0.324*** (0.120)	-0.392*** (0.108)	-0.488*** (0.108)	-0.263** (0.122)	-0.401*** (0.106)
Tenure (mos)	0.004** (0.002)	0.004** (0.002)	0.005*** (0.002)	0.003* (0.002)	0.001 (0.002)	0.002 (0.002)	0.003* (0.002)
Observations	963	963	963	962	940	962	962
Control Mean	-0.12	-0.06	-0.04	-0.08	-0.09	-0.15	-0.11
p (Trainee = Comp Fem)	0.000	0.001	0.006	0.000	0.000	0.000	0.000

Notes: Unit of observation: line operator. Outcomes are within-factory standardised indices. Column 1 reports the supervisor composite index; columns 2-6 report the supervisor-rated sub-indices that make up the composite; column 7 reports the Working Conditions Index from the comparison-form survey items. Panel A reports the main trainee effect; Panel B adds the Trainee $\times$ Tenure interaction; Panel C adds an indicator for non-trainee female supervisors to isolate the role of gender from the role of training (reference: male supervisors), with the row labelled reporting the p-value from a Wald test of equality between the two coefficients. All columns include worker-level controls (age, education, gender, sector tenure, factory tenure), supervisor-level controls (age, education, factories worked, months in factory), and factory fixed effects. Standard errors are clustered at the supervisor (line) level. * p<0.10, ** p<0.05, *** p<0.01.

6.4 Effects Concentrated in Relational Coordination

H3 predicts that intervention effects concentrate in outcomes that depend on relational coordination, the domain in which supervisory capability is enacted through ongoing communication, real-time problem solving, and the negotiation of authority across the supervisor-worker interface (Gittell, 2002; Thompson, 1967).

The first evidence of H3 emerges from the the supervisor-quality indices, where five indices vary in the extent to which they capture relational coordination versus individual task expertise. Subordinate scut work captures the most direct form of relational engagement: stepping into production tasks alongside operators, demonstrating standards through behavior, and involving operators in problem solving (Ranganathan & Shivaram, 2021). Respectful treatment captures avoidance of coercive forms of authority enactment, which is also relationally intensive. Leadership and career support involve relational components such as motivational influence and developmental coaching alongside more positional dimensions of supervisory practice. Technical competence captures task-relevant expertise, including error prevention, machine diagnostics, and production goal attainment, that is closer to individual capability than to relational coordination.

Trainee effects track the difference between relational and technical outcomes. Panel A of Table 4 reports the largest effect on subordinate scut work (0.327 SD, $p < 0.01$), followed by respectful treatment (0.238 SD, $p < 0.01$), career support (0.200 SD, $p < 0.01$), leadership (0.158 SD, $p < 0.05$), and technical competence (0.134 SD, $p < 0.10$). Table 5 reports a stacked specification that pools the five indices and includes a Trainee $\times$ Relational interaction, with technical competence as the omitted category. The interaction coefficient is 0.118 ($p < 0.05$), implying that the trainee effect is larger on relational outcomes than on the technical outcome by approximately 0.12 standard deviations. The implied trainee effect on relational outcomes is 0.236 SD ($p < 0.01$), compared with 0.117 SD on technical competence. The contrast supports H3 directly. This is further supported by my mediation analysis, which we ran as an additional robustness check.

An additional support for H3 emerges from the productivity findings reported in Section 5.1. Line efficiency is itself a coordination-dependent outcome since in relationally intensive production processes, daily output depends on the supervisor’s capacity to balance the line under disruption, resolve bottlenecks, manage interpersonal friction, and adjust workflow in real time

(Adhvaryu, Nyshadham, & Tamayo, 2023; Gittell, 2016). Effects on line efficiency are positive, significant, and accumulate with tenure. Line-level absenteeism, by contrast, depends substantially on individual worker decisions and on external constraints outside the supervisor’s relational reach, including commuting disruptions, family obligations, and illness, and shows directionally consistent but imprecise effects.

