

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(13), 2014 [7255-7259]

Analysis on current status of material management for power grid enterprises in China

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ABSTRACT

Power grid enterprise has the intensive properties of equipment, capital and technology. As the strategic resource, the material plays an important supportive role in the production operation and sustainable development of the enterprise. This paper analyzes the current status of the material management in power grid enterprise and decomposes the root cause of the problems and clears the strategic objectives. Based on the analysis, certain reference is provided for the development of the management of power grid material.

KEYWORDS

Power grid enterprise; Material management; Analysis of current status; Constraints.



INTRODUCTION

The most part of power grid enterprise's production operations are achieved by equipment and materials. They are directly related to its development^[1]. Fixed asset is a majority part of power grid enterprise's asset structure. Its depreciation, operation and maintenance are closely related to material quality. The level of material management directly affects the security and stability of production and economic efficiency of power grid enterprise.

Material management is a general term of management work, such as planning, organization, control, coordination, of various materials needed for production and operating activities^[2,3]. The grid material management has obvious characteristics of its industry. It's basic work is the supply logistics that takes the demand of power grid material as starting point; takes physical flow of material as main clue; takes logistic infrastructure as safeguard and takes logistic information as guidance.

Domestic related papers on grid material management are only focused on power grid enterprise. They have studied from the supply guarantee point of view, analyzed the current status and problems of material management, put forward some suggestions. While, the systematic analysis of the cause of these problems and the strategic objectives and development of grid material management has been seldom mentioned.

Current status of the grid material management

With the pushing of reform in electric power system and adjustment of enterprise strategy, the pattern and content of grid material management has changed greatly: During the process from loose management under planned economy to intensive management, grid material management experienced three patterns: division management, company management, and centralized management^[4]. The focus of material management in power grid is to ensure sufficient supplies. Judging from logistic, current grid material management is based on information system and transform to win-win supply chain management.

The extent of grid material management

Power grid material is a general term of materials, equipment and goods used in all business of grid enterprises. Such as infrastructure, production, spare parts, IT, marketing, office supplies, low-value products, instruments, emergency supplies, etc. It can be divided into infrastructure engineering, operation and maintenance, emergency protection and low value consumable class according to different uses. It can also be divided into project material and non-project materials according to management characteristics. These two kinds of materials have large differences in management idea, management concept and management process.

The main contents of grid material management

The work of grid material management mainly includes requirements planning; purchase orders organization, quality supervision, transport and delivery coordination, storage and delivery, waste materials disposition, emergency transportation and supplier relationship management.

(1)Requirements planning: Requirements planning is the starting point of power grid material. It is usually in accordance with project plan and production operations need. The subsidiaries, branches, and other basic units report information of material requirements. Provincial companies collect the information and make the material requirements plan.

(2)Purchase orders organization: Through balancing inventory and inspection, requirements plan becomes procurement plan. The material management department will implement differentiated procurement strategies based on material features. Because power grid material is very important, the competent supplier is determined by tender. The demand and supply sides sign a purchase contract and supply materials according to the contract.

(3)Quality supervision: Grid equipment/material supervision is an important method to ensure material quality and supply schedule. Supervision units supervise the technological process, manufacturing quality and production schedule of equipment/material according to the agreed supervision contract. Currently methods of grid material supervision are mill supervision, the key point to witness, inspection and sampling.

(4)Transport and delivery coordination: Key equipment of grid project often have longer production cycle. It contains many uncertain influences and has a sharply fluctuating supply. The demand and supply coordination of material is of great importance. In addition, these equipment have logistics properties of most large materials and require professional logistics service providers to provide transportation and other support services.

(5)Storage and delivery: Non-project materials often supply under contract and warehousing after inspection, or managed by the supplier through protocol inventory. These materials often have the business requirements of receiving, delivering and storage. According to the operation phase, it can be divided into three sessions: receiving of storage, storage in the warehouse and delivery out of the warehouse.

(6)Waste materials disposition: Waste and old materials can be divided into waste materials and idle materials. Waste materials are mostly scrapped or upgraded from equipment/materials idle materials generally come from engineering materials. Waste materials disposition typically includes recovery, identification sale and re-use, forming a part of closed loop of grid material management.

(7)Emergency materials transportation: Emergency materials are reserved to avoid power blackout and plants suspension caused by natural disaster or other occurrences and to restore electricity in a short time. Accidents of grid are

sudden and uncertain; require a high degree of material response. So emergency materials center and response plan are need to be set scientifically.

(8)Supplier relationship management: Power grid material suppliers are manufacturers. The number of key equipment manufacturers is small. Strengthening supplier relationship management, establishing stable cooperation with strategic suppliers are the important methods to stabilize material supply and reduce risks.

