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(REVIEW ARTICLE)

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From HR to Human Capital in Bangladesh's Power Distribution: A Sector Review with a Utility Transformation Roadmap (DESCO as a Case)

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Abstract

Bangladesh's energy and utilities sector faces a triple mandate: expand and improve service quality, modernize networks for digital operations, and strengthen climate resilience while enabling clean-energy integration. In the electricity subsector, distribution utilities are central to achieving these goals because they operate the low- and medium-voltage systems where outages, losses, and service complaints occur, and they sit at the direct customer interface.

Across national policy documents and development partner programs, a consistent conclusion is clear: technology and capital investments deliver limited value unless utilities have the institutional and workforce capabilities to implement, operate, and sustain them. For example, the Electricity Distribution Modernization Program (P174650) [1] explicitly emphasizes capacity building and institutional strengthening alongside investments in modernization technologies such as SCADA and AMI.

This review examines human capital (HC) as a core performance driver for distribution utilities. HC is defined as the combined stock of workforce skills, leadership practices, organizational systems, health and safety discipline, and culture that enable reliable, safe, and customer-responsive service. In practice, HC is managed through connected systems: workforce planning, competency management, learning and certification, performance management, safety management, and workforce analytics.

Six propositions summarize the findings. (1) Skills gaps in modern distribution operations and digital utility functions—SCADA/AMI operations, analytics, and cyber-resilient practices—are binding constraints. (2) Training is often activity-based rather than capability-based; certification and transfer-to-job approaches improve impact. (3) Performance management must be tied to operational KPIs and perceived as fair to change behavior. (4) HC information systems and analytics are essential for planning and transparency. (5) Safety and contractor management require systematic OHS leadership and enforcement. (6) Inclusion and gender are both equity and talent strategies; WePOWER evidence indicates women remain underrepresented, especially in technical roles.

To translate evidence into action, the manuscript aligns these insights with DESCO's HR-to-HC transformation roadmap and proposes a sequenced 12-month plan and an HC Scorecard linked to reliability and modernization outcomes.

Keywords: Human capital; Electricity distribution utilities; Utility modernization (SCADA/AMI); Workforce capability development; Performance management; Safety culture and inclusion

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1. Introduction

Energy and utilities are foundational to Bangladesh's economic growth, industrial competitiveness, and human development. Electricity distribution utilities in particular translate national generation and transmission investments into delivered service for households, commerce, and industry. In dense urban areas, the distribution network's performance shapes economic productivity because outages and power quality events quickly propagate into business disruption.

Over the last decade, the operating environment for utilities has become more complex. Distribution companies are being asked to reduce technical and non-technical losses, improve customer service, and manage growing demand while modernizing for digital control (SCADA/ADMS), advanced metering (AMI), and integration of distributed generation. These demands are not only technical; they are organizational and behavioral.

Human capital is therefore a decisive factor. A distribution utility can only restore supply quickly, operate switching safely, use meter data to manage losses, and deliver projects on time to the extent that its people and systems can execute. Technology investments can even increase operational risk if workforce capability and governance do not keep pace (for example, new digital control systems without trained operators or cyber hygiene).

This manuscript responds to a practical need: a rigorous, Bangladesh-relevant review that focuses on human capital in the energy and utilities sector, with a distribution-utility emphasis and a clear pathway from diagnosis to implementation. It is also intended to be adaptable: as a journal-style review, a policy note, or a utility transformation document.

A key contribution is the integration of the DESCO HR-to-Human Capital transformation outline (attached file). While the outline is short, it provides a coherent sequencing that is consistent with global practice and can be used as a backbone for a longer, evidence-based manuscript. The review expands the outline with sector context, intervention design options, measurement approaches, and references.

2. Bangladesh energy and utilities sector context (electricity focus)

2.1. Sector structure and institutions

Bangladesh's energy and utilities sector encompasses electricity, gas, and related fuel supply chains, as well as water and waste services that are typically governed under separate institutional arrangements. This manuscript focuses on electricity because it is the dominant platform for industrial growth and because distribution utilities are central to service outcomes.

