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JETT MOLECH G. SUBABA

DESIGN, DEVELOPMENT, AND TESTING OF TACIT KNOWLEDGE-CAPTURING PROTOCOL OF PHILMECH SCIENTISTS

Thesis Adviser:

MELINDA F. LUMANTA, PhD
Faculty of Information and Communication Studies

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MELINDA F. LUMANTA, PhD
Chair, Thesis Committee

(Date)

ALEXANDER G. FLOR, PhD
Member, Thesis Committee

(Date)

SERLIE B. JAMIAS, PhD
Member, Thesis Committee

(Date)

DIEGO S. MARANAN, PhD
Dean
Faculty of Information and Communication Studies

13 September 2024
(Date)

Biographical Sketch

The author is a development communication practitioner who has been working in the development sector for 14 years. He completed his bachelor's degree in Development Communication at the Central Luzon State University in the Science City of Muñoz, Nueva Ecija. Currently, he is employed at the Philippine Center for Postharvest Development and Mechanization (PHilMech), an attached agency of the Department of Agriculture, as the youngest Supervising Science Research Specialist.

He leads a section of young development communication practitioners in PHilMech under the Applied Communication Division. Their work involves creating various print and video information, education and communication (IEC) materials, and knowledge products on postharvest and mechanization. They also run community-based campaigns to increase awareness and knowledge for farmers, fisherfolk, and other stakeholders.

In 2021, he was recognized for his excellence in public service as the Natatanging Kawani ng PHilMech for Extension Awardee (Junior Category) and the Dangal ng PHilMech Awardee—the highest recognition given by the agency. This year, he received another recognition, the Gawad Likha Award for his commendable creativity in crafting projects such as the Youth for Mechanization Advocacy Campaign, and Staff Recognition System.

He has completed three levels of Supervisory Development Courses (SDC) of the Civil Service Commission and a ten-month knowledge management practitioner certification course by the Asian Institute of Journalism and Communication and the Community and Corporate Learning for Innovation. These courses are relevant in pursuing excellence, competence, and innovativeness in his career path.

This multi-talented practitioner possesses excellent skills in oral and written communication, layouting, script writing and video production, photography and videography, content editing, social media management, project conceptualization, and people management. He is passionate about his work, believes in the next generation, and is a patriot and a servant of God.

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Dedication

I would like to dedicate this research to the next generation of PHilMech scientists, researchers, extension staff, and those who will contribute greatly to the achievement of the agency's mandate and will offer their best years to the agency. May this research be the first of many more academic studies and research that will directly benefit PHilMech.

I also dedicate this to those who think they are not capable of pulling off a skill in doing research or those who want to quit instead of finishing their thesis or degree. This is proof that nothing is impossible and that you are capable of finishing what you have started.

Finally, this piece of work is dedicated to my family who deserve all the good things in this world. And to Mommy Barang, in heaven, I hope you are proud of me. This is for you.

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Abstract

Capturing and preserving tacit knowledge within organizations is a challenging yet crucial endeavor. However, if successfully captured, it can prevent knowledge loss in an organization and contribute to the improved productivity and efficiency of the next generation of staff. This is the case for PHilMech scientists who hold critical organizational knowledge. Therefore, the study aims to design, develop, and test a protocol for capturing tacit knowledge.

This study used participatory action research (PAR) and collaborated with PHilMech scientists and the members of the PRAISE committee of PHilMech as research participants. Data were collected through unstructured interviews and focus group discussions.

The study identified storytelling sessions, lessons learned sessions, and legacy talks as the appropriate methods for the design of the protocol. Meanwhile, the developed protocol was determined to be embedded in the offboarding requirements of the retiring staff to ensure the capture of his/her knowledge before leaving the agency. Lastly, the pilot testing of the protocol has produced knowledge products in formats of flippable manuals, podcasts, online video series, and an easily accessible online repository.

In conclusion, the study has designed, developed, and pilot-tested an applicable protocol to capture the tacit knowledge of PHilMech scientists. Future research should explore other KM methods for sustaining this protocol, deeply analyzing the tacit knowledge captured, and expanding this intervention even beyond PHilMech.

Chapter I

INTRODUCTION

Background of the Study

Since it emerged as a scientific discipline in the field of management in the early '90s, knowledge management (KM) has evolved from a pure information and communication technology (ICT) approach to a human resource development approach, organizational approach, and now, as an integral system approach that improves organizational performance and services to its stakeholders (Ndagire, 2018). The KM is considered a valuable resource or asset of an organization (Sullivan, 2016) since human knowledge is the only certain and lasting source of competitive advantage in any organization in this uncertain economy (Nonaka, 1995).

Kamasak and Yucelen (2010) stated that knowledge assets represent the foundation of an organization's competencies and capabilities, which are pivotal to its growth, competitive advantage, and human development (p.65). Their study showed that experienced people or seasoned staff of an organization are the most important knowledge assets.

In another study on knowledge assets among biopharmaceutical firms (Sapienza & Lombardino, 2002), the expertise of research and development (R&D) scientists was deemed a critical asset for the organization's competitive advantage. This importance was underscored in terms of retirement, recruitment, and turnover perspectives. Neglecting to capture this knowledge could result in a significant loss for the organization.

Nonaka and Takeuchi (1995) argue that the success of Japanese enterprises in terms of innovations is anchored in the tacit-driven approach, where these companies prioritize implicit knowledge in their knowledge management strategies.

A key concern in knowledge management today is the capturing of tacit knowledge from experienced employees to prevent loss when they leave or retire. This ensures the availability of valuable knowledge, reduces the likelihood of repeated mistakes, and prevents the loss of critical knowledge upon personnel departure (Serrat, 2010).

In the context of the Philippine Center for Postharvest Development and Mechanization (PHilMech), an attached agency of the Department of Agriculture and an RDE institution in the country, the critical asset of the agency is its researchers, most importantly, the agricultural career scientists. These scientists were conferred through the Scientific Career System program of the National Academy of Science and Technology, Philippines. To date, the System has conferred 77 Scientist I, 25 Scientist II, 20 Scientist III, and 14 Scientist IV. These scientists were evaluated through a rigorous process of validating the nominee's accomplishments over the last 10 years after finishing their master’s degree through the number of publications, patents, discoveries, and researchers published.

PHilMech has nine career scientists. At least three of them have retired from government servive and three more are nearing their retirement. The current situation in the agency is the absence of a protocol for capturing the rich tacit knowledge of these scientists. If this continues, their knowledge components: experience, ground truth, judgment, and rules of thumb (Davenport and Pruska, 1997) acquired through years of

training, learning, research, development, and discoveries will be lost as they leave the agency.

As Albert et al. (2015) highlight the notable contribution of R&D in improving productivity in some sectors of the economy, like agriculture, it is imperative to develop a system that will enable the capture of the valuable tacit knowledge of the important assets in the agriculture sector like the scientists of PHilMech. With the use of various ICT and knowledge management tools, the captured tacit knowledge can be transformed into relevant and applicable knowledge products or Information, Education, and Communication (IEC) materials. Once this is made available to the younger researchers and aspiring scientists, and even across the sector horizontally (Galtung,1971) it could create a culture of smooth knowledge sharing and improve the services to the sector's stakeholders.

By addressing this gap, the lack of a protocol, this study sees a favorable outcome for the sector with more progressive, harmonized, effective, and problem-oriented R&D results established in the past experiences, best practices, and lessons learned of these scientists. These collective efforts will in turn address and contribute to Sustainable Development Goal (SDG) number two (i.e. ending hunger), and one of the goals of the Philippine Development Plan 2023-2028 (i.e. ensuring food security of the Philippines).

