Bringing Novices From the Passive Role in Knowledge Sharing to the Active Role

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Abstract: Purpose: The nature of firm competition between firms and the source of competitive advantage in many industries has shifted toward a knowledge-based economy. This is particularly the case in knowledge intensive industries, wherein a firm's competitive advantage is highly dependent on its ability to generate and deploy new knowledge solutions. Although knowledge management (KM) is relevant to all organizations, it is likely that its importance is higher at some functional units like maintenance. The field of industrial maintenance is complex and knowledge-intensive. Typically, industrial maintenance knowledge is inaccessible due to industry policies and practices; furthermore, motivation to share knowledge is low or inexistent, due to its tacit and complex nature. Despite these difficulties, sharing knowledge between experienced workers and managers, on one hand, and novices and new comers, on the other hand, is a fundamental problem in industrial maintenance settings, and about which there is still much to be known. The current research reports an investigation aimed at increasing knowledge sharing (KS) between novices and other workers in industrial maintenance. Design/Methodology/Approach: A quantitative field longitudinal research was carried out at a maintenance department of a high-tech company. The research included three steps: the first one assessed the current situation of KM and KS in the department; the second one implemented a number of training programs aimed to increase KS between novices and the rest of the department; and the third one collected information about KM and KS, to assess changes between the two observation moments. Findings: Novices can take an active role in KM and KS in maintenance departments of high-tech industries, rather than a passive role, which can significantly facilitate and improve their own and other employees' knowledge while moderately enhancing the culture of knowledge sharing. Practical Implications: sharing knowledge is a very challenging issue to maintenance managers, faced with risks and problems that need to be acquired by novices. The current research helps knowledge-intensive companies by highlighting solutions that can be designed and adapted to improve employees' knowledge and also KS. Originality/Value: Empowering novices to transition from a passive role in knowledge sharing to an active one, while simultaneously improving their knowledge and also KS practices in industrial maintenance through their involvement.

Keywords: Knowledge management, Knowledge sharing, Industrial maintenance, Novices, Physical asset management, Knowledge sharing barriers

1. Introduction

In today's fast-paced and competitive industrial environment, the importance of KM and KS cannot be overstated (Iheukwumere-Esotu and Yunusa Kaltungo, 2020). Effective KM and KS can help organizations to reduce costs, increase efficiency, improve performance, and achieve a competitive advantage. KM is viewed as an increasingly important discipline that promotes the creation, sharing, and leveraging of the corporation's knowledge (Becerra-Fernandez and Sabherwal, 2014). KM was initially defined as the process of applying a systematic approach to the capture, structuring, management, and dissemination of knowledge throughout an organization to work faster, reuse best practices, and reduce costly rework from project to project (Nonaka and Takeuchi, 1995). Knowledge has been classified and characterized from several points of view to individual, social, causal, conditional, relational, tacit, explicit, pragmatic (Alavi and Leidner, 2001) embodied, encoded, and procedural (Venzin et al., 1998). An important classification of knowledge views it as tacit or explicit (Polanyi and Sen, 2009). Explicit knowledge is knowledge that has been expressed into words and can be shared formally and systematically in the form of data, specifications, manuals, drawings, audio and video, computer programs, patents, and so on (Becerra-Fernandez and Sabherwal, 2014). Among processes of KM, KS has been identified as the most vital one (Asrar-ul-Haq and Anwar, 2016). KS has been identified as the most important process for facilitating organizational learning and innovation and is critical to organizations that wish to use their knowledge as an asset to achieve competitive advantage. The major focus of KS is on the individual who can explicate, encode, and communicate knowledge to other individuals, groups, and organizations (King, 2011).

