REINFORCING THROUGH COMPETENCY AND KNOWLEDGE MANAGEMENT!

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ABSTRACT

The need to reinforce human resources engaged in the LNG industry and the lack of human resources in the same is rapidly intensifying, with the global expansion of the LNG market. Conversely however, another important problem involves how to minimize terminal cost through smaller systems with progressive liberalization.

We pondered the problem of which action to take in order to minimize the operation cost; keeping us in pole position among energy companies while achieving a secure energy supply to the Tokyo metropolitan area.

The solution we devised to the challenging problem of ensuring a "coexistence of quality and cost" involved promoting the business of employees with high efficiency and quality, and handing down technology / LNG operational and maintenance skills for receiving terminals in a prompt and secure manner.

As solutions to these problems, we have two countermeasures; firstly to develop human resources based rapidly on the idea of "competency", the behavioral characteristics of a person who continually achieves a high performance in daily business.

The second involves promotion of knowledge management (KM), aiming at a more practical use of vast accumulated knowledge on the LNG terminal handling experience.

Firstly, concerning the first Competency, the concrete methods are as follows:
1. We have positioned "Competency" as "a software skill" to comprehensively exploit two "hardware skills".
2. We interviewed middle-class maintenance staff with abundant experience (so-called high fliers) about certain tips to remember regarding daily terminal operation from the following six categories, namely: "human relations", "management", "activeness", "power to achieve", "intelligence" (=IQ) and "emotional intelligence" (=personal EQ).
3. By making a sentence as a concrete action example about the content that was interviewed, we have defined this with the necessary competency for maintenance staff.
4. Each maintenance staff member checks this competency themselves biannually and is given assessment through an interview with their boss.

Elements of the assessment result are illustrated on a radar chart, which helps both the boss and the maintenance staff member recognize the strengths and weak points of the latter.

This process allows maintenance staff to establish benchmarks based on the behavioral characteristics of high performers, and provides them with high consciousness to accomplish their daily business. This has led to improved efficiency and working quality for each staff member in the LNG terminal, thanks to the introduction of a competency-aware working style.

Secondly, we execute Knowledge Management (KM) based on the premise that effective transfer of technology and skills is necessary. We promote KM based on the following three principles:
1. We established rules requiring all staff to save the personal results of their job, and share it throughout the whole organization to be permanently utilized.
2. Knowledge contents are arranged and made such as to facilitate utilization.
3. Infrastructure of knowledge sharing was accomplished using IT technology.

Now, the Energy Production division is implementing organizational and personnel strategy in the form of the so-called "Open/Expansion action plan". In this plan, we reconstruct our organization to be slimmer, stronger and more flexible, boosting all staff from an earlier point in the areas of the synergy effect of "competency" and "KM"
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1. Introduction

The expansion of the global LNG market has produced a need to train people to work with LNG, and has even raised the prospect of a shortage of appropriate people.

At the same time, competition between terminals has become fiercer with increased liberalization, and the topic of how to operate a terminal at minimum cost with fewer people has become another important issue.

At the Production Department of Tokyo Gas, a gas company whose mission is to provide a reliable supply of energy to Tokyo and its surroundings, a great deal of attention has been given to the issue of what sort of measures need to be taken in order to operate terminals efficiently with smaller numbers of people, while at the same time maintaining and improving qualitative aspects such as ensuring energy supply reliability and safety.

Internally, the Production Department defines quality in terms of operating facilities safely, ensuring safety, and preserving the environment. ‘Enhanced quality’ and 'low costs' appear to be diametrically opposed, and achieving them both at the same time is a significant challenge. The department’s response to this challenge has been to enhance the quality and efficiency of each individual staff member’s work, and to pass on techniques and skills for LNG terminal running and maintenance to others in a reliable manner at an early stage.

To do this, it became necessary to accelerate the growth in each individual's abilities, so to meet this objective, two major initiatives were undertaken, commencing in FY 2003.

The first initiative focused upon and put into practice concerned the accelerated training of human resources using competency (the characteristic seen in all people who are constantly producing good performance in their work; a behavioral characteristic of high-performing people).