Statement of the Problem

The central question this study aims to answer is how tacit knowledge can be captured. Specifically, it aims to answer the following questions:

1. What KM methods can be utilized to capture the tacit knowledge of PHilMech scientists?
2. What procedures can be employed in developing a protocol?
3. What protocol can be applicable and useful for the agency?

Objectives of the Study

Generally, the study aims to design, develop, and test a tacit knowledge-capturing protocol of PHilMech scientists. Specifically, it aims to:

1. Design applicable tacit knowledge-capturing methods/tools for PHilMech scientists.
2. Develop a protocol with procedures for capturing the tacit knowledge of PHilMech Scientists
3. Test the protocol to the PHilMech Scientists

Significance of the Study

The study holds significant importance as it aims to contribute substantially to the capture, storage, and sharing of tacit knowledge among career scientists in the agriculture sector. The development of a functional tacit knowledge-capturing protocol can potentially safeguard best practices and important lessons learned by scientists.

It also proposes implementing captured knowledge at the local and national levels through the National Academy of Science and Technology (DOST-NAST), aiming to influence knowledge management practices within the Scientific Career System.

Additionally, the study aspires to provide credible, captured knowledge to serve as a reliable reference for younger PHilMech researchers, inspiring further innovations in postharvest and agricultural mechanization research.

The resulting knowledge repository aims to make substantive contributions towards addressing the Sustainable Development Goals outlined by the United Nations, particularly in ending hunger and achieving food security. In the broader context of development communication, the study's potential to enhance the systematic capture and utilization of tacit knowledge within scientific communities can significantly impact agricultural advancements and promote collaboration, informed decision-making, and sustainable practices, aligning with the goals and principles of development communication.

Scope and Limitations of the Study

This study will focus on the knowledge conversion process, specifically the transformation of tacit knowledge into explicit knowledge or externalization, among the current scientists at PHilMech. The study encompasses designing methods to capture the tacit knowledge of the participants, developing a useful protocol, and testing it on PHilMech scientists. However, the study does not delve into the broader effects of the system on the agency, ensuring the use of the protocol, the potential outputs it can generate, or the overall outcomes it may contribute to the industry. These are beyond the defined scope and limitations of this study.

Chapter II

REVIEW OF RELATED LITERATURE

Agricultural transformation has flourished over the past 50 years. This was propelled by the development and innovations of technologies and systems resulting from research and development (R&D) processes and efforts (Tri-Merit, 2021). Albert et al. (2015a) emphasized the notable contribution of R&D towards improving productivity in various sectors of the economy, particularly in agriculture, health, and industry (p. 1). They also highlighted that the 1987 Philippine Constitution, by endorsing R&D, has provided incentives to further encourage participation in R&D activities (Albert et al., 2015b, p. 1).

In some cases, the government's support for R&D manifests in the acts and laws enacted to strengthen the mandates of R&D institutions and enhance their efforts. For instance, the Philippine Center for Postharvest Development and Mechanization (PHilMech) is a research, development, and extension (RDE) institution under the Department of Agriculture. In 2013, the passing of the Agriculture and Fisheries Mechanization Act (AFMech) or Republic Act No. 10601 (Article III, Section 7) conferred an additional mandate to PHilMech to lead and explore more R&D and extension activities in mechanizing the farm and fisheries sectors of the Philippines (Official Gazette, 2013). These government efforts have paved the way for researchers, especially among R&D institutions, to thrive in the past decades. UNESCO (2021) recorded a significant increase in the number of researchers per million people in R&D from 2003-2015, reaching 105.7 per million people in 2015.

The OECD (2001) defines researchers as professionals who are conceiving and creating new knowledge, products, processes, methods, and systems, as well as

managing the projects concerned. In knowledge management, researchers (or human assets) constitute part of an organization's knowledge assets alongside structural and relationship assets (Talisayon, n.d.). This literature review explores various knowledge management literature, focusing specifically on different methods of capturing the tacit knowledge of employees in an organization, the dangers of knowledge loss, hindrances to knowledge sharing, benefits of effective knowledge sharing, and literature on current programs of organizations in the development sector for capturing the tacit knowledge of their seasoned employees.

Definition of Knowledge Management

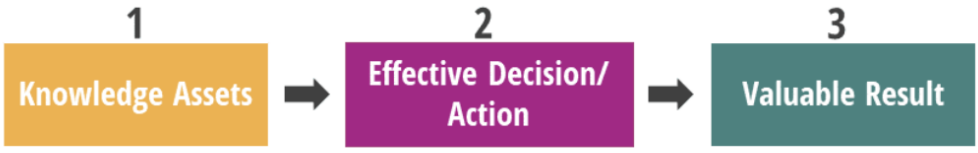
The concept of knowledge management (KM) has been defined in various ways by researchers and practitioners. Albert (1998) describes KM as organizing and disseminating information within an organization to make it purposeful for those who need it. Anthes (1991) emphasizes using policies, procedures, and technologies to operate continuously updated networked databases. Beckman (1997) highlights the formalization of experience, knowledge, and expertise to create new capabilities and enhance customer value. Gray (1996) associates KM with complementing and enhancing other organizational initiatives such as total quality management and business process re-engineering. KM also combines indexing, searching, and push technology to organize data stored in multiple sources (Hibbard, 1997). Maglitta (1996) sees KM as a means of organizing and making important know-how available using intranets, groupware, and data warehouses. Petrash (1996) emphasizes the importance of getting the right knowledge from the right people at the right time. Ruggles (1998) highlights the value

creation through leveraging the know-how, experience, and judgment within and outside an organization. Finally, the World Bank (1998) views KM as an organic and holistic approach to understanding and exploiting the role of knowledge in managing work processes, especially in coping with the complexities of the modern economy.

Knowledge management (KM) is a relatively new discipline that focuses on the strategic management of intellectual assets within organizations. According to Flor (2019), the primary objective of KM is to facilitate the sharing and reuse of knowledge. This approach positions knowledge as a key asset that can be managed and leveraged to drive organizational performance and innovation.

Furthermore, Talisayon (n.d.a) simplifies KM as managing people, processes, and technology to enhance organizational effectiveness and efficiency. The KM framework illustrated in Figure 1 by Talisayon (n.d.b) demonstrates how knowledge assets, such as researchers, generate valuable results, both in terms of market value for the private sector and social value for the development sector. This is achieved through effective actions, such as applying R&D results to farm practices, as demonstrated in the case of PHilMech.

Figure 1: Basic KM Framework (Talisayon, n.d.)



KM4D

Recent literature has highlighted the significant evolution of knowledge management (KM), demonstrating its expansion from the private sector to government and international development agencies (Flor, 2019). In the mid-1990s, Stephen Denning established the Knowledge Management Program at the World Bank, marking a new era in implementing KM within international development assistance, known as KM4D (Flor, 2019). This development marked a pivotal moment in integrating knowledge management across sectors beyond the private industry.

The idea of "horizontalization," as articulated by Galtung in 1971, finds resonance with the principles of Knowledge Management for Development (KM4D). Galtung's concept promotes exchanges on equal terms, reduced vertical interaction, self-reliance, and the dissolution of asymmetric relationships. This vision aligns with the knowledge-sharing and collaborative efforts emphasized in KM4D, highlighting the significance of equal participation, shared learning, and balanced relationships in the pursuit of sustainable development.