The critical business of grid material management can be divided into two parts: supply management and support logistics. Supply management is mainly referred to the integration of information flow and capital flow; among which requirements planning is the start point of material management. Its accuracy has guiding significance for material management. Support logistics is the entity flow in material management and requires corresponding infrastructure and operational equipment to guarantee.

The existing problems in grid material management.

At present, both the intensive material management of China State Grid and materials integrated management of Southern Power Grid reflect the management thought of centralized system: using the advantage of business scale, integrating internal and external resources and providing strong material guarantee for the enterprise development. It can be learn from the practice of material management in power grid enterprise that the promotion of intensive, lean, standardized management plays an active role in enhancing material management level^[5]. However, many problems still exist in the grid material management:

(1) The overall strategic level: The orientation and goal are not clear. The orientation of material strategy should be defined first^[6]. Namely, "Whom does it serve for? What does it aim at?" Does it serve for enterprise's internal market or external market, or both? Dose it aim at quality and supply security or pay attention to costs and benefits? Is the goal relatively stable or change phases? If it is dynamic, where is the strategic turning point embodies? These problems should be defined in the first place. They have overall guiding significance for material management. The material management goal set by China State Grid is to build the domestic first-class, international leading supply chain system. However, its specific implementation steps are not clear and are difficult to operate.

In addition, the problem that lines blur between functions of strategy layer and operation layer in grid enterprises are common. This lead to the results that material management works are struggling to daily affairs and work for strategic planning is significantly insufficient.

(2) The specific management level: Power grid material management refers to many functional departments inside and outside the enterprise. The information communication is massive and coordination is hard. There are also many problems exist in the actual operational level:

a. Emphasizing business flow and neglecting logistics. Purchasing management is the focus of material management, because power grid materials vary in type and model, require specific complementary goods and occupy a large quantity of funds. Although bidding management achieved results, the logistics management is relatively lag and cannot meet the needs of the modernization of enterprise management.

b.Emphasizing trading and neglecting relationship. Widely used in the bidding procurement is the evaluation system including indexes such as quality, price, service, etc. It neglects the supplier relationship management and not establishes stable strategic relationship with suppliers. So it is not conducive to the stable supply of power grid materials and has poor risk prevention ability.

c. Emphasizing supply and neglecting recovery. Procurement of power grid materials attracted much attention. The management from requirements planning to procurement strategy, from quality supervision to contract performing, from field handover to storage and delivery are relatively lean and orderly. While extensive waste material management, low idle material utilization ratio^[7,8], irregular waste material disposal are common.

d. Emphasizing result and neglecting process. The following problem is most conspicuous in this regard. Planning is less rigorous; enterprise's reality requirements are emphasized but the standardization of process management is neglected; causing problems such as many unplanned purchase and higher supply cost.

(3) Basic support level: Power grid material management requires the support of modern infrastructure, efficient process management and professional personnel. However, current grid enterprises often have short board in these aspects. Phenomenon such as old warehouse, lack of operation facilities, and lack of professional quality are common^[9,10].

(4) Environmental benefits level: Grid enterprises have long overly concerned about their own interests, ignoring environmental benefits. Their assets are concentrated. equipment updated and eliminated every year are of large amount. Much waste equipment can be recycled. Most waste materials such as transformer, switch, line materials, communications equipment, and metering device can be disassembled and reused. Some materials such as transformer oil, SF6 will influence environment in the long run, should brought to recycling and disposal.

As an important component of enterprise's auxiliary business chain, the primary target of grid material management is to ensure supply. However, the single supply security often puts material management in a passive response situation. Enterprises ignore the cost of logistics to improve the security level and focus too much on self-interests regardless of supplier interests and environmental benefits.

The Strategic Objectives of Grid Material Management

The objectives of grid material management should be consistent with the enterprise's overall strategy. Its strategic objectives should be based on constraint analysis.

The Constraint Conditions of Grid Material Management

It can be learned from the grid material management practice that there exists many constraints: plan and reality, time and space, cost and service, standard and special, concentration and dispersion, self-supporting and out-sourcing, economic and environment.

(1)Plan and reality: Plan is based on expectations of future demand. It has irreconcilable conflict with the reality. Different expectations for the future will form different plan. The common way to reduce the disparity is to make plans based on certain experience and methods, dynamically adjust it according to the feedback during implementation to meet the reality. However, plans are neglected or not adjusted in time and be divorced from reality.

(2)Time and Space: Unlike material management in other industry, the subject of grid material management is supply logistics that support production. There is hardly any production logistics or distribution logistics. Time difference is mainly reflects in the conflicts between supply schedule and production plan, emergency needs and transportation lag. Spatial difference is mainly the distance between the supplying place and the receive place It focuses on imbalance between the concentration of production or reserves and the dispersion of needs.

(3)Cost and Service: There is a trade-off between cost and service. That is why supply security of material management and the cost-reducing contradicts. Grid material management has long set supply security as the fundamental starting point and neglected cost management. That is not conducive to improve material management.