The electricity value chain includes generation, transmission, and distribution. Distribution is delivered through multiple entities, including urban distribution utilities (for example, DESCO and DPDC), regional distribution companies, and the rural electrification system under BREB with PBSs. The Ministry of Power, Energy and Mineral Resources and its Power Division provide sector policy direction, while BERC performs regulatory roles across electricity and gas, including technical codes such as the Electricity Grid Code 2018 [2].

Bangladesh's Electricity Act 2018 [3] provides the legal basis for sector development, reform, and service delivery objectives. From a human capital perspective, legal and regulatory frameworks matter because they define license responsibilities, performance expectations, and the compliance environment in which utility work is performed.

2.2. Demand growth, system evolution, and investment pressures

Bangladesh has expanded electricity access substantially and continues to face challenges related to affordability, fuel price volatility, and system reliability. Analysts have noted that changes in the generation mix and the need for improved governance and financial sustainability create pressure on utilities to increase efficiency and reduce losses [4] [5] [6].

In a budget analysis for FY2023-24, SANEM [7] reports that installed grid-based generation capacity reached 23,482 MW in FY2022-23 and that natural gas remained the largest fuel source at 47.8 percent of capacity. Such system characteristics influence distribution utilities because fuel constraints and dispatch dynamics affect load shedding patterns and customer expectations.

Planning documents such as the Integrated Energy and Power Master Plan (IEPMP 2023) [8] and the Renewable Energy Policy 2025 [9] signal a push toward clean energy, net and gross metering, and broader modernization. For distribution utilities, this increases the importance of data, planning capability, and customer engagement at the grid edge [10] [11].

2.3. Modernization programs and the explicit role of capacity building

A key recent example of modernization-by-design is the World Bank's Electricity Distribution Modernization Program (P174650) [1]. The program's appraisal document frames capacity building and institutional strengthening as a key priority, intended to enable sector agencies to transition to new technologies and business models. The program also emphasizes digital transformation and adoption of technologies such as SCADA, AMI, and battery energy storage pilots [12] [13].

Implementation monitoring illustrates how modernization and human capital considerations are increasingly linked. In the program's July 12, 2024 Implementation Status and Results Report, disbursement-linked indicators include achievements related to smart meter data, smart meters installed, and a completed SCADA pilot. The same ISR notes that gender considerations are embedded, including an indicator on the share of female staff in technical roles [14].

These programs imply a practical expectation for utilities: modernization investments will be evaluated not only by infrastructure built but by the institutional ability to operate, maintain, and use new systems. This shifts the management agenda from personnel administration to measurable human capital.

3. Conceptual framing and review approach

3.1. Defining human capital for utilities

Human capital has a broad economic meaning (education, health, productivity). For utilities, a more operational definition is useful: the combined workforce capability, leadership practices, and organizational systems that enable safe and reliable service delivery [15] [16].

This review organizes human capital into six interacting systems: (1) workforce planning and critical role management, (2) competency frameworks and job architecture, (3) learning, certification, and knowledge transfer, (4) performance management and incentives, (5) safety management and operational discipline, and (6) analytics and information systems. Culture and engagement are treated as cross-cutting mechanisms that influence behavior across all six systems.

International reporting standards can support this operational definition. ISO 30414 [17] (human capital reporting and disclosure) provides a structured menu of human capital areas such as workforce composition, skills and capabilities, occupational health and safety, and organizational culture. While utilities are not required to apply ISO 30414, it is a useful reference for designing HC scorecards and disclosure.