The Philippines has been actively advancing Knowledge Management for Development (KM4D) initiatives, focusing on driving sustainable development. Notable efforts in the country include the Philippine Knowledge Management (KM) Network, the Government Data Portal (data.gov.ph), the Philippine Health Information System, and collaborations with organizations such as the United Nations Development Programme (UNDP) and the World Bank. These diverse initiatives reflect a strong commitment to leveraging knowledge to promote development across various sectors in the Philippines.

In his book, Flor (2019) emphasizes the importance of embedding information networks into organizational culture for optimal functionality. The author advocates for a culture that promotes knowledge sharing not only between agencies but also among officials and colleagues at all levels. Flor further contends that knowledge sharing should be an integral component of an agency's fundamental operations.

Knowledge Loss in the Organization

The synthesis of multiple studies underscores the pervasive impact of knowledge loss on organizational dynamics. According to Massingham (2018a), such loss manifests as a cascade of negative outcomes, including reduced productivity, capability gaps, stakeholder dissatisfaction, increased turnover among inexperienced employees, customer mistrust, elevated learning costs, extended search cycle times, etc. The breadth and depth of these repercussions highlight the urgency of addressing knowledge loss within organizational contexts. For instance, in biopharmaceutical firms, Sapienza and Lombardino's study (2002) emphasizes the strategic significance of R&D scientists' expertise. This expertise, deemed crucial for the organization's competitive advantage, becomes particularly vulnerable during transitions such as retirements, recruitment, and turnover. Neglecting to capture and manage this specialized knowledge poses a tangible risk of significant knowledge loss for the organization. Sapienza and Lombardino (2002b) further accentuate the consequences of expert turnover, especially in the biomedical sector. The loss of the extensive training invested in these experts creates a setback, essentially requiring the organization to revert to square one. This scenario underscores

the critical need for strategies that preserve and transfer valuable knowledge within the organization.

Massingham's recommendation (2018b) for effective knowledge management emerges as a pivotal intervention in mitigating the negative impacts outlined in various studies. By instituting comprehensive knowledge management practices, organizations can proactively address the challenges of knowledge loss and its far-reaching implications. Building on these insights, Levallet and Chan (2019) stress the importance of well-defined processes for organizational knowledge retrieval and reuse. Their emphasis on completing the knowledge retention cycle through efficient retrieval and reuse mechanisms provides a strategic approach to counteracting knowledge loss.

Murumba et al.'s conclusion (2020a) encapsulates the culmination of these perspectives. They assert that a lack of documented and managed tacit knowledge not only leads to stagnation but also serves as a harbinger of organizational growth impediments. In essence, the collective findings from these studies coalesce into a compelling narrative that underscores the imperative for organizations to actively manage their human capital and knowledge assets to avert the adverse consequences of knowledge loss.

Managing Knowledge (Human) Assets

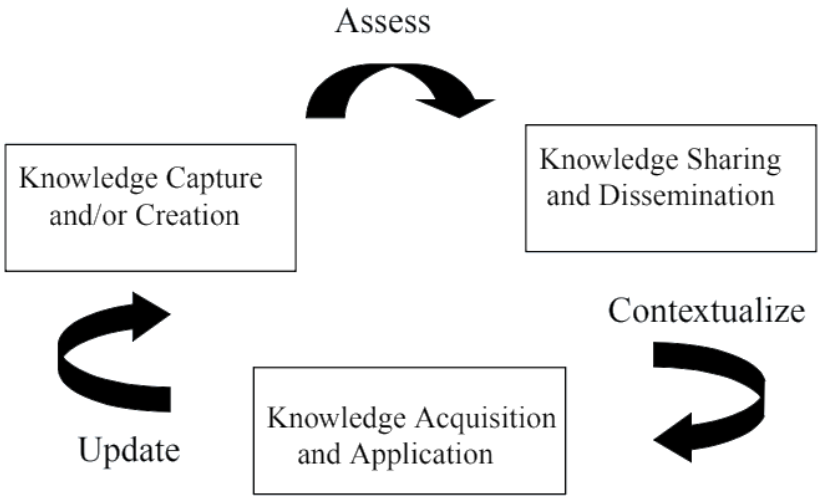
In the contemporary business landscape, the significance of knowledge assets as a pivotal strategic resource is underscored by Bender and Fish (2000). Organizations are confronted with the imperative to retain these knowledge assets in the face of evolving challenges (Joe & Yoong, 2006). Emphasizing the centrality of knowledge assets to an

organization's competencies, capabilities, growth, and competitive advantage, Kamasak and Yucelen (2010a) identify experienced personnel as the foremost knowledge asset (2010b, p. 65). Recognizing the critical role of human capital in organizational performance, Murumba et al. (2020b) advocate for the orderly management of an organization's human capital. Furthermore, Muthuveloo et al. (2017) stress the need for a systematic approach to managing and capturing tacit knowledge held by key employees, ensuring its retention within the organization even after their departure or retirement.

Highlighting the value of shared knowledge as a unique strategic corporate resource, Henard and McFadyen (2006) recommend that managers assess their knowledge storage and absorptive capacity, essential factors for achieving sustainable competitive advantage (p.49). Echoing similar sentiments, Ashish and Kumar (2004a) assert that managing the knowledge base is instrumental in gaining a sustainable competitive advantage, revealing that a substantial portion of companies' market value is derived from intellectual capital.

Dalkir (2005c) contributes to the discourse with the integrated Knowledge Management (KM) cycle, as shown in Figure 2, which encompasses knowledge capture, sharing, dissemination, acquisition, and application. Notably, the cycle's success hinges on capturing tacit knowledge, especially from employees who have acquired explicit knowledge. In conclusion, the effective management of knowledge assets, particularly the capture of tacit knowledge from employees, emerges as a vital component in sustaining an organization's competitive advantage and overall success.

Figure 2: Integrated KM Cycle (*Dalkir, 2005)*



Capturing Tacit Knowledge

Tacit knowledge, as conceptualized by Polanyi (1966), is inherently challenging to articulate or formalize, embodying the notion that "we can know more than we can tell." Recognized by Seidler-de Alwis and Hartmann (2008) as a valuable organizational asset due to its difficulty to imitate, tacit knowledge necessitates similar experiences for acquisition (Zack, 2002). Despite the complexities it introduces to knowledge management (Linde, 2001; Santoro & Brezillon, 2005), preserving and capturing tacit knowledge is imperative.

Panahi et al. (2012) delineate avenues for sharing tacit knowledge, including experience sharing, social interaction, and informal networking communication, all underpinned by mutual trust. Knowledge acquisition involves three major approaches: (i) interviewing experts through structured, semi-structured, or unstructured interviews, and storytelling; (ii) learning through verbal communication; and (iii) learning through

observation (Parsaye, 1988). Dalkir (2005d) underscores the application of these approaches in combination for successful knowledge capture.

Organizations like IBM employ storytelling as its knowledge-sharing and knowledge-capturing method, utilizing a four-stage approach: anecdotal elicitation, anecdotal deconstruction, intervention/communication design, and story deployment. Stories are recognized as effective vehicles for capturing and storing tacit knowledge (Serrat, 2010a), with organizational stories described as informal communications comprising interactions, actions, and events within an organization (ADB, 2010a). In this, Murumba et al. (2020b) identify ICT tools such as recorders, videotapes, and cameras, as well as social media, minutes of meetings, and documentaries, as instrumental in capturing tacit knowledge in Kenyan universities. Sternberg (1999) employs a combination of semi-structured interviews and storytelling to capture the tacit knowledge of the U.S. army, while Goffin and Koners (2008) utilize metaphors and stories as proxy measures for tacit knowledge generation and transfer. Storytelling is a powerful tool in knowledge management within organizations, though it remains less explored (Haghirian and Chini, 2002). ADB's knowledge harvesting method, designed to draw out and package tacit knowledge, involves seven steps: focus, find, elicit, organize, package, evaluate, and adapt. Effective knowledge harvesters, strong communication skills, and high emotional intelligence, play a pivotal role in this process (ADB, 2010a). The outcomes of knowledge harvesting may manifest in manuals, checklists, guidelines, or films, evaluated based on efficiency, effectiveness, relevance, sustainability, and impact (ADB, 2010b). Notably, this method is contributor-driven, emphasizing the significance of what the knowledge contributor deems important for others to know (ADB, 2010b).