(4)Standard and Special: Power grid material varies in types and models It is the inevitable choice of material intensive management to use unified material code and procurement standards. Intensive material management can increase procurement scale and have the advantages of intensive. Because of the continuity of grid production and the complexity of the environment, complementary materials need to be specific. There is a contradiction between standardization and specificity in management.

(5)Concentration and Dispersion: Concentration is helpful to play the role of economies of scale. Dispersion can increase flexibility of operating. The centralized scale management and decentralized classification management need to be combined in material management.

(6)Self-supporting and Out-sourcing: By clearing the core function of grid material management, operating core business by its own and giving non-core business to professional service providers,not only benefit of the enterprise itself can be increased but also the overall resources can be integrated and optimized.

(7) Economic and Environment: On the surface, the enterprise investment funds to implement environmental protection. Contradiction exists between the economic interests and social environmental benefits. In fact, from the sustainable point of view, the two are complementary to each other. For example, the implementation of green procurement management and green recycling can maximize the utilization rate of resources, reduce resource consumption and reduce costs directly. It also can reduce or eliminate environmental pollution, reduce or avoid fines caused by environmental problems, provide a better social image and add intangible assets for enterprises^[11].

These constraints are interwoven, constitute the complicated situation of grid material management. Material manager shall seize the main contradiction, clear phase objectives and lay a solid material foundation for development of the enterprise.

Establishment of the Strategic objective of Grid Material Management

Considering many constraints of grid material management, strategic objectives of grid material management should be dynamically adjusted along with the change of its strategy. It can be divided as follows:

(1) The strategic objective based on purchasing: The material management in grid enterprise is serving for internal demand. Purchasing supply based on the production security becomes the strategic choice for this state. The quality and the price of material are the main indicators.

(2) The strategic objective based on time: If supply is guaranteed, the increase of the efficiency of logistics service is required by enterprise development and is the necessary way to improve material management. The time reduced on responding to demand is an important indicator for service efficiency.

(3) The strategic objective based on cost: If supply is guaranteed, the development of performance of material management is mainly about reducing total operating cost. The indicators usually refer to whole life cycle cost.

The three phases are internal resource integration of grid enterprises. They mainly involve the optimization and recombination of work flow, logistics, information flow and cash flow. Enterprises can achieve integration of internal information and business processes through ERP system, and combination with other functional modules^[12].

(4)The strategic objective based on supply chain: Grid material management can't do without cooperation with the upstream and downstream partners. Establishment of the system of material supply chain becomes the inevitable choice of material management. Material supply chain is the auxiliary chain of grid supply chain. It is the network composed of grid equipment (material) suppliers, grid enterprises, waste material recycle, and professional service providers (providing logistics, evaluation, inspection, and test service).

The fundamental objective of material supply chain is to build the security system to coordinate supply and demand, according to requirements of grid production and construction. In the long-term, the development objective of grid material management is to establish a supply chain system that members can coordinate with each other, supply and demand are stable and has revenue sharing contract.

(5)The strategic objective based on green supply chain: From the perspective of sustainable development, the establishment of green supply chain system that includes production, procurement, transportation, storage, recycling is the win-win goal that balances the benefits of enterprise, social and environmental.

The trend of the grid material management

Following the strategic goal of grid material management, the management ideas appear following changes:

(1)Take the enterprise's strategy as guidance; highlight the supportive role of material management. The material management is not just procurement and supply, but an important component of enterprise's strategy. The transformation from specific operational level to strategic management level will give full play of the guiding role of strategic material and contribute to the promotion of management level of material.

(2)Performance evaluation of material management is the evaluation of effectiveness of material management. It is the essential means to improve the management level. The material management should be evaluated not only from aspects such as efficiency, effectiveness, but also from the multi-dimensional considerations such as innovation, flexibility and core ability.

(3) Take the relationship management as the key point; highlight the cooperation between members of supply chain. The security supply of power grid material requires the strategic cooperation between both sides of supply and demand. The only way to promote the ability of material supply is to change the traditional trade model based procurement and establish a strategic partnership with key suppliers.

(4) Center in regular process, highlight the constraints role of planning. The contradiction between standardization of process and enterprise's actual demand is caused by cultural differences between domestic and foreign enterprises. To realize the strategic objective of grid material management requires establishing a standardized operational process and defining a rigorous guarantee system.

CONCLUSIONS

Power grid material is an important content of power grid enterprise management, and analysis of its management status could be used to identify existing problems and has a good practical significance of promoting the management level. Through the analysis of present situation and contradiction of power grid material management, this paper determined the strategic development goals and provided important solutions for grid material management. Limited to the lack of related foreign data, this paper cannot compare foreign and domestic current status of grid material management. In addition, the strategic analysis of power grid material in this paper is based on some enterprises and is lack of typicality. Moreover, the analysis tool remains to be further improved.

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