Evidence across worker-reported and productivity outcomes converges on a common pattern, which shows that when outcomes depend on the supervisor’s ongoing relational engagement with workers, intervention effects are large and consistent. Conversely, when outcomes depend on individual task execution or worker-side determinants, effects are smaller or imprecisely estimated. The pattern reflects the relational interdependence of strongly interlink production processes developed in Section 2.3 rather than a generic effect of training across all outcomes. The same logic explains why the H2 evidence on the legitimacy offset concentrates on relational supervisor-quality indices: it is in the relational domain that gendered expectations of authority are most salient (Ridgeway, 2011) and that capability investment can most directly substitute for stereotype-based inference.

7 Discussion

The empirical findings shift our understanding of how capability-based interventions affect the dynamics of decoupling in transnational settings. As these interventions shift the authority of the actors who implement policy, the locus of decoupling moves from the organizational boundary to the role itself, and to the features that shape individuals’ authority and incentives to implement change. Consequently, when practices are embodied in individuals rather than in formal structures, outcomes depend on whether newly developed capabilities are recognized and enacted in day-to-day work.

The data illustrate this at the factory level since performance gains emerge gradually as supervisors accumulate role-specific experience, while changes in supervisory practice and worker evaluations appear earlier. Moreover, these effects vary within gender between those who receive training and those who do not, as well as across genders. Trained women supervisors are evaluated on par with men, while comparable untrained women are not, indicating that the translation of capability into outcomes depends on how authority is recognized. Finally, the concentration of effects in relational domains points to the importance of coordination-intensive

Table 5: H3: Testing Relational versus Technical Supervisory Practices

H3: Stacked Trainee x Relational	
	(1)
	All Outcomes Stacked
Trainee (Tech baseline)	0.117 ⁺ (0.072)
Trainee x Relational	0.118** (0.046)
Tenure (mos)	0.003** (0.001)
Observations	4790
R^2	0.048
Trainee on Relational	0.236
SE (Relational)	0.055
p (Relational)	0.000

Standard errors in parentheses

Stacked specification: each worker-supervisor pair contributes one row per outcome type (Leadership, Career, Treatment, Sub-Scut, Technical). Trainee captures the effect on the technical outcome (relational = 0). Trainee x Relational captures the additional effect on relational outcomes; this coefficient is the H3 test. Outcome-type fixed effects absorb mean differences across indices. Worker and supervisor controls and factory fixed effects included. Standard errors clustered at the supervisor level.

Bottom rows report the implied trainee effect on relational outcomes (Trainee + Trainee x Relational) with its standard error and p-value.

* p_i0.10, ** p_i0.05, *** p_i0.01.

⁺ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

settings, where authority is enacted through ongoing interaction rather than through formal position.

7.1 Capability-Based Interventions and the Locus of Decoupling

Our first contribution extends institutional accounts of decoupling by demonstrating the dynamics of policy-practice versus means-ends decoupling that emerge from the systematic study of sustained capability-based interventions (Bromley & Powell, 2012; Meyer & Rowan, 1977). Existing work on transnational labor governance documents the incidence and limits of these two dimensions of decoupling under compliance-based regimes, in which external standards are codified, monitored, and enforced from outside the firm (Bird et al., 2019; Distelhorst & Locke, 2018; Locke, 2013). The findings here reframe the decoupling problem under a different governance modality that relocates the locus of decoupling. Policy-practice decoupling observed in typical compliance regimes becomes difficult to sustain when firm capability is embodied in