The US Army's Center for Army Lessons Learned (CALL) has a method for capturing real-life experiences to improve knowledge transfer. Ground truth - understanding what really works - is critical for military success. The CALL experts participate in operations, collect knowledge, and share it through various mediums. The "After Action Review" (AAR) program is a key part of their success, allowing them to analyze mission outcomes and learn from any discrepancies (Davenport and Prusak, 1998).

Inhibitors in Knowledge Sharing

Common inhibitors that companies must overcome, as identified by Ashish and Kumar (2004b), include (i) lack of trust, (ii) diversity of cultures, (iii) varied vocabularies and frames of reference, (iv) insufficient time and meeting places, (v) allocation of status and rewards primarily to knowledge workers, (vi) insufficient absorptive capacity among recipients, (vii) the "Not-invented here" syndrome, and (viii) intolerance of mistakes (p. 18). In contrast, Dalkir (2005) highlighted several impediments to knowledge sharing, such as (i) the perception that knowledge is personal property/ownership, (ii) individual rewards being tied to what is known rather than what is shared, (iii) a lack of established trust and credibility, and (iv) an inadequate organizational culture and climate for knowledge sharing (pp. 132-134). Additionally, Becerra-Hernández et al. (2004) noted that articulating knowledge proves challenging for experts because many perform their tasks subconsciously.

Benefits of captured tacit knowledge

Serrat (2010c) highlighted numerous benefits associated with well-documented tacit knowledge. Among these advantages are the increased accessibility of knowledge to those who may require it, a reduced likelihood of recurring mistakes, and the preservation of valuable knowledge even when personnel depart. In a separate study, Meixell et al. (2002) outlined significant organizational benefits derived from the successful capture of knowledge. These advantages encompass the minimization of errors through the avoidance of repetitive mistakes, enhancement of quality by adopting best practices, acceleration of decision-making processes through improved cross-functional coordination, cost reduction achieved by promptly identifying expertise, and the provision of value for money by expediting training through the recognition of common mistakes and learning from best practices. Additionally, the study highlighted the contributions to learning and innovation (Meixell et al., 2002). A pivotal element in realizing these benefits involves the motivation of knowledge workers (APO, 2008a). The APO's case studies elucidated best practices for motivating employees, including the implementation of rewards and recognition schemes, alignment of personal and organizational goals, utilization of a combination of formal and informal communication methods, nurturing a culture of caring leadership, designation of honorific roles, and the training and certification of employees (APO, 2008b).

KM Initiatives in Capturing Tacit Knowledge of Critical Assets

In organizational knowledge, tacit knowledge, comprising unquantifiable insights, experiences, and intuitions, plays a vital role for institutions such as the Bangko Sentral ng Pilipinas (BSP) and the Asian Development Bank (ADB). Successful implementation of knowledge management (KM) strategies is imperative for the acquisition and utilization of this specific knowledge type, thereby facilitating informed decision-making, enhancing organizational efficacy, and safeguarding institutional heritage.

Bangko Sentral ng Pilipinas (BSP)

The Bangko Sentral ng Pilipinas (BSP), in its role as the central bank of the Philippines, acknowledges the significance of managing explicit and tacit knowledge to ensure effective monetary and financial stability. The BSP has established internal knowledge-sharing platforms to facilitate the exchange of tacit knowledge among employees. These platforms often include collaborative tools, discussion forums, and knowledge repositories designed for capturing and disseminating insights from experienced personnel (BSP, 2018). Moreover, to capture and transfer tacit knowledge, the BSP has established mentoring and coaching programs. Experienced staff are paired with newer employees to transfer critical knowledge, skills, and organizational wisdom. (Cheng & Ho, 2015). This initiative assists in closing the knowledge gap and ensuring the continuity of key functions. Last is the documentation of best practices from important projects. This documentation process involves gathering the implicit knowledge of experts in the field through interviews and case studies, which are later incorporated into organizational knowledge repositories. (BSP, 2020).

Asian Development Bank (ADB)

The ADB, a major international financial institution, has also implemented various KM initiatives to capture and utilize tacit knowledge. The ADB has created Communities of Practice to enable experts in related fields to exchange knowledge. These communities allow for the informal sharing of experiences and insights, which is essential for preserving tacit knowledge that is not easily documented. (ADB, 2017). Also, the ADB has created sophisticated KMS that combine explicit and tacit knowledge. These systems include knowledge mapping, expert directories, and interactive forums that help identify and share tacit knowledge throughout the organization (Shin, 2015). Lastly, ADB utilizes different approaches to acquire implicit knowledge, such as organized interviews, storytelling gatherings, and workshops. These techniques are specifically crafted to extract valuable perspectives from seasoned employees and guarantee that important knowledge is maintained and available. (ADB, 2018).

Comparative Analysis and Best Practices

Similar strategies are used by the BSP and ADB to get tacit knowledge, but they are modified to match the specific organizational environments of each. The BSP, for example, places a high priority on formalizing tacit knowledge through structured mentorship programs and documentation. This approach guarantees that important information is methodically documented and made available to subsequent workers (BSP, 2020).

Meanwhile, the ADB places a strong emphasis on community-based strategies to promote natural knowledge sharing and collaboration, like Communities of Practice

(CoPs). This method collects and distributes tacit information by utilizing group expertise and unofficial networks (ADB, 2017).

The knowledge management initiatives at BSP and ADB serve as examples of how important it is to gather and manage implicit information in order to support corporate goals and ensure continuity. Both organizations seek to effectively utilize their vital information resources by employing a variety of strategies, including community-centered methods, mentorship programs, and knowledge exchange platforms.

Developing Protocols in Knowledge Management

It is important to develop an efficient procedure within an organization to achieve an effective knowledge management (KM) initiative.

Nonaka and Takeuchi (1995) highlight formalized methods as an important guide to creating, sharing, and utilizing knowledge within organizations. These procedures can guarantee consistency, improve an organization's efficiency, and enhance the quality of knowledge flows (Davenport & Prusak, 1998). Optimizing organizational learning and decision-making relies heavily on effective procedures (Argote & Miron-Spektor, 2011).

There are numerous organized methods for creating knowledge management protocols. The iterative process of socialization, externalization, combination, and internalization is highlighted as the foundation for developing efficient knowledge management systems in Nonaka and Takeuchi's SECI model (1995). According to Nonaka and Takeuchi's (1995) approach, procedures ought to expedite knowledge conversion processes and promote ongoing learning.

The Knowledge Management Cycle, which encompasses knowledge production, storage, dissemination, and application, is another essential concept (Wiig, 1997). The overall efficacy of knowledge management activities can be improved by creating protocols that cover each step. To guarantee convenient access and utilization, protocols for knowledge storage ought to incorporate directives for data arrangement and retrieval (Wiig, 1997).