3.2. A utility human capital value chain

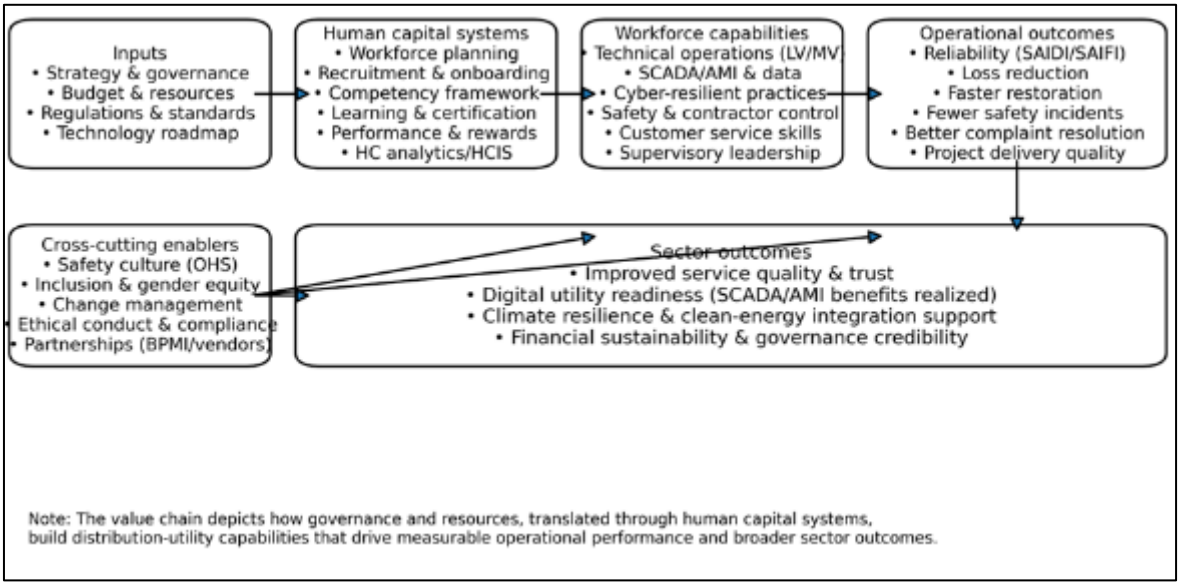

Figure 1 Human capital value chain for electricity distribution utilities

Figure 1 presents a distribution-utility human capital value chain. Inputs (people, leadership commitment, policies, and data resources) build capabilities (competencies, learning, culture, and safety). These capabilities enable execution

(operations and projects), producing outcomes such as reliability, reduced losses, financial sustainability, climate resilience, and customer trust.

This framing is useful because it connects human capital investments to the outcomes that sector stakeholders care about. It also clarifies measurement: human capital metrics should not be isolated HR statistics; they should be linked to execution and outcomes.

3.3. Review approach and limitations

The manuscript is a narrative review, synthesizing sector policy documents, development partner program documents and technical assessments, and applied research literature on utility workforce transformation. The intent is to provide decision-relevant synthesis rather than a narrow meta-analysis.

Limitations include the relative scarcity of long-run impact evaluations of HR and workforce interventions inside Bangladesh electricity utilities. Therefore, the manuscript emphasizes plausible mechanisms, program designs, and measurement strategies that utilities can use to generate their own evidence through pilots and monitoring.

4. Human capital challenges in Bangladesh electricity utilities

4.1. Capability gaps for modern distribution operations

Distribution utilities require strong competence in protection and control, switching discipline, outage management, asset inspection, and safe field operations. Historically, many utilities have built these capabilities through apprenticeship and experience. However, rapid modernization requires accelerated upskilling and formalization.

Modernization adds multiple new skill domains: SCADA/ADMS operations, AMI head-end and meter data management, GIS-enabled planning, analytics, cyber hygiene, and vendor management for complex systems. These domains require a blend of engineering, IT/OT, and operational decision-making skills.

Capability gaps are especially risky in urban utilities, where load density makes outages highly visible and where network switching errors can have large consequences. Therefore, utilities need structured competency models and certification for safety-critical roles.