In the context of industrial maintenance, KM and KS are critical for ensuring optimal performance, safety, and reliability of equipment and systems (Cárcel-Carrasco and Cárcel-Carrasco, 2021). Maintenance is defined as "the combination of all of technical, administrative and managerial actions performed during life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function" (Márquez, 2007). The field of industrial maintenance is complex and knowledge-intensive (Aromaa et al., 2015). However,

despite the recognized importance of KM and KS, many organizations struggle to implement effective KS practices, particularly when it comes to new or inexperienced employees. Maintenance managers must strongly consider how to transfer expertise and knowledge from experts who have it to novices who need to know (Hinds et al., 2001). An important effect of maintenance KS is that it will transfer maintenance expertise between experts and novices. Novices and newcomers often have valuable insights and fresh perspectives that can contribute to the organization's overall knowledge base, but they may not have the same level of expertise and experience as their more experienced colleagues.

Difficulty in educating and training novices has been identified as one of the most important barriers of KS at maintenance (Chirumalla et al., 2015). To address this challenge, this paper explores a novel approach to KM and KS in an industrial maintenance setting. Specifically, this study has involved novices and newcomers in the KS process by assigning them tasks and using them as lecturers in the presence of experienced colleagues. By doing so, this study aims to facilitate KS between novice employees and their more experienced colleagues.

The paper describes the methodology used to implement this approach, as well as the results and outcomes achieved. It also discusses the implications of this approach for KM and KS in industrial maintenance settings, and provide recommendations for organizations seeking to improve their KS practices. Overall, this paper highlights the importance of involving novices and newcomers in the KS process, and demonstrates a practical and effective approach for facilitating KS in industrial maintenance settings.

2. Method

For this study, a quantitative approach was utilized, and a questionnaire was administered. The questionnaire used in this study is a combination of four previously developed and utilized questionnaires by researchers. A quantitative approach was employed, utilizing a questionnaire with closed-ended questions. The study was conducted at a high-tech industry's maintenance department, which employs 103 personnel among the company's 1250 employees. To collect data, a questionnaire with 66 closed-ended questions that measure KM and KS related variables was distributed among the maintenance personnel. Next, 14 novices and new comers were selected, and new and challenging tasks were assigned to them, which they were not experts in. They were given two months to prepare training content and materials in whatever format they wanted, such as Word documents, PDFs, PowerPoint presentations, and videos. During this period, four follow-up meetings were held with the novices to facilitate document preparation and remove any obstacles, and the novices presented their progress.

After two months, experts on the selected topics and employees who needed to know about the topics were selected by the sub-department managers. Then semi-formal training sessions were conducted, in which the novices taught the topics and experts were present to correct any misinformation in this semi-formal atmosphere. The teachers who taught in the program were novices and lacked expertise in the topic they taught. Similarly, the learners who participated in the program were not experts in the topic they learned. On the other hand, the experts who participated in the program were specialists in the topic they were assigned. It is important to note that some participants had multiple roles. For instance, a teacher who taught one topic also participated as a learner in another topic. To have a control group, 21.3% of employees were excluded from the program.

After the program was completed (which lasted for five months), the same questionnaire was distributed to measure the current level of knowledge, as well as the KM and KS variables. Furthermore, additional questions were added to the questionnaire for the second round of data collection. Finally, the data was analyzed using descriptive statistics to assess the impact of the training program on KS and knowledge of participants.

3. Findings and Discussion

The study categorized participants based on their job level, education level, and responsibilities. It investigated the extent to which participants' knowledge improved during the program and the effectiveness of the program in the opinion of various participant categories. The study also examined whether participants across different categories agreed to extend the program. Additionally, the study explored the desired roles of participants in the program, including that of teacher, learner, expert, or a combination of roles.

3.1 Improvement in Knowledge

According to the questionnaire, 67% of learners who attended the program reported an improvement in their knowledge. In addition, 77% of experts and 90% of teachers reported an improvement in their knowledge.

Overall, 71% of all participants reported an improvement in their knowledge, and the level of knowledge among participants in the program improved by 43.9%. All participants, regardless of their role (learner, expert, teacher (novice or newcomer)), reported an improvement in their knowledge as a result of their participation in the program. This is particularly noteworthy considering the short duration of the program and the fact that the training was provided by novices. Table 1 presents the percentage of participants who reported an improvement in their knowledge, categorized by the role they played in the program.

