

Title	人間の気づきと機械センサの統合による人間・機械協働型ナレッジマネジメント
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Abstract

While the rapid development of AI technology such as ChatGPT has been seen in recent years, its main application has been for office workers such as programmers, and it has not provided sufficient support for knowledge sharing and knowledge utilization in the field, where awareness, experience and judgment are important, which depend on situations such as maintenance, inspection, and agriculture and are difficult to be formalized (manualized). The support for knowledge sharing and knowledge utilization in the field, where awareness, experience and judgment are important, is not sufficiently provided. In this study, we define the knowledge possessed by workers in the field, especially the knowledge such as work tips and experiences that workers in the field have tacitly, as “Gen-Ba knowledge (Gen-Ba means the work field in Japanese)” and propose a method for collecting and utilizing this knowledge.

This research aims to realize knowledge management that utilizes Gen-Ba knowledge and ①to investigate the usefulness of human awareness by supporting knowledge sharing through the use of field workers’ awareness. ②Improving models and extracting knowledge through a knowledge management method that combines human awareness and machine sensors (physical device sensor), ③we propose a knowledge management method that captures and utilizes Gen-Ba knowledge in a shared way by means of human awareness and machine sensors.

To achieve those purposes, ①the effectiveness of knowledge management utilizing human awareness was verified through the use of a smart voice messaging system to collect the awareness of the field workers in the engine department of a pelagic tuna longline fishing boat, and through knowledge sharing with the onshore manager. ②Then, through a plant cultivation experiment in a planter, a prediction model integrating human awareness and sensor data was constructed, and its effectiveness was evaluated. ③ Based on these results, we proposed a new human-machine collaborative knowledge management method that integrates human awareness and machine sensors.

The following three points were identified as research results. First, we proposed a method for effective collection and sharing of Gen-Ba knowledge, and demonstrated its effectiveness through trials at actual sites. In particular, trials in the engine room of a pelagic tuna longline fishing vessel showed that effective knowledge sharing with onshore managers, who are temporally and spatially distant, is possible through knowledge sharing triggered by audio recordings of human noticing. Second, we showed that integrating data from human noticing and machine sensors enables the construction of more accurate prediction models.

In a planta cultivation experiment, it was demonstrated that the addition of human awareness improved prediction accuracy in predicting soil moisture content compared to sensor data alone. Third, integrating these findings, we proposed a framework for human-machine collaborative knowledge management that can continuously collect and utilize Gen-Ba knowledge.

The significance of this study is that it focuses on the utilisation of Gen-Ba knowledge, which has not been sufficiently addressed in conventional knowledge management research, and presents a new approach based on the integration of human awareness and machine sensors. In particular, the proposed method shows academic novelty and practical knowledge, such as knowledge sharing in an environment with temporal and spatial constraints and the construction of a prediction model by integrating sensor data and human awareness. Future work will involve investigating the applicability of the proposed method to other fields and further pursuing methods for structuring and utilizing the collected knowledge.

This study shows a new direction for future knowledge management research in terms of the fusion of human knowledge and experience with the development of digital technology. In particular, it shows the feasibility of more practical and effective knowledge management by effectively combining technologies such as IoT and machine learning with human awareness.

Keywords: Knowledge Management, Smart Voice Messaging System, Gen-Ba Knowledge, Knowledge Sharing, Digital Knowledge Twin