4.2. Training system fragmentation and uneven transfer-to-job

Bangladesh has sector training infrastructure, including BPMI and training units within sector agencies. Nevertheless, training can be fragmented across institutions and vendors, with limited standardization by job role or proficiency level.

A common weakness in many utilities globally is that training is counted by inputs (number of courses or participants) rather than outcomes (capability achieved and applied on the job). Without assessment and coaching, training does not reliably translate into improved restoration time, safety discipline, or loss management.

A modernization program increases the cost of weak transfer-to-job. For example, AMI investments produce value only when staff can validate data, identify anomalies, and coordinate field actions to reduce losses and resolve customer issues. This requires training that is integrated with work processes and performance metrics.

4.3. Performance management not fully linked to operations

Utilities often have formal appraisal systems but struggle to make them operationally meaningful. If appraisal is not linked to measurable KPIs and does not incorporate feedback and coaching, it becomes a procedural exercise.

Distribution utilities are well-suited to KPI-driven performance management because their work produces measurable outputs: outage response times, safety incidents, work order completion, customer complaint resolution time, and loss reduction. The challenge is aligning these metrics with job roles and ensuring data quality.

Another challenge is credibility: performance systems must be perceived as fair. This requires transparent calibration across units, clear rules for incentives, and grievance or appeal pathways.

4.4. Safety, contractor management, and enforcement gaps

Distribution utilities rely heavily on contractors for construction, maintenance, and service connections. Contractor-heavy models increase OHS risks because safety culture and supervision are harder to control across multiple employers.

Development partner assessments emphasize that improved monitoring and enforcement of safety codes, as well as HR planning and training upgrades, can address many OHS issues. This implies that safety is a human capital system and not only a compliance manual.

A practical implication is that utilities need dedicated safety leadership, clear contractor safety clauses, job hazard analysis routines, and leading indicators such as near-miss reporting and safety observations.

4.5. Inclusion and underutilized talent pools

Inclusion is both a social objective and a workforce strategy. The power sector requires large numbers of competent technical staff; excluding or discouraging women and other groups reduces the effective talent pool.

The World Bank's WePOWER Bangladesh [18] brief reports that women represented about 9.5 percent of total staff across six public utilities and only about 6 percent of engineering staff, with women concentrated in junior and assistant positions. The brief also reports organization-level variation, including DESCO's representation in the compiled utility sample.

These patterns suggest structural barriers (fieldwork expectations, facility constraints, cultural norms, limited mentoring, and weak reporting mechanisms for harassment). Addressing them requires targeted interventions across recruitment, development, retention, and policy.

5. Human capital interventions and evidence

5.1. Workforce planning and critical role management

Workforce planning in utilities should move beyond headcount budgeting. The key is critical role management: identifying roles that pose high operational risk if vacant or under-skilled, and proactively managing coverage, succession, and certification.

In a distribution utility, critical roles typically include control center operators, protection and relay engineers, SCADA/ADMS administrators, AMI head-end and analytics specialists, safety supervisors, and key customer service escalation roles. Workforce planning should incorporate retirement risk, modernization timelines, and geographic demand growth.

A practical approach is to create a critical-role heatmap (criticality vs. current coverage), then prioritize recruitment, training, and retention actions accordingly.

5.2. Competency frameworks and job architecture

Competency frameworks convert strategy into role requirements. A robust framework defines job families, proficiency levels, and observable behaviors. It then links competencies to recruitment criteria, training plans, promotion criteria, and performance management.

International energy-industry competency models emphasize a building-block structure: foundational competencies (safety, teamwork, communication), industry-wide competencies (utility operations context), and role-specific technical competencies. Such models are useful templates for Bangladeshi utilities, but must be localized to specific technologies and regulatory requirements [19].

For digital utility functions, competency frameworks should explicitly include data literacy, system thinking, cyber hygiene, vendor management, and change management. These are often missing in traditional utility job descriptions.

