INITIATIVES IN CONTINUING EDUCATION FOR ENGINEERS AT NIPPON KOEI

日本工営における技術者の継続教育方法

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日本における建設コンサルタントのリーディングファームの1つである日本工営が、全社の技術力強化に向け、この2年間実施しているユニークな取り組みについて紹介する。1つは人材育成の支援策であり社内CPD制度、キャリアヴィジョン とアクションプランを作成する短期研修（TD・P研修）、技術士試験受験支援、人材交流制度、およびキャリアモニタリングからなる。2つ目はこのような育成策の成果を含む人的情報を技術情報の一部として全社的に共有し循環を図る知的情報プラットフォームの運用である。

Key Words：*人材育成、支援策、キャリアビジョンとアクションプラン、継続教育(CPD)制度、資格取得支援、人材交流制度、キャリアモニタリング、知的情報プラットフォーム*

1. INTRODUCTION

Nippon Koei Co., Ltd. has been leading consultant firm for providing comprehensive services in the field of technical assistance to developing countries for a long time. Now, Nippon Koei has been implementing new measures in continuing education since April, 2002 to enhance the technical capability of engineers as professional staff. The present paper introduces the background, structure, progress, and future outlook for this initiative.

2. BACKGROUND

Nippon Koei, (hereinafter called as NK) consists of four operating divisions, i.e., Domestic Consulting Administration, Overseas Consulting Administration, Power Engineering Administration and Socio-environmental Engineering Division. Out of its 1,600 employees, 1,100 are engineers and among these, 650 are certified PE. Since its foundation in 1946 by Yutaka Kubota, Nippon Koei has developed into an engineering group with much to contribute to both domestic and international infrastructure development. In recent years, the company has made advances in meeting environmental needs for supporting sustainable development. Its management philosophy is "contributing to society through technology with sincerity." After 1991, when the cold war ended with the collapse of the Soviet Union, bubble economy in Japan went through rapid decline. Through subsequent attempts at economic recovery, expenditure on public works expanded temporarily but quickly declined thereafter, and this trend has continued to date. It is reported that there will be a further 15% contraction in public works spending over the next five years. Meanwhile, the tide of globalization is pressuring Japan to liberalize and deregulate various markets, including those for public-works projects.

As part of such globalization, the APEC Engineer Register was established in 2001 to promote the mobilization of engineers among APEC economies. This system recognizes the equivalence of qualifications of engineers in participating economies. Qualified Engineers (PE) are registered as APEC engineers and can be accepted as equal to any local engineers with mutual agreement of participating economies. Indispensable requirements for APEC engineers include completion of engineering education, a certain amount of practical experience, observance of engineer's ethics (ensuring of safety) and continuing professional development (CPD). Since not all these requirements had previously been included in the standards for Japanese PE certification system, Japan quickly revised the PE Law and became a founding member of the APEC Engineer Register. While the aim of the PE Law remains the same, that is, technological improvement and national economic growth, there has been a major shift in the idea of the archetypal engineer from being single-minded and task-oriented to being conscientious and valuing professional ethics and social peace.

Considering these external and internal factors and exploring how to provide long term career development, Nippon Koei

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prepared a booklet, "Career Vision for NK Engineers." This booklet, which was distributed to all employees in November, 2001, stresses that an engineer's capabilities are the source of company profit, and that long-term increase in technical capability ensures a competitive edge and contributes to increased profit. The booklet also presents the company's ideal image of an engineer and introduces new policies to support engineers in their career development. In order to implement these policies, the Knowledge Information & Human Resources Development Center was established in April, 2002.

3. OVERVIEW OF NEW MEASURES

The Knowledge Information & Human Resources Development Center offers support for engineers through the following five measures:

- CPD system for engineers
- Technical Development training/Professional training (TD-P)
- Study seminars for PE qualification
- Talented individuals exchange system (Multi Seed Program, "MSP")
- Career monitoring system

These measures alone, however, are not sufficient to achieve our final aim and contribute to profit. In other words, the company reaps benefits only when there is a structure that can utilize the maximum potential of the improved capabilities of each engineer. Based on this thinking, the system is designed to share personnel information on the capability and career development of engineers, along with other technical information, throughout the company. There are various components to strengthening technical capability, and all need to be connected in a closed circle so that information can circulate among the people involved in these various components. We believe that engineering education pays off in company profits when technical information continuously flows in this circle.

Fig.1 indicates the actual flow of information to people involved in 1) planning for bringing up technical capability, 2) implementing training, MSP, and CPD, or providing support for qualification acquisition, 3) career monitoring, 4) providing services (e.g., proposals, technology, marketing) utilizing the newly acquired qualifications and skills, 5) implementing services, 6) systematization of acquired technology, 7) evaluating projects and the people managing them, and 8) career management.