Table 6: H4: Trainee Effect on Worker-Reported Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Sup. Index	Leadership	Tech. Comp.	Career	Treatment	Sub-Scut	WCI
<i>Panel A: With Trainee $\times$ Supervisor Tenure</i>							
Trainee Status	0.393*** (0.117)	0.164 (0.117)	0.227* (0.125)	0.286** (0.110)	0.322*** (0.113)	0.334*** (0.111)	0.343*** (0.112)
Tenure (mos)	0.005** (0.002)	0.004* (0.002)	0.005*** (0.002)	0.004* (0.002)	0.002 (0.002)	0.002 (0.002)	0.003+ (0.002)
Trainee x Tenure (mos)	-0.004 (0.003)	-0.000 (0.003)	-0.004 (0.003)	-0.003 (0.004)	-0.003 (0.003)	-0.000 (0.004)	-0.003 (0.004)
Observations	963	963	963	962	940	962	962
Control Mean	-0.12	-0.06	-0.04	-0.08	-0.09	-0.15	-0.11

Notes: Unit of observation: line operator. Outcomes are within-factory standardised indices. Column 1 reports the supervisor composite index; columns 2-6 report the supervisor-rated sub-indices that make up the composite; column 7 reports the Working Conditions Index from the comparison-form survey items. Panel A reports the main trainee effect; Panel B adds the Trainee $\times$ Tenure interaction; Panel C adds an indicator for non-trainee female supervisors to isolate the role of gender from the role of training (reference: male supervisors), with the row labelled reporting the p-value from a Wald test of equality between the two coefficients. All columns include worker-level controls (age, education, gender, sector tenure, factory tenure), supervisor-level controls (age, education, factories worked, months in factory), and factory fixed effects. Standard errors are clustered at the supervisor (line) level. * p<0.10, ** p<0.05, *** p<0.01.

trained individuals placed into critical operational roles. This is because practice is enacted through day-to-day behavior within the technical core, rather than through symbolic structures that can be loosely coupled from operations (S. M. Ansari et al., 2010; Canales, 2014; Hallett, 2010). The results from *H1*, which demonstrate that trained supervisors deliver measurable gains on the outcomes most closely monitored by local managers, namely operational efficiency, and on outcomes directly experienced by workers, namely the Working Conditions Index, reflect this shift.

Means-ends decoupling, by contrast, may emerge within the role when capability is present but not translated into outcomes because the authority required to enact it is contested (Bromley & Powell, 2012). The *H2* evidence on subordinate evaluations identifies this within-role decoupling, where untrained female supervisors carry capability into the role, by virtue of having been promoted, but are evaluated between roughly 0.26 and 0.50 standard deviations below male supervisors on the relational supervisor-quality indices and the Working Conditions Index. The intervention narrows this gap by making capability more observable, consistent with status-characteristics accounts in which task-relevant information substitutes for diffuse status beliefs (Ridgeway, 2011; Ridgeway & Correll, 2004).

These results have two implications for the institutional literature on decoupling. First, decoupling is not simply a feature of governance regimes, but depends on the interaction between the form of the intervention and the role through which it is enacted. Coupling at the policy-practice boundary can coexist with means–ends decoupling at the role level unless complementary investments address the legitimacy of authority. Second, the carrier of the institutional intervention matters for where decoupling occurs (S. M. Ansari et al., 2010). When the carrier is an individual situated in the technical core, capability and authority become the proximate conditions for substantive change, in contrast to the formal-structure carriers that dominate most accounts of decoupling.

7.2 Role-Level Segregation and the Offset of the Legitimacy Deficit

Our second contribution advances research on gender and organizations by distinguishing inequality in occupational segregation from role-level segregation. We also show that capability investment can serve as a mechanism to address the legitimacy deficit characteristic of the latter, particularly in contexts where it is most salient. A large part of the literature on women in management is developed in Global North contexts, where representation gaps emerge through cumulative attrition across hierarchical transitions in the career pipeline (Bertrand, 2018; Cotter et al., 2001; Kleven et al., 2019). Under role-level segregation, a different structure arises: despite being highly visible in the production workforce, women remain largely absent from supervisory authority, and the transition into supervision crosses a gendered boundary at the point of entry (Charles & Grusky, 2004; Heath & Mobarak, 2015; Kabeer, 2004; Reskin, 1993). The legitimacy implications for career pipelines are distinct from that in role-segregation contexts. In the former, individuals advancing into authority roles can accumulate reputational resources across earlier transitions that partially offset evaluative bias (Ibarra et al., 2010). However, in the case of the latter, entrants face the full legitimacy challenge without prior accumulation and in front of an audience with little exposure to similar role occupants. Role congruity and status characteristics theories predict an evaluative penalty under these conditions (Eagly & Karau, 2002; Heilman, 2012; Ridgeway, 2011). Evidence from 3 supports this prediction: untrained female supervisors are rated systematically below male supervisors across all relational outcomes, holding supervisory tenure, factory experience, and demographic characteristics constant. This gap can be mitigated through capability investment