5.3. Learning and development: from courses to capability

Learning and development (L&D) systems are most effective when designed around job-to-be-done outcomes. In utilities, this means linking learning to safe switching, fault isolation, restoration speed, meter anomaly investigation, and customer communication.

Three design choices strongly predict transfer-to-job: (1) assessment (pre and post), (2) supervised practice and mentoring, and (3) reinforcement through performance management and job aids. Without these, training can become a compliance activity.

Modernization rollouts should include training strategies as part of the implementation plan. For example, USTDA [20]-supported smart grid planning work in Bangladesh explicitly includes developing a training strategy to enable utilities to successfully operate and manage smart grid technologies.

5.4. Performance management, incentives, and integrity

Performance management should be designed as an execution system: clear objectives, transparent measurement, regular feedback, and credible consequences or rewards. A best-practice utility system includes quarterly check-ins, differentiated objectives by job family, and structured calibration to reduce bias.

Operational KPIs should be carefully mapped to controllable actions. For example, SAIDI/SAIFI capture reliability at system level, but frontline teams can be evaluated on restoration time, adherence to switching protocols, work order completion, and safety behaviors. Customer service teams can be evaluated on complaint resolution time and first-contact resolution rates [21].

Integrity safeguards matter in utilities because discretionary decisions in connection services, billing disputes, and contractor oversight can create corruption risk. Transparent performance systems, audits, and grievance pathways are therefore human capital governance tools [22].

5.5. Human Capital Information Systems (HCIS) and analytics

An HCIS enables evidence-based workforce management by providing a single source of truth for staffing, skills, training records, performance outcomes, and diversity metrics. For utilities, an HCIS becomes particularly valuable when linked to operational systems (OMS, SCADA, AMI, work order systems) to enable productivity and capability analytics.

Analytics should be decision-driven. Early dashboards should prioritize: critical role vacancies and certification status; training completion and effectiveness; safety leading indicators; and workforce productivity measures relevant to the utility's operating model.

International standards such as ISO 30414 [17] provide a structured set of human capital reporting areas that can help utilities avoid blind spots (for example, reporting not only headcount but also skills and safety metrics) [23].

6. Digital utility transition: skills, systems, and change management

6.1. Why digital modernization changes the workforce equation

Digital modernization (SCADA/ADMS, AMI, DMS, GIS) changes the nature of work. It shifts value creation from manual monitoring and reactive repair toward data-driven decision-making, proactive maintenance, and coordinated customer communication.

This shift requires new roles (data analysts, AMI system administrators, cyber-aware OT engineers) and also changes existing roles (line crews using digital work orders, control room operators using ADMS applications). Workforce planning must therefore account for both new headcount needs and re-skilling of existing staff.

6.2. Evidence from modernization programs: SCADA and AMI as capability triggers

In the World Bank distribution modernization program, results frameworks and implementation monitoring include explicit milestones for smart meter data, smart meter installations, and SCADA pilot completion. Such milestones are not only technical: they imply that trained operators, maintainers, and analysts must be available by go-live dates.

Technical assessment documents for the program note that Power Cell is responsible for preparing policy assessments and roadmaps on new technologies as well as human resource upgrade and training plans for sector entities. This highlights that human capital planning is recognized as part of modernization governance [12].

A practical recommendation is to treat each major digital system as a capability program with four pillars: staffing model and roles, training and certification, operating procedures, and cyber and resilience controls.

6.3. Cyber and operational resilience as human capital issues

As utilities adopt digital control and metering, cyber risk becomes intertwined with operational risk. While cyber controls include technology solutions, many failures stem from human factors: weak access control practices, poor incident reporting, and limited operator understanding of secure operating procedures.

Utilities therefore need cyber awareness embedded into competency frameworks and training. Even basic practices (role-based access, password hygiene, secure remote access) require consistent behavior and enforcement.

