



Research on the Optimization of Grassroots Power Grid Organization under the Background of High-Quality Development of Distribution Networks

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Abstract. With the advancement of high-quality development in distribution networks, the morphology and operational characteristics of distribution grids are undergoing profound changes, which impose higher demands on the responsiveness and regulation capabilities of power grid systems. The emergence of new elements and business models, such as distributed photovoltaics, new energy storage, virtual power plants, microgrids, and load aggregators, provides greater flexibility in resource management and scheduling for the power system. However, these changes also present challenges to the safe and stable operation of the grid, the local consumption of renewable energy, and flexible self-regulation. This paper explores the new requirements for optimizing the production organization model of the power grid in the construction of new power systems and proposes directions for future optimization. The study first analyzes the impact of high-quality development on grassroots power grid organization, including stimulating management efficiency and enhancing the technical and business capabilities of specialized teams. It then discusses optimization directions for grassroots power grid organizations, including the creation of agile front-end organizations, comprehensive promotion of grassroots business integration, and the establishment of flexible team work modes. Finally, strategies for optimizing the management of grassroots power grid teams are proposed, including creating learning-oriented and innovative grassroots organizations and constructing a role-based management model based on power grid business scenarios. The research findings are of significant theoretical and practical importance for guiding the organizational optimization of distribution networks under new conditions.

Keywords: distribution network; power grid enterprise; grassroots power grid organization; agile organization

1 Introduction

Under the background of high-quality development in distribution networks, the morphology and operational characteristics of these grids are undergoing significant changes, demanding higher responsiveness and regulation capabilities from power grid systems. The large-scale integration of distributed photovoltaics, new energy storage,

virtual power plants, microgrids, and load aggregators presents higher demands for the safe and stable operation of the grid, local consumption of renewable energy, and flexible self-regulation. The integration of distributed energy may alter the flow direction of the grid, increasing unpredictability and posing challenges to grid stability; its volatility and uncertainty may also affect power quality. The characteristics of active distribution networks are becoming more pronounced, with load characteristics shifting from rigid, purely consumption-based to flexible, dual-purpose models involving both production and consumption. This results in a transition from real-time balance modes to collaborative interaction modes among source, network, load, and storage. The rapid development of new business models at the grassroots level necessitates further exploration of demand-side regulation potential, enhancing the grid's self-regulation capabilities and resource allocation efficiency^[1].

High-quality development in distribution networks raises demands for management efficiency, organizational agility, customer responsiveness, and team capabilities at the grassroots level. Therefore, this study delves into the new requirements for optimizing the production organization model of power grids in the context of constructing new power systems and proposes directions for future optimization.

2 The Impact of High-Quality Development on Grassroots Power Grid Organization

2.1 Stimulating Management Efficiency

The accelerated influx of various new elements and business models at the distribution network level highlights the need to enhance management penetration and stimulate management efficiency at the grassroots level. This requires a downward shift in the management organization, strengthening terminal integration, and improving organizational agility to meet the demands for rapid response and flexibility.

The continuous integration of distributed networks and new loads into distribution networks necessitates improvements in self-regulation capabilities and resource allocation efficiency, calling for clearer accountability at all levels of the grid and streamlined management processes^[2]. There is a need to further enhance management penetration to ensure effective grassroots execution and vertical connectivity. As diverse elements rapidly enter the distribution network, grassroots management has shifted to become a market front, raising higher demands for management efficiency and requiring the optimization of specialized management models and a focus on bottom-up work. The growing characteristics of high demand and extreme weather conditions require the production organization model to enhance capabilities for rapid environmental adaptation and self-adjustment, ensuring effective resource organization and responsiveness to unconventional task demands.

2.2 Strengthen the Efficiency of Horizontal Professional Collaboration

The accelerated influx of new elements and formats such as distributed new energy has brought about profound changes in the form and operational characteristics of the distribution network, placing higher demands on the response speed and regulation capability of the power grid system. In terms of distribution network management, it is required to reform and optimize the distribution network management mode according to local conditions, strengthen vertical coordination and connectivity, enhance horizontal professional collaboration, achieve efficient collaboration and resource integration on the distribution network side, and improve the efficiency and market responsiveness of distribution network management.

Adapt to the new situation of large-scale development of distributed power sources and the accelerated rise of various new elements and models, further clarify the division of responsibilities among departments such as horizontal development, infrastructure, equipment, marketing, scheduling, and materials in distribution network management; Explore professional integration management, combined with the development foundation of power grids and the degree of electricity marketization in various regions, encourage localities to adapt to local conditions, actively research and steadily promote integrated management models of planning, construction, operation and maintenance, scheduling, marketing and other distribution network businesses, improve management efficiency, and meet development needs.

2.3 Enhancing Technical and Business Capabilities of Specialized Teams

The strengthened coupling of new information technologies with energy and electricity places higher demands on the technical and business capabilities of the power grid's specialized teams, necessitating the rapid establishment of learning-oriented and innovative organizational models to adapt to the energy transformation.