The results demonstrates that the capability-building intervention provides a route that does not depend on either the prior gender composition of the role or the entrant’s own accumulated resources. This contrasts with prior work showing that the gender of initial role occupants shapes the perceived authority of the role itself, with persistent effects on subsequent occupants (Doering & Thébaud, 2017), and that women face ambiguity in interpreting gender-based disadvantage, limiting unstructured learning on the job as a route to overcoming the deficit (Doering et al., 2023). Through training, women receive role-specific behavioral scripts that they can enact in daily interactions with subordinates (Ely et al., 2011; Lacerenza et al., 2017), generating the task-relevant information that status-characteristics theory identifies as a substitute for stereotype-based inference (Ridgeway & Correll, 2004). The asymmetric pattern across groups—an evaluative penalty for untrained women, parity for trained women, and a within-relational gap of approximately 0.28 to 0.41 standard deviations between them—is consistent with this informational mechanism rather than with explanations based solely on selection or composition.

Finally, our results clarify the conditions under which representation alone is insufficient. Women who reach supervisory positions through internal promotion in factories with limited female representation operate at the intersection of role congruity and status characteristics. They hold formal authority but lack observable competence signals that would substitute for gendered inference (Eagly & Karau, 2002; Heilman, 2012). Capability investment supplies those signals before sustained interaction generates them organically, which helps explain why the offset appears early in tenure rather than accumulating over time (Table 4). This temporal pattern complements, but does not duplicate, the *H1a* tenure profile for operational outcomes, where line-specific knowledge accumulates more gradually. Subordinate-reported and operationally coupled outcomes therefore capture both the productivity and the legitimacy facets of the same intervention.

7.3 Transnational Governance and the Technical Core

Our third contribution shows how interventions initiated by transnational private governance regimes can shape organizational practice. Compliance-based regimes often operate at a distance from the technical core by specifying standards that are externally designed but implemented locally and enforced through audits (Amengual et al., 2020; Distelhorst & Locke, 2018; Locke,

2013; Pierce & Toffel, 2013). Capability-based interventions instead operate within the technical core by investing in actors whose role enactment shapes daily production. This shift in the process and locus of intervention has several implications for how governance operates in practice.

Firstly, the study considers how greater alignment of incentives can be achieved between external organizations and local implementers. Compliance regimes often impose costs on local managers, in the form of reporting burdens or constraints on labor practices, while the legitimacy benefits accrue primarily to external stakeholders (Malesky & Taussig, 2017). Capability-based interventions can instead be structured so that their effects align with outcomes that local managers already monitor, such as throughput, coordination, quality, and retention. The evidence from 1 suggests that trained supervisors improve line-day efficiency, a metric that local managers observe continuously, creating reinforcement for sustained use rather than the symbolic adoption often observed in compliance settings (Bromley & Powell, 2012; Kalev et al., 2006).

Secondly, we show how the role of internal organizational conditions in compliance-led initiatives extends to capability-building ones. Bird et al. (2019) show that the extent to which externally specified labor codes are integrated into supplier practices depends on the firm's internal structure, including whether managerial arrangements support cross-organizational coordination or insulate the technical core from external demands. The findings here extend this argument to capability-based interventions. In production environments with strong interlinkage, the technical core cannot easily be insulated from a capability intervention delivered through the supervisor, because the supervisor is the point at which coordination is organized. Capabilities that improve coordination, communication, and conflict management are enacted at the same site where production is managed, limiting the scope for separation from core operations. The concentration of effects in relationally coordinated outcomes from *H3* is consistent with this interpretation, as coordination-intensive work makes the technical core more responsive to relational capability.