Table 1: Knowledge Improvement Base on the Role in the Program

Role in the program	Learners	Experts	Teachers (novices and new comers)	Overall
Percentage of participants reporting improvement in knowledge	67%	77%	90%	71%

Table 2 displays the knowledge levels of participants in the taught topic before and after the training by novices. The table is categorized by education level and also presents the percentage of change in knowledge and table 3 shows improvement in knowledge based on position level.

Table 2: Improvement in Knowledge Based on Education Level

Education level	Diploma	Associate	Bachelor	Master	PhD	Overall
Average knowledge level prior to Program (scored out of 7)	3.53	3.39	3.52	2.5	6	3.46
Average knowledge level after program completion (scored out of 7)	5.3	5.09	4.86	4.82	7	4.98
Percentage of change	+50%	+50%	+75.5%	+92.5%	+16.6%	43.9%

Table 3: Improvement in Knowledge Based on Position Level

Job level (position)	Technician	Foreman	Expert	Boss	Manager	Director
Average knowledge level prior to program (scored out of 7)	3.34	4.4	3.09	4.37	3.5	2
Average knowledge level after program completion (scored out of 7)	5	5.8	4.27	5	6	6
Percentage of change	+49.7%	+31.8%	+38.1%	+14.4%	+71.4%	+200%

3.2 Effectiveness of the Program (Training by Novices)

Participants were asked to provide feedback on the effectiveness of the program. Table 4 displays the effectiveness of the program based on the job level of the participants, while Table 5 presents the effectiveness of the program based on their education level.

Table 4: Effectiveness of Program Based on job Level (Position)

Job level (position)	Technician	Foreman	Expert	Boss	Manager	Director	overall
Percentage of participants who found the program effective	55.1%	80 %	57.1%	62.5%	100%	100%	58.5%

Table 5: Effectiveness of Program Based on Education

Education level	Diploma	Associate	Bachelor	Master	PhD
Percentage of participants who found the program effective	63.6%	56.3%	56.4%	60%	100%

3.3 Agree to Extend (Continuation of) the Program

Participants were asked another question regarding their agreement with extending the program. Table 6 shows the percentage of participants who agreed with extending the program based on their job level (position), while Table 7 presents the percentage of those who agreed based on their education levels.

Table 6: Agree to Extend the Program Based on Position

Job level (Position)	Technician	Forman	Expert	Boss	Manager	Director	Overall
Agree to extend the program	56.5%	60%	57.1%	62.5%	100%	100%	58%

Table 7: Agree to Continue the Program Based on Education

Education level	Diploma	Associate	Bachelor	Master	PhD
Agree to continue the program	77.3%	59.4%	48.7%	40%	100%

3.4 Desired Roles

Participants were also asked to indicate their preferred role in the program, which included being a teacher, a learner, an expert, or a combination of these roles. Table 8 shows the results for each role.

Table 8: Desired Role of Participants

Desired role in KM and KS program	Teacher	Leaner	Expert	Teacher and Learner	Teacher and Expert	Learner and Expert	Teacher and (Learner or Expert)	Not answered
percentage	9.7%	50.5%	12.6%	6.8%	1.9%	1.9%	7.8%	8.7%

3.5 Other Findings

The findings of this study indicate that the program has resulted in a modest increase of 3.9% in KS among participants. Additionally, the participants' perception of the culture of KS has increased by 4.6%, but statistically, the difference is not significant. According to the results from the additional questions in the second round of data collection, participants have stated that the main problem with the program has been a lack of motivation. They suggested that the program should be connected and related to their career promotion as an improvement. Interestingly, the control group, who did not participate but were aware of the program, reported an increase in barriers to KS by 12.3%. These results suggest that while the program may have had some positive impact on KS, it may also have inadvertently created new barriers for non-participants.