7. Safety, contractor management, and operational discipline

7.1. Safety management systems and culture

Occupational health and safety is an operational priority for distribution utilities because of high-risk work (live line operations, switching, working at height, traffic exposure). Safety performance is influenced by both technical controls and human behavior.

The ILO-OSH 2001 [24] guidelines provide a widely referenced framework for safety and health management systems, emphasizing policy, organizing, planning and implementation, evaluation, and action for improvement. Many utilities also align with ISO 45001 for OHS management. The key point for human capital is that safety should be managed as a system with leadership accountability, training, supervision, and continuous improvement.

Leading indicators are essential. Near-miss reporting, safety observations, and compliance with job hazard analysis routines often predict serious incidents better than lagging indicators alone.

7.2. Contractor ecosystem governance

Contractor management is a human capital and governance challenge. Utilities must ensure contractors meet training and certification requirements, comply with PPE standards, and follow switching and isolation procedures.

Contracts should include clear safety obligations and enforcement mechanisms. Utilities also need internal capacity (safety supervisors and site inspectors) to monitor compliance. Development partner assessments emphasize that stronger supervision and enforcement can address many OHS issues [13].

8. Inclusion and gender as a human capital strategy

8.1. Why inclusion is a utility performance issue

Inclusion is often discussed as a social objective, but for utilities it is also a workforce and capability issue. Utilities need large numbers of engineers and skilled technicians. Underrepresentation of women reduces the pool of available talent and can slow modernization.

WePOWER's Bangladesh baseline brief reports that women's representation across six public utilities was under 10 percent of total staff, with women engineers representing a smaller share of engineering staff. The brief highlights barriers such as sociocultural norms, lack of facilities, and limited gender sensitivity in technical institutions and workplaces [25] [26].

Program frameworks increasingly treat gender as measurable. In the World Bank distribution modernization ISR, an indicator tracks the share of female staff in technical roles in BREB and PBSs.

8.2. Practical interventions across the talent lifecycle

A utility inclusion strategy should cover recruitment, development, and retention. Recruitment actions include targeted campus engagement, internships, and inclusive selection panels. Development actions include mentorship, leadership training, and transparent promotion criteria. Retention actions include safe facilities, clear fieldwork policies, and credible anti-harassment systems.

Utilities can adopt a simple measurement approach: track representation by job family and grade, training access rates, promotion rates, and attrition rates by gender. These should be reviewed alongside operational metrics to reinforce that inclusion is part of performance management.

9. DESCO roadmap: HR-to-Human Capital transformation

The attached DESCO slide deck provides a concise transformation sequence from administrative HR to strategic human capital management. The sequence is consistent with the utility human capital value chain: align strategy, diagnose gaps, redesign the operating model, build competency systems, digitize data, strengthen learning and performance management, and institutionalize governance and continuous improvement [27].

In this section, the DESCO sequence is expanded into a utility-ready roadmap with deliverables and decision points. While DESCO is the anchor case, the roadmap is broadly applicable to Bangladesh distribution utilities.

Table 1 HR-to-Human Capital transformation roadmap (DESCO outline) expanded into deliverables.