The second initiative is the practice of knowledge management ("KM"), which aims to enhance the utilization of human and intellectual assets. KM is given particular attention in the process industry that the Production Department represents, but there were very few precedents for its implementation in Japan.

As the initiatives produce successes, this paper provides a detailed examination of the two initiatives and of the synergy between them.

2. The first major initiative - accelerated human resource training using competency

2.1 FY 2003

The attention was first focused on competency (the characteristic seen in all people who are constantly producing good performance in their work; a behavioral characteristic of high-performing people). Tokyo Gas has three plants (LNG Terminals) in Tokyo Bay at Negishi, Sodegaura and Ohgishima, of which, the Sodegaura LNG Terminal handles about half the gas set out to the National Capital area. The initiative was first applied to maintenance staff at the Sodegaura LNG Terminal in an attempt to use competency to accelerate human resource training.
1) In the past it had taken about 10 years to train fully-fledged maintenance staff who can handle a full range of tasks. An objective was set of halving that period to 5 years.

2) Three training tools were established as the pillars of this approach:
   a. common skills (skill/technique/knowledge required by all those engaged in running an LNG terminal. For example, knowledge of the Gas Utility Industry Law, and knowledge about safety and the environment that is essential for running a gas plant)
   b. specialized skills (specialist skill/technique/knowledge required for special areas such as electrical, mechanical, or instrumentation engineering), and
   c. competency

   Competency was regarded as a 'software' skill, required to make proper use of the two types of 'hardware' skill, common skills and specialized skills. The reason for this is that differences in work performance of two people with the same levels of common skills and specialized skills are attributable to their ways of thinking and their characters, with differences of awareness affecting actual behavior. These awareness aspects are what determine competency.

3) After studying a variety of references on the topic, we interviewed mid- and high-grade maintenance staff with a wealth of knowledge and experience (people known for their capabilities and high performance levels). The interviews focused on "human relations", "activeness", "management", "power to achieve", "intelligence (IQ)", and "emotional intelligence (personal EQ)", asking each of the interviewees about what they were attempting to do in their day to day work of operating the terminal.

4) The findings from the interviews were rephrased in the form of sentences describing instances of actual behavior in the terminal in "I do ..." terms. Making a collection of sentences like this built up a body of knowledge about competency for maintenance staff.

5) The sentences obtained in this way have been used twice a year for self-checking by maintenance staff, followed by assessment through a meeting with the individual's boss. The assessment results are plotted on a radar chart (Figure 1) to make them easier to visualize, enabling the maintenance worker and his or her boss to gain a clear picture of strengths and weaknesses. The meeting between the boss and the maintenance worker is then used to set up a year-long behavior plan to build on the individual's strengths and to reinforce his or her weaknesses. Progress is checked and followed-up half a year later, and then at the end of the company year, the level of accomplishment of the year's objective is checked, and a new behavior plan is set up for the new year predicated on the individual's strengths and weaknesses. This ongoing process is a PDCA cycle.
2.2 FY 2004 onwards

On the basis of the Tokyo Gas Group's mid-term business plan for FY 2003 to FY 2007, the Energy Production Department started in 2004 to reform the LNG terminal from just being a cost center to being a business that makes use of the terminal infrastructure. To achieve low costs as part of those reforms, further efforts are being made to raise operating efficiency and to cut costs. Furthermore, preparations have started on determining the policies for the Tokyo Gas Group's new mid-term business plan for FY 2006 onwards.

The department's human resources strategy is particularly affected, with two people (the author and his immediate superior) being assigned to Open/Expansion Task Force Secretariat at the Production Department to work on formulating an Open/Expansion Action Plan (an action plan with the objective of opening up by taking away barriers created by systems and setups that have been put in place over the years as the LNG plant is operated, to extend each individual's abilities, and to make the most of those abilities to contribute to the company). The Secretariat is also the base for a working group that cuts across the organization to incorporate the three plants and head office. For the three items set out below(Figure 2), the present assets for the further reinforcement of competitive strength were reviewed to come out with solutions.
2.2.1 Organizational reforms

Each of the three terminals, Negishi, Sodegaura, and Ohgishima, consisted of three sections – Production Section, Facilities Maintenance Section, and General Administration Section. The fence between the Production Section and the Facilities Maintenance Section is now being torn down to create a unified operation section that is responsible for both operation and maintenance. This has produced a more efficient working setup means. In FY 2005, the Ohgishima LNG Terminal led the way by setting up the new system consisting of the Operating Section and the General Administration Section. Since the beginning of FY 2006, the other two terminals have switched to a similar system.

