

Factors affecting the degree of knowledge sharing achieved when sharing infrastructure maintenance management knowledge

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1. Introduction

Recently, Japanese infrastructure has been aging rapidly, and systems and technologies for maintenance management have been developed in response to this situation. However, it is a lack of human resource for maintenance management in local area. Some universities conduct infrastructure maintenance training programs in local area for solving this. However, the number of participants and opportunities for training programs is limited. So, it is efficient that participants share knowledge acquired by training programs in their organizations to enhance the organizations. In this paper, factors that affect the effectiveness of sharing knowledge are identified for various knowledge sharing methods and knowledge types by analyzing the results of a questionnaire survey to trainees who have taken local infrastructure maintenance training programs.

2. Knowledge management

Knowledge management is one approach to the business management for achieving organizational objectives by making the best use of knowledge. In this theory, knowledge is divided into two types in terms of the knowledge characteristics. "Explicit" knowledge is objective knowledge that can be expressed by words, figures or formulas, and it can be preserved as a database by computer processing. On the other hand, "tacit" knowledge is subjective knowledge that is based on personal feeling or experience, and it is difficult to transfer to another person by words or language alone [1].

3. Methodology and sample characteristics

Data for this research was collected using an online questionnaire survey targeted at engineers who participated in local infrastructure maintenance training programs. Seven programs cooperated by distributing the survey request to their participants. The questionnaire survey was designed to clarify how trainees shared knowledge within their organizations, and contained eight sections covering program participation, degree of

knowledge sharing achievement, knowledge sharing methods, sharing environment, improvement of knowledge sharing, organizational characteristics and environment and respondent characteristics. The survey received 337 responses, for a 42.3% response rate.

4. Results & discussion

4.1. Methods utilized for knowledge sharing

The utilization of methods for knowledge sharing inside their organizations is shown in Figure 1. The most utilized methods were "report" and "informal communication," which were conducted by about half of respondents, whereas "seminar" and "OJT" were the least utilized methods.

4.2. Degree of knowledge sharing achievement

The degree of knowledge sharing achievement by

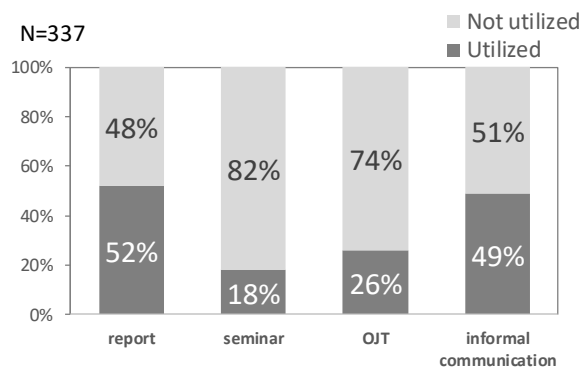


Figure 1 Methods utilized for knowledge sharing

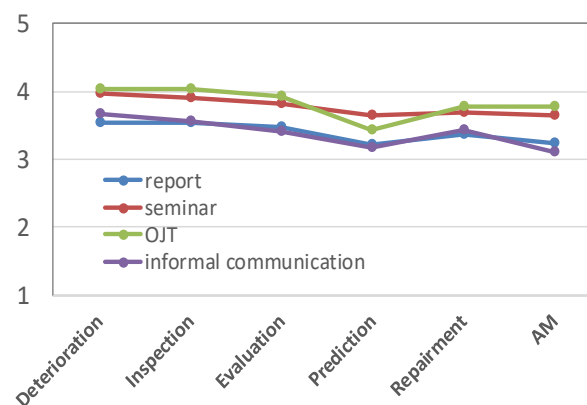


Figure 2 Degree of knowledge sharing achievement

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methods and type of maintenance management knowledge are shown in Figure 2. The respondents evaluated degree of knowledge sharing achievement by 5 scales: 5:Could share, 4:Could somewhat share, 3:Can't say either way, 2:Somewhat could not share, 1:Could not share. The method with the highest level of achievement was generally "OJT," but "seminar" also showed a high degree of sharing achievement. On the other hand, "report" and "informal communication" were the least effective methods.

4.3. Regression analysis

To examine the factors affecting the achievement of knowledge sharing, linear regression was conducted using the organizational environment (scale of organization, leadership, quality and number of human resource, framework, economic resource and IT environment), individual characteristics (tacit level, age, gender, academic background, years of experience) and sharing environment (relationship, shared level of knowledge, motivation, trust relationship). Table 1 summarizes the factors that have high significance ($p < 0.05$) from the linear regression analysis results for each of the knowledge sharing methods and the types of maintenance management knowledge. In terms of methods, it is found that "tacit level" and "shared level of knowledge" are common for improving knowledge sharing achievement in report, OJT, and informal communication. For "report," whereby people share knowledge by words and figures, "shared level of knowledge" is common across all types of knowledge. For "informal communication," "trust relationship" is a

common factor, because "informal communication" is a method that occurs in personal conversation with friends or colleagues. "Tacit level" is common factor for "inspection technology" because "inspection technology" requires a high level of tacit knowledge.

5. Conclusion

Knowledge sharing can be an important activity for improving the capability of civil engineering organizations. This survey showed that it is useful to enhance participants' retention and shared level of knowledge with someone for improving degree of knowledge sharing achievement in organization. However, these are difficult to improve immediately, so it is necessary consider improving organizational environment for enhancing knowledge sharing about infrastructure maintenance management in organizations

Acknowledgement

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References

- [1] Ikujiro Nonaka, Hirotaka Takeuchi, "The Knowledge Creating Company," in Toyo Keizai Inc., 1996.

Table 1 Significant factors for knowledge sharing identified by regression analysis

Method	Deterioration	Inspection	Evaluation	Prediction	Repairmen	AM.
Report	✓Shared level ✓Motivation	✓Tacit level ✓Shared level ✓Motivation	✓Tacit level ✓Experience ✓Shared level	✓Tacit level ✓Experience ✓Shared level	✓Tacit level ✓Shared level	✓Tacit level ✓Shared level
Seminar	✓IT environment ✓Relationship ✓Shared level	✓Scale of organization ✓Leadership ✓Tacit level ✓Shared level	✓IT environment ✓Trust relationship		✓Number of human resource ✓Age ✓Gender ✓Experience	✓Number of human resource
OJT	✓Quality and number human resource ✓Tacit level ✓Shared level ✓Trust relationship	✓Tacit level	✓Tacit level ✓Shared level	✓Tacit level ✓Shared level	✓Scale ✓Quality of human resource ✓Tacit level ✓Academic background	✓Quality of human resource
Informal communication	✓Scale ✓Quality and number of human resource ✓Tacit level ✓Shared level ✓Trust relationship	✓Tacit level ✓Shared level	✓Scale of organization ✓Quality of human resource ✓Economic resource ✓Tacit level ✓Shared level ✓Trust relationship	✓Quality of human resource ✓Tacit level ✓Trust relationship	✓Tacit level ✓Relationship ✓Motivation ✓Trust relationship	✓Tacit level ✓Trust relationship