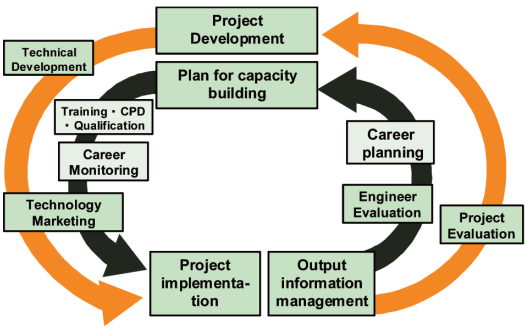

Fig.1. Company-wide Information Circulation

The cycle of informational circulation is expected to be no longer than one year. While all the components (or functions) such as capability-building, marketing and operational activities have long been in place, a management style that stresses information circulation about each of the components has not been clearly defined before. The most prominent features of our system are the new components such as the NK Engineer CPD and the system for the circulation of information.

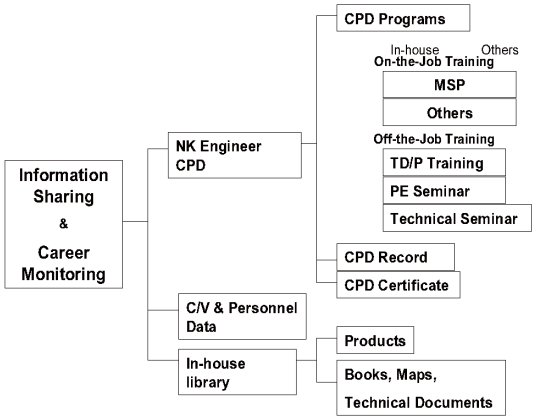

Fig.2. Company-wide Information Circulation

Fig.2 indicates the types of managed information and Fig.3 shows the information database system for sharing and utilizing such information by company intranet. Fundamentally, this system environment consists of a communication environment shared by all employees and an information search environment. The information that can be searched are 1) career-related

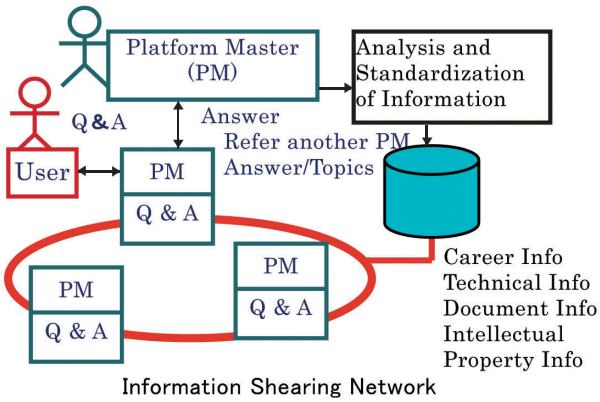

Fig.3. Information Shearing Network

information such as CPD records, curriculum vitae (CV), and personnel records, and 2) document information including project reports, books and maps as well as intellectual property information owned by the company.

Furthermore, since the communication between users and the platform master include some important technical information, such information is planned to be standardized and shared. The software program for our communication environment is also used by the Japan Society of Civil Engineers.

4. IN-HOUSE CPD SYSTEM

The NK Engineer CPD system ensures that all employees working in technical fields are encouraged to participate in the CPD. The system helps participants to achieve their goals efficiently in a cycle where they set their own targets and schedules, follow through their own programs, and evaluate the results. During this program, two types of records are kept: Record Sheet 1 is used for target setting and evaluation and Record Sheet 2 is for recording all training attended. Record Sheet 2 is almost identical to the official CPD Record Sheet designated by the Institution of Professional Engineers, Japan (IPEJ) and thus the records entered on this sheet can easily be registered as PE CPD records at IPEJ.

While we consider Record Sheet 1 as the more important of the two for the effective implementation of CPD, we also use Record Sheet 2 since PE is the major professional qualification in our company, and compliance with the PE CPD is important. The suggested duration of CPD is set at 50 hours, following the PE standards, but we place more emphasis on the cyclical approach of planning, implementation, and evaluation in accordance with Record Sheet 1.

The contents of CPD are generally determined by the engineer's own initiatives as they themselves deem necessary. This is consistent with the PE standards. Following the standards for the PE qualification and the Japan Society of Civil Engineers, we accredit a range of formats for CPD: in-house technical seminars for technical development and professional training; external activities such as seminar participation; preparation of publications (books and papers); lectures, and committee activity; self-study for sitting qualification examinations.