With the innovation of energy technologies and the deep integration of information and energy technologies, a substantial amount of business is shifting online, raising the bar for the technical and business capabilities of various professional teams within the grid. Currently, there is a relative shortage of technical, compound, and innovative talents across different levels of the grid, necessitating an enhancement of professional skills. The long-standing high outsourcing ratio of grid construction and operations has led to a hollowing out of personnel and a degradation of professional skills, which in turn affects and restricts the safe and stable development of the grid, highlighting the need to improve core business capabilities, particularly at the grassroots level.

3 Optimization Directions for Grassroots Power Grid Organization

3.1 Creating Agile Front-End Organizations

By establishing an agile front-end organizational model, the grassroots front-end organization can overturn the traditional value creation and management model of pyramid-shaped structures. Empowering leadership and flexible team models can replace traditional hierarchical structures and professional barriers, enabling agile perception, flexible resource coordination, and rapid response to customer demands at the front end.

Empowering leadership breaks away from traditional top-down control and upward reporting, enhancing decision-making and resource allocation capabilities while granting more autonomy and flexibility to frontline business units. Rapid response to customer demands and flexible resource coordination are crucial. The optimization of new organizational structures at the grassroots county company level should focus on customer-centric approaches at the front end, aligning backend operations with front-end needs and central resource allocation for capacity sharing^[3]. This involves minimizing boundaries, weakening hierarchies, and emphasizing actions while dismantling barriers between functional and professional departments, fostering a differentiated, personalized, and localized integration model. The flexible team model should be designed to enhance dynamic capabilities and responsiveness to unconventional tasks in response to diverse user needs, emergency situations, and market changes.

3.2 Promoting Comprehensive Business Integration at the Grassroots Level

In grassroots power supply organizations, it is essential to gradually advance the comprehensive integration of marketing, distribution, and scheduling operations, based on local business development characteristics and current management foundations, enhancing customer demand responsiveness and service levels.

Organizational Integration: Deeply integrate marketing, distribution, and scheduling organizational structures, merging roles like equipment owner, area manager, and service grid management. Establish versatile grassroots teams that can handle multiple tasks, promoting seamless integration of operations.

Business Integration: Foster collaboration between marketing and distribution network planning and scheduling. Organically combine operations such as distribution and scheduling, energy loss management, user inspection, complaint handling, equipment maintenance, and fault repair. Implement a task-oriented approach for operations to achieve efficient coordination.

Application Integration: Build a unified business support platform that comprehensively supports distribution scheduling, user expansion, equipment inspection, and marketing services, empowering the entire process of operations.

Management Integration: Standardize work goals across operations, clarify management mechanisms, improve institutional frameworks, and establish standardized workflows. Review and adjust job roles and resource allocations, and implement a robust

performance management system with unified evaluation standards to effectively leverage incentives.

3.3 Establishing a Flexible Team Work Mode

To address long-term tasks, professional needs, new business initiatives, and temporary projects, a collaborative and flexible team model should be established that integrates cross-functional and cross-departmental resources, enhancing agility and responsiveness in grassroots organizations.

For long-term tasks, a normalized internal flexible organization model and operating mechanism should be developed to facilitate strategic execution and special project tackling. For professional needs, flexible teams should be formed through a “lead + collaborate” approach across business units. For new business initiatives, especially in the early stages, a flexible team work model should be adopted without establishing physical entities. For temporary projects, particularly in innovation or engineering, flexible team structures should be utilized, enhancing evaluation and incentive mechanisms to unleash grassroots employee potential^[4].

4 Management Optimization of Grassroots Power Grid Teams

4.1 Creating Learning-Oriented and Innovative Grassroots Organizations

The strengthened coupling of new information technologies with energy demands higher technical and business capabilities from power grid teams, necessitating the rapid establishment of learning-oriented and innovative organizational models^[5].

By establishing a management concept of innovative learning-oriented organizations, teams can empower members and implement role-based management approaches, ensuring that value is assigned based on contribution, which enhances team vitality and dynamism.

4.2 Constructing Role-Based Management Models

Based on Power Grid Business Scenarios Develop a role-based management model grounded in scenario tasks, integrating position management with role management, precisely managing roles flexibly while clarifying the scenarios, tasks, and capabilities that power grid personnel encounter in the construction of new power systems.

This approach emphasizes the need for role differentiation in light of the unique requirements of various business scenarios. Role-based management minimizes over-emphasis on position hierarchy, focusing more on the differentiated task requirements presented by different scenarios in the construction of new power systems^[6]. By clearly defining and iterating on objectives related to the new power system, managers and teams are afforded greater autonomy to unleash individual initiative. Moreover, role-based management emphasizes aligning personnel capabilities with strategic goals, recognizing the significant variances in skill requirements across different scenarios.

5 Conclusion

This paper has examined the impact of high-quality development on grassroots power grid organization optimization and proposed strategies for adaptation. The findings indicate that the integration of distributed energy and new power elements has significantly altered operational characteristics and management needs within distribution networks. To adapt to these changes, grassroots organizations must enhance management efficiency and elevate the technical and business capabilities of their teams. Optimization directions include creating agile front-end organizations, promoting business integration, and establishing flexible team work modes. Additionally, fostering learning-oriented and innovative organizations while implementing role-based management can further improve adaptability and innovation within the power grid workforce. These measures will help power grid enterprises maintain competitiveness and ensure stable operations and service quality in the evolving power

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