Stakeholder involvement, clarity, and adaptability are best practices for creating knowledge management procedures. By involving important stakeholders in the procedure creation process, procedures are ensured to satisfy the requirements of all users and are in line with organizational objectives (Earl, 2001). Clear and explicit instructions avoid uncertainty and ensure consistent use (Gold, Malhotra, & Segars, 2001).

Additionally, flexibility is essential since knowledge management practices need to adjust to new developments in technology and organizational requirements (Alavi & Leidner, 2001).

It is important to periodically evaluate and change procedures to consider new information and methods. Obstacles to creating and executing knowledge management procedures, such as organizational support gaps and reluctance to change, can hinder the process. Effective change management techniques and leadership backing are required to overcome these obstacles (Kotter, 1996). Furthermore, the effective implementation of processes depends on their practicality and alignment with organizational culture.

Adoption of procedures that are excessively complicated or at odds with organizational values is comparatively low (Krogh, 1998). Creating efficient knowledge management procedures requires a methodical approach informed by best practices, established frameworks, and analysis of potential obstacles. By considering these factors, organizations can create policies that improve knowledge management practices and promote organizational performance.

Synthesis

The literature review emphasizes the importance of capturing tacit knowledge, particularly from experienced employees, to prevent knowledge loss and ensure the availability of valuable knowledge within an organization. It highlights knowledge management's evolution from a pure ICT approach to a human resource development and organizational approach, emphasizing its importance as a valuable asset.

The review also magnifies the critical role of knowledge assets in an organization's competencies and capabilities, emphasizing the importance of capturing the valuable tacit knowledge of scientists in organizations such as the Philippine Center for Postharvest Development and Mechanization.

The literature review's synthesis suggests that developing a knowledge-capturing protocol can transform captured tacit knowledge into relevant and applicable knowledge products, ultimately promoting a culture of smooth knowledge sharing and improving services within the organization and across sectors.

Theoretical Framework

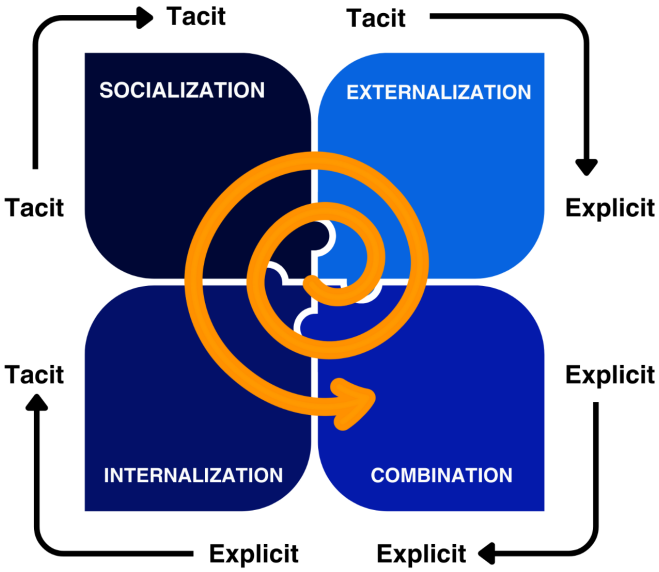
This study will be anchored on the Nonaka and Takeuchi Knowledge Spiral Model (1995). At the core of this model is making tacit knowledge accessible to all members of an organization, which aligns with the research's objectives. Knowledge sharing and utilization occur through the "knowledge spiral," starting with an individual and expanding across communities of interaction or practice within organizational boundaries (Nonaka and Takeuchi, 1995).

The model consists of four quadrants—Socialization, Externalization, Combination, and Internalization—which form a continuous, spiral process without a specific beginning or end. Socialization involves exchanging knowledge within a community of practice through observational learning, brainstorming, and learning sessions. Externalization, a crucial stage, transforms tacit knowledge into explicit knowledge using metaphors, analogies, concepts, or models, facilitated by ICT tools and proper KM tools like recorded storytelling or lessons learned sessions. The combination recombines discrete pieces of explicit knowledge into a more user-friendly form. Finally, internalization entails embedding newly acquired knowledge into a person's practice, through an accessible platform, potentially leading to innovation or increased productivity. While the model has limitations in explaining other stages of knowledge management, it adequately addresses the research question or problem.

In communication, this KM theory shares similarities with Dance's Helical Model, suggesting that communication is circular, can return to its starting point, and is a continuous, moving process. Furthermore, this communication model can effectively

illustrate information gaps and the idea that knowledge begets more knowledge. Returning to the KM theory, these information gaps can be filled through knowledge creation (tacit-to-tacit, explicit-to-tacit) and knowledge conversion (tacit-to-explicit, explicit-to-explicit).

Figure 3: Knowledge Spiral Model (Nonaka and Takeuchi,1995)



Conceptual framework

The research problem, which is the potential loss of knowledge in the organization and how to capture the tacit knowledge of the scientists, will be addressed through the Nonaka and Takeuchi Spiral Model, which will begin and focus heavily on the externalization phase. Meanwhile, the tacit knowledge captured under this phase will come from the internalization phase which involves the training courses, education,

learnings from various literatures through the years, and the socialization phase or learning from their previous supervisors/boss, professors, and colleagues.

Under the externalization, activities adopted to capture and convert tacit to explicit knowledge are storytelling, lessons learned sessions, and legacy talks. These will be packaged into explicit documents or knowledge products like a podcast, a manual, and a video series. These will then be embedded or published into PHilMech's online repository, the knowledge pantry for easy access and retrieval of the intended users–younger researchers.

Then, the methods used will be combined to create a protocol, which will help capture the scientists' tacit knowledge. The cycle goes on as this protocol will be updated over and over, and newly captured knowledge from scientists in the future will also be externalized into an explicit format.

Captured knowledge will then be instrumental in honing and persuading the next generation of scientists so more can take that path. Also, more relevant R&D outputs on postharvest and mechanization are expected to be developed. Below is the conceptual framework of the study based on the Nonaka and Takeuchi's (1995) knowledge spiral model.