2.2.2 Comprehensive measures for staff training

Until recently, operators, maintenance staff, engineers, and corporate staff were each oriented towards being specialists in a particular special field. This is going to change, with the links to KMPG described under KM initiatives, and with shifting training towards a multiple approach, with each individual handling two or more specialties.

A plan to broaden the scope of the competency approach was also formulated to take in operators, engineers, and corporate staff in addition to maintenance staff. People known for their high performance, particularly mid- and high-grade staff, were interviewed to ask about what they attempt to do in their day to day work of operating the terminal, enabling competency to be defined for each of the four job types.

In FY 2005, the operators and maintenance staff categories were unified to produce three lists of competencies for the three job types, and a wide-reaching revision of the competency items was undertaken. In this revision, the categories of "human relations", "activeness", "management", "power to achieve", "intelligence (IQ)", and "emotional intelligence (personal EQ)" were replaced with "conceptual power" (with three subcategories: understanding/analysis, reform/creativity, topic formulation), "cooperative power" (with six subcategories: interpersonal understanding, ability to express, teamwork, negotiation/coordination, flexibility, influence), and "technical power" (subcategories: knowledge/information, skills, enthusiasm, planning ability, self-development, decision).

2.2.3 PDCA setup used for continuing and enhancing the Open/Expansion Action Plan
A setup was put in place to ensure that each year the reformed organization and human resource training approaches are reviewed to make sure that they are functioning properly, and to make improvements where required on the basis of that review. Annual maintenance was decided for the competency approach in particular.

As a result of the initiative and the sort of activities described above, by means of benchmarking their behavioral characteristics with those of high performers, the people in the department have each begun to go about their daily work with higher level of awareness. Bosses have gained clear pictures of their subordinates’ strengths and weaknesses, enabling them to be more effective in guiding training and managing targets. The persistent application of this sort of initiative is successfully enhancing the quality and efficiency of work of each individual staff member at Tokyo Gas LNG terminals.

3. The second major initiative - Putting KM into practice

In the same way that effort was put into competency, this second major initiative took place in a context of needing to raise quality of reliable energy supply, etc. along with coping with shrinking the number of staff, particularly of veteran staff. At the same time as enhancing the quality and efficiency of each individual staff member’s work, and reducing the costs of the terminal, the company is in a period of tremendous change, with its scope of business broadening to include new areas such as power generation and engineering business. The second major initiative developed from a need for effective transfer of techniques and skills.

From this perspective, the Production Department became aware of the increasing need to organize and systematize intellectual assets, to make those assets more comprehensive, and to transfer expertise. To provide a solution, in 2003 the department set up a knowledge management project group (KMPG) and decided that knowledge management would be adopted throughout the department.

3.1 The Energy Production Department's approach to KM

The timing for promoting KM in the department was excellent, as KM had become very popular in Japan in about 2002. We made a thorough examination of the subject resulting in a decision to orient the initiative in the following manner.

Orientation for KM initiative in the Energy Production Department
- All staff members participate
- Instead of attempting to gather all information, the particulars of the initiative are prioritized, placing the focus on important topics
- The work setup constructed through KM must be a setup that can be maintained over the long term

3.2 'Knowledge' in the Energy Production Department

Before the initiative, the department's approach to organizing knowledge and making it easy to use had most frequently been to collate histories of the plant and to make collections of design ideas, or make databases or new resources such as business support software to provide the knowledge
Knowledge in the Energy Production Department means techniques, experience, and expertise in the LNG and power generation business. Specifically, it refers to achievements in work in the following areas:
- Construction / startup
- Operation / maintenance
- Engineering / technical development
- Safety and disaster prevention, environment, compliance
- Businesses associated with LNG

Knowledge is produced through day to day work, it was decided to create a setup whereby knowledge that is obtained through work is left behind in a form that allows effective use to be made of it in the future, and to always approach work with the question "How I can leverage accumulated knowledge."