Roadmap step	Intent (DESCO deck)	Utility-ready deliverables
Set strategic vision	Align human capital goals with corporate mission; secure leadership commitment and policy support.	HC strategy; KPI tree aligned to corporate plan; leadership sponsor model.
Assess current HR system	Review HR structure, policies, and workforce skills; identify gaps and future competency needs.	Skills inventory; critical role list; baseline KPIs; gap analysis and risk heatmap.
Restructure HR division	Rename as Human Capital Management Division; create units for Talent, L&D, Performance, and Analytics.	HC operating model; service catalog; new roles (talent, L&D, analytics); change plan.
Adopt competency-based framework	Define core and job-specific competencies; link to recruitment, training, and promotions.	Job family architecture; competency dictionary; assessment rubrics; promotion criteria.
Digital transformation	Implement a Human Capital Information System (HCIS) and build analytics for planning and tracking.	HCIS requirements; data governance; dashboards; integration plan with operational systems.
Enhance learning and development	Continuous training programs and leadership development; partnerships for technical and managerial skills.	L&D strategy; certification pathways; mentoring; evaluation of transfer-to-job.
Performance-based management	KPI-driven appraisals and incentives; fairness and transparency.	KPI-linked appraisal design; calibration process; incentive rules; appeals pathway.
Promote engagement and culture	Accountability, teamwork, and service excellence; engagement and satisfaction initiatives.	Engagement survey; frontline routines; recognition system; culture action plans.
Update policies and governance	Human capital policy and succession plans; compliance and ethics.	Revised policies; succession plan; ethics and compliance reinforcement.
Monitor and improve	Track HC KPIs and report annually; refine based on feedback and results.	Quarterly scorecard; annual HC report; audit and improvement backlog.

10. Measurement: Human Capital Scorecard and governance cadence

Human capital transformation needs measurement that is decision-relevant. A practical scorecard should include a small number of leading indicators (skills, training effectiveness, safety leading indicators) and lagging indicators (reliability, losses, customer outcomes).

ISO 30414 [17] provides a useful reference for reporting areas, but utilities should tailor metrics to what they can control and what matters for outcomes. A governance cadence (for example, quarterly scorecard reviews chaired by senior leadership) is essential to turn metrics into action.

Table 2 Example Human Capital Scorecard for distribution utilities.

Domain	Example KPI	Why it matters	Data source
Capability	Critical role coverage rate (%)	Continuity of safe and reliable operations	HCIS + org chart
Capability	Skills gap index (required vs assessed)	Targets recruitment and training investment	Competency assessments
Learning	Training transfer-to-job score	Ensures learning changes work behavior	Supervisor checks + tests

Performance	KPI-linked appraisal completion and calibration consistency	Fairness and motivation	Performance system
Safety	Near-miss reporting rate	Leading indicator for serious incidents	OHS system
Inclusion	Share of women in technical roles (%)	Expands talent pool; aligns to program indicators	HR analytics
Operations	SAIDI/SAIFI (or local outage metrics)	Customer reliability outcomes	OMS/SCADA logs
Financial	System loss reduction (%)	Affordability and utility sustainability	Metering + billing

11. Implementation agenda (12-month plan and 3-year institutionalization)

11.1. First 90 to 120 days: establish foundations

- Confirm a clear human capital strategy with an executive sponsor and an agreed KPI tree aligned to the corporate plan.
- Run a workforce and skills diagnostic: headcount and vacancies by job family, critical roles, retirement risk, and skill gaps for modernization.
- Define job families and publish a first version of a competency dictionary for priority roles (control room, field operations, metering, customer service, IT/OT).
- Stand up a minimum viable human capital dashboard (headcount, vacancies, training completion, gender representation, safety incidents, and critical-role certification status).
- Select one pilot area (for example, control center or metering) and implement certification and KPI-linked performance objectives for that area.

11.2. Months 4 to 12: scale capability building and performance systems

- Launch certification pathways for safety-critical and digital-utility roles, timed to modernization go-live milestones.
- Redesign performance management: define role-specific KPIs, run calibration, and introduce feedback and coaching routines.
- Expand HCIS scope and data quality: training records, competencies, and performance outcomes integrated into dashboards.
- Implement targeted inclusion actions: recruitment partnerships, mentorship, facilities, and policies.
- Strengthen contractor safety management: contractor onboarding, safety audits, enforcement, and reporting.

11.3. Year 2 to 3: institutionalize the human capital operating model

By year 3, the goal is a fully operational Human Capital Management Division with analytics capability, mature competency and certification systems, credible performance management linked to outcomes, and an embedded governance cadence. At this stage, utilities can add advanced practices such as productivity analytics, predictive safety analytics, and structured leadership succession pipelines.