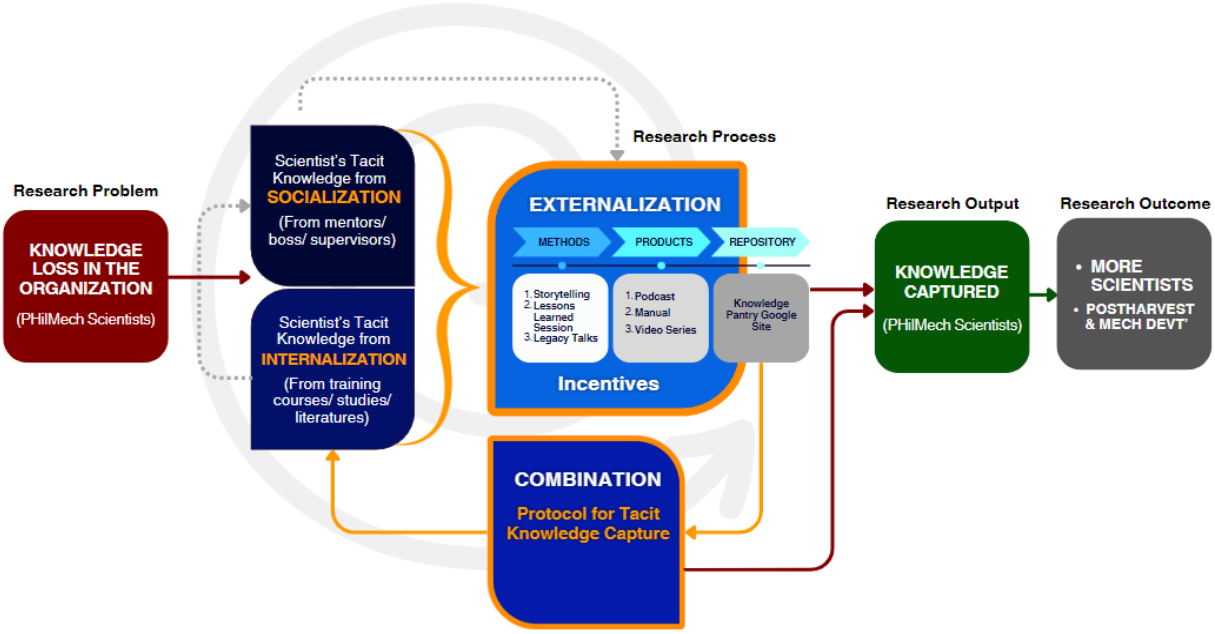


Figure 4: Conceptual Framework

Definition of Terms

1. Externalization—the first phase of the spiral model and the focus of the study which will dwell more on the tacit knowledge capture process of PHilMech Scientists. This includes KM methods to be conducted with the research participants, the knowledge products to be produced, and an online repository for the storage and access of the captured knowledge.
2. Combination—this is the second phase of the study, during which the protocol will be developed by combining all the tested methods and procedures to capture the tacit knowledge of the PHilMech Scientists.
3. Internalization and Socialization—these phases are expected to be possessed by the PHilMech scientists in their years of experience. These are where the

tacit knowledge may come from during the conduct of the protocol and methods of the study.

4. Tacit Knowledge Capturing Protocol—it involves a series of procedures applied to retiring scientists or staff who hold critical knowledge within the agency. This process takes place during the last month of the retiree's 90-day or three-month preparatory period for retirement to ensure that their valuable tacit knowledge is captured.
5. Storytelling Session—it is a knowledge management tool for capturing the tacit knowledge of PHilMech scientists/retirees. This captures anecdotes of significant experiences that have led to the scientist's/retiree's achieving its current position (like becoming a scientist). Questions to be asked, for example to scientists, will revolve around being a researcher, being a scientist, and personal values and principles governing his or her actions over the years. The approach involves conducting one-on-one interviews between the retiree and a facilitator. This method is recorded using ICT equipment such as an audio or audio-video.
6. Lessons Learned Session—it is another kind of knowledge management tool for capturing the tacit knowledge of PHilMech scientists/retirees. The approach involves conducting a focused group discussion with the retiree/scientist and his/her colleagues to discuss areas like resource mapping, hurdles/challenges encountered, best practice (what worked well), and next practice (what did not work with recommendations). (See separate sheets for the facilitator's guide in

conducting LLS and the guide questions for LLS) This method is captured using an audio recorder.

7. Legacy Talks—This is another knowledge management tool for capturing the tacit knowledge of PHilMech scientists/retirees. The approach involves conducting a mini seminar-type activity where the scientist/retiree shares his/her legacy of best practice with the next-in-line staff, followed by a forum and evaluation. This method is captured using an audio and video recorder.
8. PHilMech Scientist/Retiree—those who have expressed their intention to retire from the position and have been relieved from current duties in the agency. They should also qualify for the scope of the protocol (see Scope 2.2)
9. ICT tool—it consists of either a good-quality audio recording or a video recording device.
10. Knowledge product (KP)—pertains to a communication material (print, audio, video, broadcast) that enables the audience to act effectively. In this procedure, the KP pertained to a video series.
11. Knowledge Pantry—the online repository of PHilMech (developed in Google site) on various knowledge products and information, education, and communication materials. This will be the storage for all the KPs produced under the tacit knowledge-capturing protocol.
12. Scientific Literature Services—the library at PHilMech where the research products are stored.
13. PRAISE Committee—Program for Awards and Incentives for Service Excellence implemented by a committee organized at PHilMech.

Chapter III

METHODOLOGY

Research Design

This study used participatory action research (PAR), a method commonly utilized to enhance conditions and practices (Lingard et al., 2008; Whitehead et al., 2003). The PAR is a collaborative approach that integrates researchers and participants as co-researchers in the research process. This methodology is particularly effective for developing and implementing interventions in complex organizational settings, as it ensures that the solutions are contextually appropriate and address the actual needs of the participants (Reason & Bradbury, 2001).

Within this framework, the researcher collaborated with two sets of study participants: primarily the PHilMech scientists and junior researchers for the testing (pilot test/run) of the developed tacit knowledge-capturing protocol, secondarily are the members of the PRAISE (Program on Awards and Incentives for Service Excellence) committee of PHilMech for the design and development of the protocol. Following the action research process, the plan include the design and development of the protocol with the different elements including the KM methods, knowledge products to be produced, the storage or online repository, and the KM incentives for those who has undergone the protocol. The second part of the plan is the testing (pilot test/run) of the KM methods' doability in the PHilMech setting with the PHilMech Scientists.

An interview with the PRAISE committee of PHilMech was conducted to determine the agency's existing protocols or KM initiatives. They also work with the researcher to

determine the right processes and procedures and where in the organizational system the developed protocol will fall. Significantly, with the help of the finance chief, possible incentives were also identified.

For the second part of the study, the protocol and KM methods were tested using one-on-one interviews and focus group discussions with PHilMech scientists, and an actual forum with the intended knowledge users to determine whether the developed protocol is workable and fits the agency environment.

Since this is an action research, the study produced outputs in the form of knowledge products, an accessible online repository for the captured knowledge of the PHilMech Scientist, and the actual protocol.

Research Locale and Participants

The research was conducted at the Philippine Center for Postharvest Development and Mechanization (PHilMech) in the Science City of Muñoz, Nueva Ecija. The study used purposive sampling and has engaged scientists from PHilMech, key members of the Program on Awards and Incentives for Service Excellence (PRAISE) committee, and junior researchers.

Purposive sampling, referenced by Patton (2002), is a widely utilized qualitative research technique aimed at identifying and selecting cases rich in information while efficiently using limited resources. This method involves the identification and selection of individuals or groups who possess exceptional knowledge or experience related to a specific phenomenon of interest, as highlighted by Cresswell and Plano Clark (2011).

Research Instrument

The research used unstructured interviews and focus group discussions as the research instruments. The unstructured interview was used during the storytelling session with PHilMech Scientists. Questions revolved around their best practice in research, their anecdotes, and experiences in pursuing and becoming a career scientist, as well as their reflections and lessons learned.

Meanwhile, the focus group discussion was used for the lessons learned session (LLS). Specifically, it utilized the participatory approaches in agriculture studies introduced by Manalo (2022), resource-mapping, and matrix ranking techniques to the PHilMech Scientists. Questions were focused on four aspects: the important resources for PHilMech Scientists, the hurdles or challenges they have encountered, their best practice, and the next practice with recommendations. Moreover, during the interview with the members of the PRAISE committee, a focus group discussion was also conducted, which dwelt on topics such as developing a PHilMech protocol for capturing tacit knowledge.

In conducting the legacy talks, the speaker was given a guide question to help develop the presentation. The questions revolved around the lessons learned, important skills, hurdles, values, and best practices.

Data Gathering Procedure

The researcher collected all the primary data through unstructured interviews and focus group discussions. First, a permission letter to conduct the data gathering activities

at PHilMech was sent to its Director IV for his approval. Once approved, communication with the research participants was done via email, Facebook Messenger, or in person.