Assuming that a substantial amount of knowledge should have been accumulated over three decades of LNG plant operation, the mission of the KMPG was to collate and organize such knowledge.

3.3 KM initiative is based on three pillars

After making a clear definition of the knowledge to be handled and determining the orientation of the initiative, the next step was to look at the basic approach to be used in the initiative, investigating how the Energy Production Department's knowledge could be made permanent and how to create an environment where the knowledge can be used efficiently.

As a result, the following three items were determined to be the three pillars of the KM initiative.

1) Creating a setup for thorough utilization of knowledge
2) Organizing the knowledge
3) Putting in place means of access for accumulating and utilizing knowledge

Figure 3 below shows the roles of these three pillars in the flow of work. Details of how the initiative was carried out are presented below.
3.4 Outline of KM initiative in the Energy Production Department

The three pillars of the initiative are described in detail here.

3.4.1 Creating a setup for thorough utilization of knowledge

Past measures by the department that had lost much of their meaning over time (such as old rules for document management) and measures to which a PDCA cycle had been properly applied (such as EMS, etc.) were analyzed to understand the differences in their setup, with the aim of constructing a KM setup that would not become permanently outdated.

a. Reflection in work planning

Since leaving behind knowledge and making use of it later is built into the work PDCA cycle, knowledge-related items are incorporated into work planning from FY 2004.

It was decided to confirm the state of progress twice a year at work planning report meetings, etc.

b. Reflection in performance evaluation

The results of KM initiatives are incorporated into performance evaluation, and from FY 2005 each individual staff member's sheet of objectives has been revised. This systematic approach ensures that KM is regarded as a part of work.

c. Briefings for people performing personnel evaluations

As measures to instill a KM mind, briefings for people performing personnel evaluations were conducted to brief these key people in each workplace on the importance of guidance by superiors and on the important points for such guidance.

d. Construction of setups to ensure the continuance of KM
A KM promotion manual was drawn up, and is being used on a trial basis from FY 2005. The aim is to systematize permanent usage of KM for FY 2006 onwards after the KMPG has wound up, to ensure that the initiative does not become outdated and fade away. The manual formalizes the day to day maintenance of knowledge, clearly stating the year-round schedule for KM, including the setting of work targets, inspection of progress, and in order that document management rule inspection can be properly implemented, allocates a knowledge manager for each specialty. In addition to preventing the initiative from becoming outdated, this constructs a setup to enable special issues to be handled autonomously, such as being reflected in standards to prevent problems.

e. Utilization of websites and email newsletters
KM must be readily understandable and accessible to all members of the department. In order to prevent them from situations such as being swept into the initiative without properly understanding the significance of KM, easy-to-understand information about the initiative will be continually published. Email newsletters with an informal approach will be issued about once a month to make KM more accessible and to help it to be understood.

3.4.2 Organizing the knowledge

In order for knowledge to be utilized, the resources must first be put into a form that makes them available. Important knowledge in a variety of fields is being organized, and for problem solving and human resource training in particular, content is being organized and means of utilization are being investigated. Some examples are set out below.

a. Preventing problems
To promote utilization in safety/disaster prevention, design/maintenance, and training (reflection in working instructions, reflection in the standards and manual, organization of the content for equipment operators, etc.), past problems are being listed and related resources are being put into electronic form.

b. Training human resources
Categorizing knowledge levels into three levels from the level of new staff on entering the company to the level of mid-/high-grade staff, appropriate content is being organized for each level.
- Content I / II: Short-term strategic support for new staff, young people, and transferees
- Content III: Knowledge provision for mid-/high-grade staff
As at July 2005, content items are being reviewed and particulars are being organized for each specialized field.

c. Other issues, including digitizing paper-based knowledge and accumulating it in electronic form
Resources that should be shared in electronic form are being systematically converted and published in a shared folder.