Utilities should also institutionalize continuous improvement: annual HC reports, periodic audits of data and processes, and structured feedback loops from frontline staff and customers.

12. Research and policy agenda

Despite the importance of human capital, research and evaluation evidence inside Bangladesh utilities is limited. Utilities and sector institutions can address this by embedding learning designs into modernization programs and HR reforms.

Priority research and policy questions include:

- What is the impact of competency-based training and certification on outage restoration time, safety incidents, and customer satisfaction?

- How does AMI adoption change workforce task allocation, required skills, and productivity (for example, field visits avoided, anomaly resolution time)?
- Which inclusion interventions measurably improve recruitment, retention, and promotion of women in technical tracks?
- What governance and performance management mechanisms reduce discretionary risk and improve integrity in connection services and billing disputes?
- What are the human capital requirements for renewable integration at distribution level (net/gross metering operations, hosting capacity analysis, protection upgrades)?

List of Abbreviations

- ADMS - Advanced Distribution Management System
- AMI - Advanced Metering Infrastructure
- BESS - Battery Energy Storage System
- BERC - Bangladesh Energy Regulatory Commission
- BPDB - Bangladesh Power Development Board
- BREB - Bangladesh Rural Electrification Board
- CPD - Centre for Policy Dialogue
- DESCO - Dhaka Electric Supply Company Limited
- DLI - Disbursement-Linked Indicator
- DMS - Distribution Management System
- DPDC - Dhaka Power Distribution Company Limited
- ESSA - Environmental and Social Systems Assessment
- HC - Human Capital
- HCIS - Human Capital Information System
- IEPMP - Integrated Energy and Power Master Plan
- ILO - International Labour Organization
- ISO - International Organization for Standardization
- KPI - Key Performance Indicator
- MoPEMR - Ministry of Power, Energy and Mineral Resources
- OHS - Occupational Health and Safety
- OMS - Outage Management System
- PBS - Palli Bidyut Samity (rural electric cooperative)
- PforR - Program-for-Results (World Bank financing instrument)
- SAIDI - System Average Interruption Duration Index
- SAIFI - System Average Interruption Frequency Index
- SCADA - Supervisory Control and Data Acquisition
- SREDA - Sustainable and Renewable Energy Development Authority
- TVET - Technical and Vocational Education and Training
- WePOWER - South Asia Women in Power Sector Professional Network

13. Conclusion

Bangladesh's electricity distribution utilities are being asked to deliver reliable and affordable service while modernizing for digital operations and clean-energy integration. Across these priorities, human capital is both a constraint and a lever.

This review synthesizes sector evidence and global practice into a practical set of human capital interventions: workforce planning for critical roles, competency frameworks, capability-based learning systems, KPI-linked performance management, HCIS and analytics, and systematic safety and inclusion management.

The DESCO HR-to-Human Capital transformation outline offers a coherent sequencing for implementation. The next step is disciplined execution: pilot, measure, refine, and scale - with governance that links human capital metrics to service outcomes.

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Appendix A. Sample competency dictionary (distribution utility)

This appendix provides an illustrative competency dictionary that utilities can adapt. Each competency should be defined with proficiency levels (awareness, working, proficient, expert) and observable behaviors.

Job family	Core competencies (examples)	Role-specific competencies (examples)
Network Operations	Safety leadership; teamwork; problem solving	Outage management; switching procedures; protection coordination
Field Services	Customer orientation; discipline; safety	Service connection standards; meter installation; theft detection basics
Metering and Revenue	Data literacy; integrity; customer communication	AMI head-end operations; meter data validation; billing exception analysis
Engineering and Planning	Analytical thinking; documentation; risk management	Load forecasting; feeder planning; hosting capacity basics; standards
IT/OT and Cyber	Systems thinking; incident response mindset	SCADA administration; access control; log review; patch coordination
Customer Service	Empathy; communication; de-escalation	Complaint triage; service-level adherence; field coordination