Externalization

Three methods were tested with the PHilMech Scientists. These included storytelling, lessons learned sessions, and legacy talks. For the storytelling, the researcher chose two retired scientists. They were given in advance the list of questions to give them enough time to ponder, reflect, and recall their experiences and stories. On the scheduled day, the researcher informed the participants that the session would be recorded, that there would be no payment but only tokens for sharing their knowledge, and that the captured knowledge would only be used for study purposes and will serve as benchmark for institutionalizing the protocol at PHilMech in the future. These were mentioned in the consent letter and personal information sheet that they signed and filled out before the session. This was also true of other methods conducted with the participants. Photo documentation was also done during the session. Captured knowledge from this method was published in the online repository in podcast format.

For the lessons learned session (LLS), guide questions were also given in advance to the participants so that they could recall important tacit knowledge and share it better during the data-gathering activity. The researcher prepared materials like manila paper, markers, meta cards, an audio recorder, and the facilitator's guide before the LLS. During the LLS, the researcher gave instructions and a time limit for each activity. The resource mapping lasted for 20 minutes and an additional 10 minutes for discussions. The matrix ranking techniques for the second and third questions were given 15 minutes each with 10 minutes of discussion. Then, each of the last two questions were given 10 minutes of

discussion. The participants were also asked about the knowledge product and incentives they prefer for their captured knowledge as part of the protocol. Photo documentation was done during the session including their outputs for easy processing and analysis. Captured knowledge from this method were published in the online repository as a manual.

Lastly, the guide questions were given in advance for the Legacy Talks. The researcher facilitated the participants' (junior researchers) invitations to the talk in collaboration with the chiefs of various R&D divisions of PHilMech. The researcher ensured a conducive knowledge-sharing venue and prepared a quality video and audio recording set-up in the facility to record the whole activity. The researcher gave a short introduction to the speaker, and then the talks lasted 40 minutes to one hour.

After the talk, a forum was facilitated by the researcher to entertain questions related to the topics discussed by the scientist. Then, a survey form was distributed to ensure the effectiveness of the talks, along with the takeaways of each participant (junior researchers). Captured knowledge from this method was published in the online repository as a video series.

After all the data-gathering procedures, the research participants from storytelling, lessons-learned sessions, and legacy talks received a token.

Combination

The researcher conducted a focus group discussion with the members of the PRAISE Committee, with priority on the decision-makers, the Chief of the Human Resource Management Section, and the Chief of the Finance Division. The researcher

has briefed the members on the tacit knowledge-capturing protocol proposed under the study. The members were asked for their inputs on the following aspects:

(1) where to embed the protocol in the organizational system;

(2) ideas on the specific procedures for conducting the protocol;

(3) provisions, laws or existing guidelines that will support the protocol;

(4) possible incentives for those who will undergo the protocol and

(5) other recommendations

The discussion was also documented through photos and audio recordings. All inputs were incorporated into the developed protocol.

Ethical Considerations

The ethical considerations addressed during the conduct of this study include the following:

- Research participants were provided with a written consent form, which they could sign if they agreed, outlining the purpose, benefits, and intentions of the study before deciding to participate.
- They were informed of their freedom to join or withdraw from the study at any time.
- Additionally, they were informed that the information they shared would be used for the study and might also serve as a basis for the development of a protocol to be adopted by PHilMech.

Data Analysis

The gathered data were subjected to narrative analysis (Butina, 2015). Narrative analysis is a qualitative data analysis method that emphasizes the interpretation of core narratives derived from personal stories within a study group. Using first-person narratives, data were collected and organized to enable the researcher to comprehend how individuals experienced certain events, aligning with the study's focus on the stories recounted by scientists in arriving at their inventions or discoveries. The researcher scrutinized the uniqueness of these narratives, which served as a representation of the richness of their tacit knowledge and packaged it into a knowledge product. Anecdotes, best practices, and lessons learned constituted the foundation for the analysis.

Chapter IV

RESULTS AND DISCUSSION

A. Designed KM methods for Tacit Knowledge Capture

Three KM methods were used in the capture of tacit knowledge in this study. These included storytelling session, lessons learned session, and the Legacy Talks.

The goal is to ensure that the tacit knowledge of departing employees, such as experiences, ground truth, judgment, and rules of thumb (Davenport & Pruska, 1997), is captured and retained for continuous improvement. The establishment of best practices within the organization is also aimed to be acquired from these methods. The following are the proposed KM methods and procedures developed to be incorporated into the protocol.

1. Storytelling Procedure

This procedure includes briefing the scientist or retiree to facilitate the storytelling, processing of knowledge captured, packaging into a podcast format, and uploading the knowledge product agency's online repository, the Knowledge Pantry.

Storytelling Session is a knowledge management tool for capturing the tacit knowledge of PHilMech scientists/retirees. The approach involves conducting one-on-one interviews between the retiree and a facilitator. This method is recorded using ICT equipment such as an audio or audio-video.

Key People Involved

Human Resource Management Section (HRMS). They shall forward the scientist/retiree's name, updated CSC Form 212 (Revised 2017)—Personal Data Sheet, and the relief period to the ACD. They shall coordinate the scheduling of the briefing on the tacit knowledge-capturing protocol. They shall be responsible for conducting a briefing with the ACD to familiarize the retiree with the tacit knowledge-capturing protocol as an additional requirement for offboarding.

Applied Communication Division (ACD). They shall assist the HRMS in the conduct of a briefing on the tacit knowledge-capturing protocol for the scientist/retiree. They shall schedule and facilitate the actual storytelling session. They will also be responsible for crafting the guide questions and forwarding them to the scientist/retiree. After the storytelling session, they will also consolidate and process the knowledge captured, and package it into a podcast format. Finally, they will handle uploading the knowledge product to the Spotify app and embed the links to the Knowledge Pantry.

Information and Communication Technology Section (ICTS). they shall be responsible for the technical aspects of the storytelling session, such as setting up the recording booth and using audio or audio-visual ICT tools for capturing.

Office of the Director. shall oversee the entire process and the editor and approval body before publishing the KP in the repository or on other online platforms.