Twenty months after we commenced operation of the CPD system, we surveyed all candidates and discovered that the participation rate was low. Subsequently, we distributed a PR pamphlet to the company's engineers stressing the necessity of CPD and asked for their understanding and cooperation. We provide these pamphlets to engineers at the time of interviews with their superiors for performance review and setting future targets for capability development.

5. TECHNICAL DEVELOPMENT (TD) TRAINING AND PROFESSIONAL (P) TRAINING

Nippon Koei has been systematically conducting extensive in-house training in two broad categories: professional skills and technical skills. Within each category, there are four types of training: 1) mandatory (base formation), 2) role development, 3) selective (strategic capability bringing up), and 4) elective (self-development). Engineers receive both types of training according to their age and experience. TD training and P training are three-day, stay-over, mandatory training seminars for the engineers whose ages are 30, 40 and 50 and are considered essential for planning their future career.

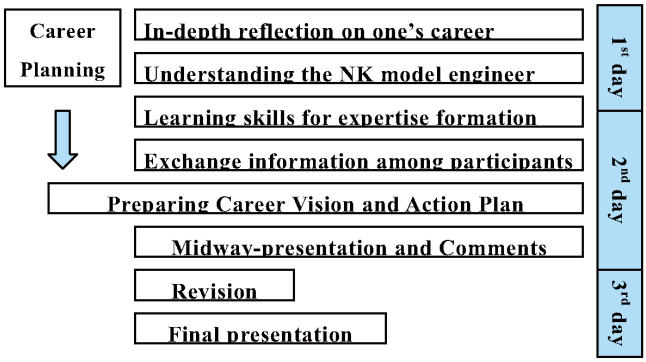

Fig.4. Structure and Aim of TD Training

The aims are to motivate engineers to form, maintain and expand their expertise and teach them how to continue their study. At the age of 30, engineers go through TD training where they establish their expertise, set career visions for the next 10 years, and prepare action plans for achieving those goals. At the age of 40, they participate in P training where they set their career visions and action plans for the following five years, examining how to maintain and expand their expertise.

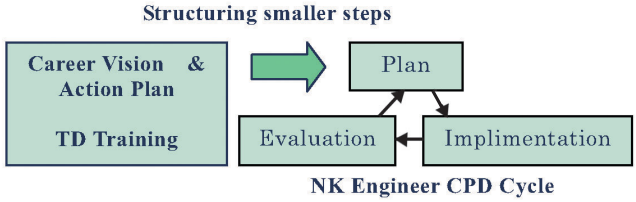

Fig.5. Transition from TD Training to CPD

An outline of the components of the TD training is shown in Fig.4. In addition to these components, TD training also 1) presents an overall scheme of company-wide technical capability

strengthening, of which TD training is one part (Fig.1), 2) instructs attendees to divide their Action Plan into smaller steps of shorter CPD plans (six months or a year) to facilitate implementation (Fig.5), 3) promotes the formation of a human network among participants and lecturers, which is important for continuing education, 4) stresses the importance of an engineer's autonomy, 5) presents lectures on professional ethics, and 6) reminds them to reconvene in two to five years to check the progress of all members. Moreover, we observe the following guidelines to ensure the effectiveness of the training:

- Fellow engineers with leadership quality make presentations on how their own expertise was developed and describe their more outstanding professional experiences.
- Lecturers are about 5 or 6 years senior to the participants so that they are closer in age and likely to communicate and instruct them after the trainings.
- The number of participants is between 15 and 25.
- Participants from heterogeneous fields shall be trained together so that they stimulate each other and build a network across the fields.

These trainings are meant to motivate participants to achieve their goals through CPD after the seminars. In other words, unless each participant actually engages in CPD, his technical capability can not be strengthened. It is important that these new measures be recognized and respected throughout the company so that the participants can partake in and continue with CPD after they return to their stations. Fortunately, these seminars have received favorable reviews from the participants and we can expect them to take on the role of advocates for these new measures. In 2003, we extended the age limit for TD training to 34 in the hope that it would be better recognized and take root in the company (Fig.6).