Thirdly, the findings have implications for the diffusion of training beyond the directly trained cohort into broader organizational practice. Figure 3 shows that participating factories increased their share of female supervisors beyond those directly trained, with the proportion of factories employing 25 percent or more women supervisors rising from 7.5 to 22.6 percent. This pattern is consistent with research on practice diffusion in which embedded individuals act as

carriers of new routines that spread through organizational learning (S. M. Ansari et al., 2010; Strang & Soule, 1998). Capability-based interventions therefore have a propagation mechanism that compliance regimes lack. The trained individual serves not only as the site of policy enactment, but also as a visible example within the organization, providing evidence that can shape subsequent allocation and promotion decisions.

7.4 The Global South as a Theoretically Generative Context

Our study demonstrates effects that develop in organizational settings characterized by a combination of features frequently observed in production settings in emerging market countries, namely strong societal gender norms that are reflected in workplace dynamics, combined with role-level rather than pipeline gender segregation. Given the structure of global supply chains (Gereffi et al., 2005), these firms also operate under transnational governance regimes where there is a separation between intervention design and implementation, alongside relationally intensive production processes in which supervisory authority is activated through ongoing relational coordination (George et al., 2016; Phillips & Ranganathan, 2025). These features define the conditions under which capability-based interventions can avoid both forms of decoupling identified by Bromley and Powell (2012).

The conditions examined here therefore generate different predictions relative to extant theories developed in settings characterized by pipeline rather than role-level segregation. Prior literature shows that women advancing through hierarchical transitions accumulate exposure-based legitimacy, reducing the marginal contribution of capability investment as a competence signal (Ibarra et al., 2010). However, when the legitimacy deficit stems from the near absence of women in a role, capability investment can help mitigate this deficit. Similarly, in more professional and managerial settings that underpin much of existing theory, the links between production processes and output are weaker, such that coordination is less directly tied to performance. As a result, the mechanisms identified here are most relevant in settings where role-level segregation and tight coupling jointly shape organizational outcomes, conditions that are more visible in low-wage factory settings in many Global South contexts (Phillips & Ranganathan, 2025).

Capability-based interventions are not confined to Global South contexts and can be deployed wherever external actors invest in the skills and roles of individuals within organizations. However, the extent to which the effects of such interventions are visible can vary. In settings where

institutional constraints are more explicit and organizational roles more sharply segmented, the translation of externally designed interventions into practice is less easily absorbed into formal structure (Canales, 2014; Malesky & Taussig, 2017; Taussig & Delios, 2015). This is consistent with work showing that institutional context shapes both the interpretation and implementation of organizational practices (Banerjee, 2008; Scherer & Palazzo, 2011).

The conditions examined here also depart from several assumptions embedded in prevailing theories of organizations, including formal equality, gradual career progression, internal organizational autonomy, and production processes disconnected from performance. These assumptions are less applicable in settings where authority is enacted through ongoing interaction and where access to roles is sharply segmented. Examining organizational processes under these conditions helps clarify which mechanisms extend across contexts and which depend on the environments in which they were originally developed (George et al., 2016; Phillips & Ranganathan, 2025; Tsui, 2007).

7.5 Limitations and Future Research

While our study provides a consistent build-up of evidence across outcomes, there remains scope to extend both the empirical analysis and the theoretical interpretation in a number of ways. Most importantly, while our empirical setting is a single sector in a single country, the RMG sector conditions mimic factory settings across industries both within Bangladesh and across other supplier countries similarly positioned in the supply chain, increasing the external validity of our study. Thus, the theoretical scope conditions developed in Section 7.4, which identify the organizational features under which the mechanisms are likely to operate, provide a basis for replication in other relationally intensive, role-segregated, and transnationally governed production settings, including electronics assembly, food processing, and contract manufacturing in South and Southeast Asia.