4. Conclusion

There have been numerous studies on KM in various industrial and service sectors, but typically the focus is on general management, accounting, R&D, development activities, information technology (IT), and similar areas, with less attention given to maintenance units (Cárcel-Carrasco et al., 2020). Within maintenance departments of companies, KM can be challenging due to the tendency of technicians to rely on their own experience rather than sharing and explaining their knowledge of operations (Cárcel-Carrasco et al., 2020).

In this study, the high levels of reported knowledge improvement among learners, experts, and teachers (67%, 77%, and 90%, respectively) suggest that this approach has been effective for a wide range of participants, regardless of their level of experience. This approach has the potential to foster a culture of continuous learning and development, where all employees are empowered to share their knowledge and expertise. Utilizing novices and newcomers as trainers in an industrial maintenance setting has proven to be an effective means of enhancing KM and KS among colleagues. Despite being conducted by novices and newcomers, the trainings have resulted in a significant increase in knowledge for experts, learners, and novices alike, specifically in the area being taught. Moreover, the increase in knowledge is substantial, even though the training was conducted over a short period of time. The findings of this study demonstrate that this approach has resulted in noteworthy improvements in the participants' knowledge, with an overall increase of 43.9% in knowledge improvement. The findings of this study also indicate that the use of novices as trainers has been

particularly effective for novices and new comers, with a knowledge improvement rate of 56.52%. This suggests that this approach may be particularly beneficial for organizations that are looking to support the onboarding and development of their new employees. It is also important that most participants preferred to have the role of learner, indicating a need for further investigation to change their attitudes and make them more willing to take on other roles.

One of the most effective ways to learn is by adopting a mindset that allows the learner to teach the material to others. This approach not only helps learners to deepen their understanding of the subject matter, but it also helps them to retain the information more effectively. When learners attempt to teach a concept to someone else, they must organize the material in a way that is easy to understand and follow. This process forces them to break down complex ideas into simple, digestible parts, and helps them to identify any gaps in their knowledge or areas where they need more practice. Moreover, teaching others also requires learners to think critically about the material and consider different perspectives and approaches to the subject matter. By doing so, they gain a more comprehensive understanding of the material and are better equipped to apply their knowledge in practical settings.

In conclusion, the findings of this study suggest that the implemented program has had a meaningful positive impact on the participants' knowledge. Although the increase in KS and culture of KS was not statistically significant, participants reported finding the program effective and agreed to continue it. AS KS is a cultural and multidimensional subject, longer-term implementation of the program may be needed for more significant improvement in KS and its culture. Overall, this study has demonstrated the potential benefits of using novices and new comers as trainers in an industrial maintenance setting. By embracing this approach, organizations can enhance their KM and KS practices, promote a culture of continuous learning, and support the development of their employees.

Implications of the research to the theory and to the practice: This research makes a significant contribution to the theory of KM by emphasizing the importance of KS in knowledge-intensive departments like industrial maintenance, specifically highlighting the involvement of novices in the KM process. By empowering novices to actively participate in KS, the research enhances the culture of KS, improves employees' knowledge, and offers practical solutions for maintenance managers in knowledge-intensive industries. This contribution expands upon existing knowledge by highlighting the active role that novices can play in KS practices.

Limitation: The findings of this study are limited by the fact that data were collected from only one company, thus limiting the generalizability of the results. Future research should aim to replicate these findings in other companies to enhance the external validity of the study.

Managerial Implication: Managers can utilize this approach to empower novices by shifting them from the passive side of KM and KS to the active side, while also increasing the knowledge of their employees and enhancing KS.

Future Works: While the results of this study are promising, there are still areas for future research. One key area for future research is to investigate how to scale this approach across other departments and larger organizations and explore the potential barriers to implementing this approach on a larger scale. Additionally, more research is needed to explore the long-term impact of this approach on employee development and organizational performance. Also in order to further advance this research, future studies could focus on identifying the issues or limitations of the program. This could be achieved through conducting interviews or questionnaires with participants to gather feedback and suggestions for improvement. Additionally, exploring the long-term effectiveness and sustainability of the program could also be a valuable area for future research.

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