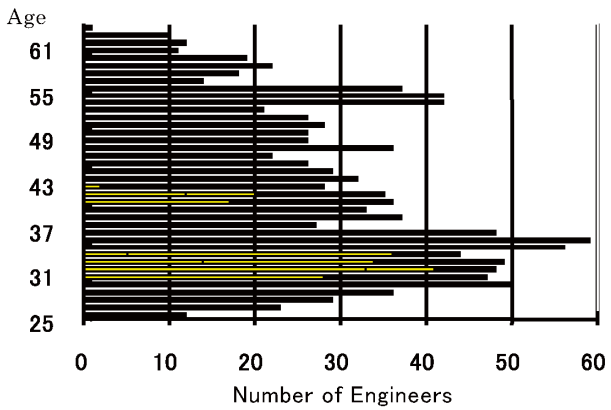

Fig.6. Age distribution of TD&P training participants

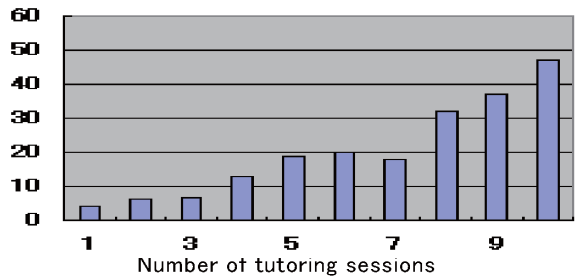

Fig.7. Correlation between tutoring and pass rate for PE exam

6. SUPPORT FOR ACQUIRING PE QUALIFICATION

For the past ten years, the importance of the PE qualification has been increasing among construction consultants. In the past, persons nominated as project manager in construction consulting proposals were required to have one of the following three qualifications: PE accreditation, doctorate, or equivalent capability. However, over time the equivalent capability and doctorate qualifications have been dropped and now the only criterion accepted is PE accreditation. Project engineers are also selected in accordance with their qualifications. Considering such changes, we now offer financial incentives for those who succeed in passing the PE examination. We also assign our engineers who have already gained PE accreditation to tutor the candidates for their written examination. Since there are certain trends in the exam questions and the answers require a great deal of writing within a limited time, it is helpful to prepare practice questions and prepare the model answers. Fig.7 illustrates the effectiveness of tutoring for the PE exam.

7. TALENTED-PEOPLE EXCHANGE SYSTEM

In today's fast changing world, in order to secure long-term employability, engineers are required to cultivate flexibility and wider perspective beyond their own specialty. Our talented-people exchange system allows young engineers (around 30 years of age) to have experience in another field or station for three years. Such exchanges are only possible through a company-wide initiative. These exchanges can be between: 1) sections (e.g., domestic and overseas), 2) different fields, 3) head and branch offices, 4) research and development, 5) different types of work (e.g., technical and marketing), 6) companies, and 7) head office and overseas project office. We prepare a list of candidates and their qualifications and seek agreement between the candidate and parties involved before an actual decision is made. After this system was introduced, engineers began to give it positive consideration and it fostered a sense of independence. Such a mindset seems to facilitate further rejuvenation of networking and

information circulation for enhanced strengthening of technical capability company-wide.

8. CAREER MONITORING

For any system to function properly, a feedback process is absolutely necessary, and monitoring is an essential part of such a process. We monitor the constantly-changing human resource information such as CPD records, CVs, and personnel information (internal and external qualifications, fields of specialty, career paths, and other personal information). Among these, all the records except CPD data already exist, but have been managed in different ways. Some data were held in a company-wide database while others were maintained by each department or section. We are coordinating these different sources and gradually building an integrated, comprehensive career monitoring environment. Recent monitoring of CPD found that the general rate of implementation was rather low and triggered the company-wide promotion of its implementation. At the moment, we conduct partial career monitoring through studying monitoring results from individual items such as CVs. We also review the outcomes and evaluate the utility of the individual items for monitoring. Through accumulation of such partial monitoring, we hope to gradually build a larger career monitoring system.

9. FUTURE TASKS AND PROSPECTS

(1) FUTURE TASKS

Currently, we are planning P training (2) for engineers at the age of 50, but have not yet finalized the contents. The aim of this training will be the same as that of P training (1) for 40-year-old engineers: the maintenance and expansion of one's expertise. One option under consideration is to assign participants to take the role of knowledge information platform masters and have them reply to all the technical questions related to their field for one year. Instead of being motivated by a short-term intensive seminar, the participants might have a better chance of maintaining and expanding their technical knowledge by answering questions and providing advice. Since the answers and advice have to be given during their term as platform master, the new knowledge and skills that they can master may be limited, but we can also expect an immediate effect, which seems to be a need of the current business climate.

(2) PROSPECTS

Today, the PE　qualification is indispensable for engineers in our company. In their action plans, almost all TD training participants mention the acquisition of this qualification over the ensuing several years. As such, we can refer to the number and rate of engineers in our company acquiring this qualification over the next few years as an index of the effectiveness of our measures for company-wide technical capability strengthening.

10. ACKNOWLEDGEMENT

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