d. Formalizing tacit knowledge and understanding
- Interviews with veterans
Several people were interviewed, primarily on the subject of engineering management, and these are steadily being published in the knowledge portal area of the Energy Production Department's website as an opportunity to learn from senior engineers, and targeted at management level staff.
- Also, we are working to ensure that bosses are consistent in giving instructions that a job is not finished until the knowledge gained has been collated and documented. The aim is to become
3.4.3 Putting in place means of access for accumulating and utilizing knowledge

In addition to the setups for organizing content and utilizing knowledge, a shared infrastructure needs to be put in place to enable the knowledge to actually be used. Currently, virtually all documents formulated at work are in the form of electronic files, and existing electronic files are a treasure trove of information. However, in the past these electronic files have been stored on shared file servers divided up by domain at each site, and because slow internal site networks have not been upgraded, the documents have not been shared effectively. Breaking down barriers to exchange of information and making it possible to freely share information is one of the major preconditions for proceeding with knowledge management. The communications infrastructure that had to be put into place for KM purposes included fast networks and a search function capable of covering all files in the Production Department.

a. Upgrading network speeds between sites

The internal network was upgraded by utilizing spare capacity on the Tokyo Gas microwave lines to inexpensively raise network speed by more than 20 times, enabling electronic information to be exchanged smoothly.

b. Adopting the ConceptBase Japanese-language capable search engine

After comparing a number of search engines, ConceptBase was selected because of its advanced Japanese-language search capabilities, and a ConceptBase search engine was installed. Along with handling a glossary of special terms used by the department, this has provided the means of easily searching through the department's electronic files.

c. Commencing use of the e-UFO (UFO=Useful File Operation) document management rules

Use of the so called e-UFO document management rules was begun to ensure sharing of paper and electronic documents throughout the Energy Production Department, going beyond the framework of individual sites.

It was decided to adopt rules that were easy to follow, keeping them simpler than the document management rules that had earlier been applied company-wide. An outline of the e-UFO rules is shown in Table 1.

d. Construction of knowledge sharing portal

Knowledge is only really valuable if it can be sufficiently utilized. In order to make it easier to utilize, paper and electronic documents were sorted and organized as part of the process of preparing content, and now that the ConceptBase search engine has been made available as a means of access, electronic documents can be easily searched.
To take a further step forward from this situation, a knowledge sharing portal was constructed to make a place where it was easy to access information and accurately reach important knowledge from among the vast amount of information accumulated.

(a) Information sharing and issues with the department's previous website
- Although the ConceptBase search engine had been made available, it was still necessary to be able to efficiently access key pieces of knowledge without having to go through a search process.

(b) New functions with the knowledge sharing portal
The portal has the following functions, enabling important information to be rapidly accessed while still providing a high level of security, and includes conferencing and other functions, providing a place where knowledge can be shared.
- Collections of links for company-wide users / internal (departmental) users
  - Bulletin boards
  - Document library (Configured so that important knowledge can be accessed more quickly than by going through a ConceptBase search process)
  - Electronic conference room (forum for sharing knowledge)

4. Conclusion
For three years after the start of competency and KM initiatives in 2003, an environment appropriate for knowledge sharing has been put in place in the Production Department, including competency as a human resource training tool, and as a result, a new climate is being nurtured. The industry fashion for competency and KM has passed, and now it is only those initiatives which are truly bearing fruit that will be able to survive and thrive in a corporate environment.
Due to the link between the Tokyo Gas Open/Expansion Task Force and the Knowledge Management Project Group, and in preparation for the Tokyo Gas Group’s new mid-term business plan that will start in 2006, the foundations have been put in place ready for the Production Department to simultaneously achieve its enhanced quality and low costs objectives. The project teams that have built the setups for competency and KM will both be disbanded, but by continuing to make the most of the PDCA setup in human resource development utilizing competency and KM as part of the department’s ordinary work, rather than as a special project, training of departmental staff can be accelerated, and construction of a slim but flexible organization that is well able to cope with change in its environment will continue to be promoted as strongly as ever.

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