However, some constraints remain since empirically, the matched comparison design controls for observable differences between trained and comparison supervisors but does not completely eliminate selection on unobservables. The within-factory comparison absorbs institutional heterogeneity, and the propensity-score robustness results confirm the $H1$ pattern under alternative weighting. Nevertheless, there remains room for greater precision. Macchiavello et al. (2026) report comparable productivity dynamics for women supervisors under randomized assignment

in this industry, providing a useful external point of comparison.

On a related methodological note, our data structure does not permit a single-equation test of the full mediated pathway from capability investment, through supervisory practice and working conditions, to performance and retention. The evidence supports two segments of this pathway, namely the supervisor-practice and operational-performance links, but is consistent with, rather than definitive of, the full causal sequence. Future work that combines repeated measures of supervisory practice with high-frequency performance data, ideally under randomized or staggered rollout designs, would allow for formal mediation analysis. A second note concerns the data. The follow-up window captures supervisors for up to approximately three years after promotion. Whether the operational gains documented in Table 3 continue to accumulate, plateau, or attenuate over longer horizons remains an open question, as does the durability of the within-factory diffusion in promotion practices (Figure 3). Conzon (2023) documents an “equality policy paradox” in which gender-equality policies are implemented unevenly at higher organizational levels; whether trained supervisors face similar constraints in subsequent promotion transitions remains to be examined.

We propose three potential directions for future research based on our findings. The within-role decoupling mechanism identified in Section 7.1 should be testable in other contexts where capability is provided to actors entering previously excluded roles, including supervisory transitions in healthcare, social services, and public administration. The legitimacy-offset mechanism identified in Section 7.2 can be examined under variation in the prior gender composition of the receiving role, providing a more direct test of the role-level versus pipeline distinction. The diffusion pattern documented in Section 7.3 invites further study of when capability-based interventions catalyze broader organizational change, including the reallocation of trained individuals to higher-leverage roles and revisions to promotion criteria.

8 Conclusion

This paper examines the conditions under which capability-based interventions translate into substantive organizational outcomes. By focusing on a setting in which women are largely excluded from positions of authority, we show that interventions that build capability and reassign managerial responsibility can affect both performance and worker experience. These effects are conditional along temporal dimensions, with performance gains emerging with experience,

and, they are concentrated in relational domains, where supervisory work depends on hands-on coordination and interaction.

Our findings highlight an underexplored dynamic in how decoupling unfolds in transnational settings. When practices are embodied in individuals rather than formal structures, the gap between policy and practice does not disappear but shifts to the role itself, where capability must be recognized and exercised as authority. This helps explain why capability-building alone is often insufficient and why similar interventions generate different outcomes across organizational settings. The results also underscore the importance of role-level segregation. In contexts where women have been largely absent from positions of authority, capability-building interventions do more than improve managerial skill; they alter who occupies the role and how that role is evaluated. As a result, the effects of these interventions depend not only on what individuals can do, but on whether they are treated as legitimate authority holders by those above and below them.

The paper highlights the value of studying organizational processes in settings where institutional assumptions differ from those underlying much of existing theory. In these production environments, authority is enacted through ongoing interaction and roles are more sharply segmented, making visible mechanisms that are less apparent where authority is more routinized. The distinction between the effects of capability-building across technical and relational dimensions warrants further attention. Future research should examine how these dimensions shape heterogeneous effects across gender and organizational roles, particularly in contexts with varying gender norms and occupational structures. Qualitative evidence on how organizational support, workforce composition, and supervisory tenure influence the translation of capability into performance would further clarify the mechanisms at work. The findings suggest that the effectiveness of capability-based interventions depends less on their formal design than on the organizational conditions under which they are implemented. Explaining when interventions reshape organizational practice therefore requires attention not only to what is implemented, but to how it is enacted within the roles and relationships that structure work.

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