Process Flow

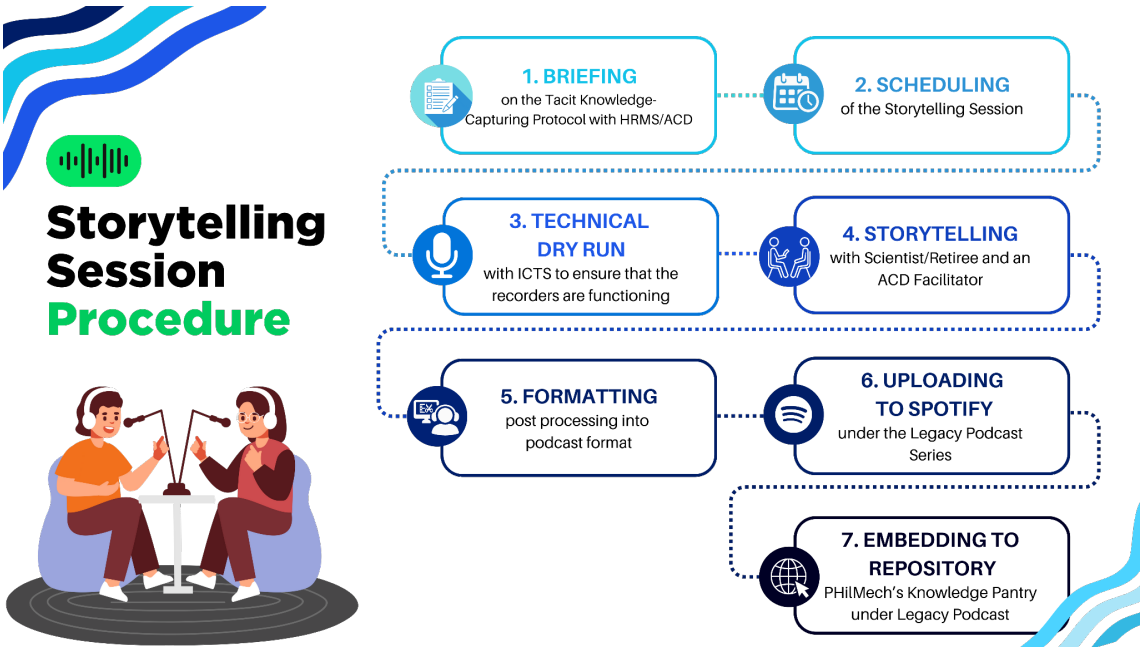


Figure 5. Storytelling Process Flow

Designed Procedure

1. The HRMS will forward to the ACD the name and personal details of the relieved scientists/retiree through his or her CSC Form 212 (Revised 2017)—Personal Data Sheet. The HRMS will also contact the scientist/retiree to schedule him/her for a briefing on the agency's Tacit Knowledge Capturing Protocol.
2. Once the scientist/retiree agrees to the schedule, the HRMS and ACD will conduct the briefing, preferably during the first week of his/her last month of relief. Topics to be discussed during the briefing include the tacit knowledge-capturing process, the activities/methods involved, the

responsibilities expected of the scientist/retiree, and the add-on incentives they will receive.

3. The briefing will end with the scientist/retiree signing the consent letter to undergo the process and the final schedule of the storytelling session, lessons learned session, and legacy talks.
4. ACD will provide the scientist/retiree with the guide questions at least five (5) days before the storytelling sessions to give them more time to recall, process, take notes, and ponder their answers. The storytelling session will happen during the 3rd week of the last month of retirement preparation, the first method to be conducted.
5. Before the storytelling begins, technical audio and recording tests should be performed to ensure that the whole session is properly recorded and of good quality. The ICTS team will assist with the test and actual recording.
6. During the storytelling session, ACD will facilitate as the interviewer, following the provided guide questions (separate sheet). Follow-up questions that can enhance the answers or anecdotes of the scientist/retiree are welcome. The interviewer must have the skills to keep the discussion on track and bring it back to the original topic if it goes off course.
7. After the storytelling session, the ICTS will turn the recordings to ACD for processing and editing and then convert them into a podcast format.

8. The file will then be uploaded to the Spotify app under the podcast title “Legacy Podcast.” Upon uploading, indicate the Episode number and the title.
9. The podcast link will be embedded in the Knowledge Pantry Google Site of PHilMech. This site will serve as the online repository of the legacy knowledge materials and will be accessible to all junior researchers, aspiring scientists, and other interested staff.

Pertinent Records

The records needed for this procedure are the Letter of Consent for Tacit Knowledge Capturing Protocol, which the scientist/retiree will sign and fill out, and the Guide Questions for the Storytelling Session.

2. Lessons Learned Session Procedure

This procedure included briefing the scientist or retiree, conducting the lessons-learned session, consolidating and processing the data gathered, packaging it into a manual, and then uploading it to the agency’s online repository–the "knowledge pantry"—for the digital format and mass printing via printing press for the printed format.

Lessons Learned Session is another knowledge management tool for capturing the tacit knowledge of PHilMech scientists/retirees. The approach involved conducting a focused group discussion with the retiree/scientist and his/her colleagues to discuss areas like resource mapping, hurdles/challenges

encountered, best practices (what worked well), and next practices (what did not work with recommendations).

Key People Involved

Human Resource Management Section (HRMS). They shall forward the scientist/retiree's name, updated CSC Form 212 (Revised 2017)—Personal Data Sheet, and the relief period to the ACD. They shall coordinate the scheduling of the briefing on the tacit knowledge-capturing protocol. They shall be responsible for conducting a briefing with the ACD to familiarize the retiree with the tacit knowledge-capturing protocol as an additional requirement for offboarding.

Applied Communication Division (ACD). They shall assist the HRMS in conducting a briefing on the tacit knowledge-capturing protocol for the scientist/retiree. They shall schedule and facilitate the actual lessons-learned session. They will also be responsible for crafting the guide questions and forwarding them to the scientist/retiree. After the LLS, they will consolidate and process the knowledge captured and package it into a useful manual. Finally, they will handle uploading the knowledge product to the Knowledge Pantry.

Office of the Director. Shall oversee the entire process and serve as the editor and approval body before publishing the KP in the repository or before mass production.

Process Flow

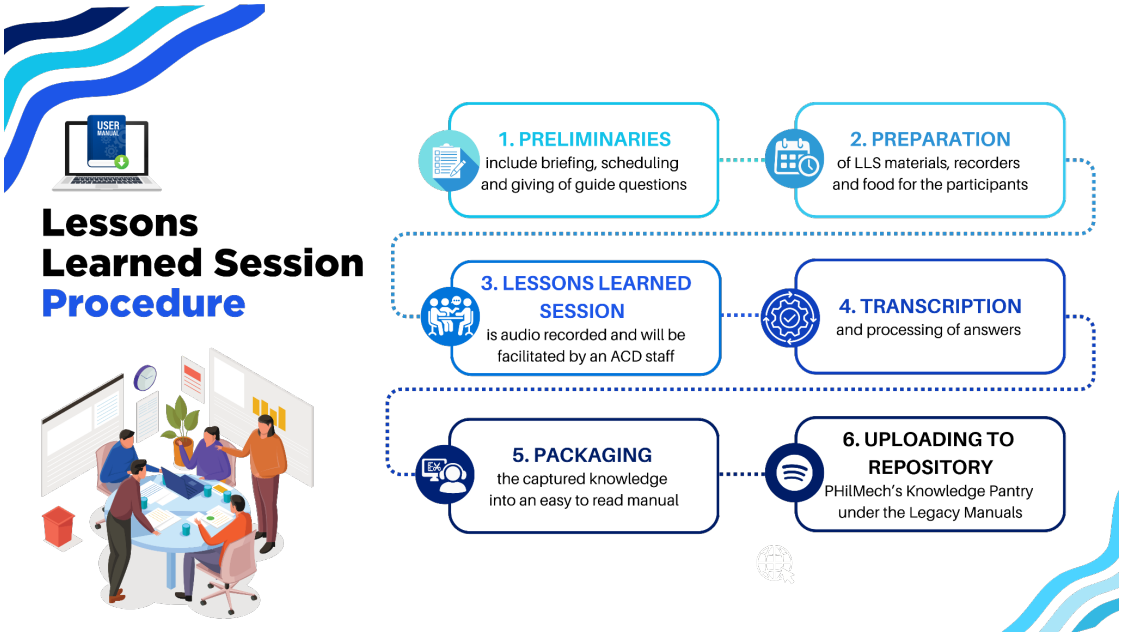


Figure 6. Lessons Learned Session Process Flow

Designed Procedure

1. The HRMS will forward to the ACD the name and personal details of the relieved scientists/retiree through his or her CSC Form 212 (Revised 2017)—Personal Data Sheet. The HRMS will also contact the scientist/retiree to schedule him/her for a briefing on the agency's Tacit Knowledge Capturing Protocol.
2. Once the scientist/retiree agrees to the schedule, the HRMS and ACD will conduct the briefing, preferably during the first week of his/her last month of relief. Topics to be discussed during the briefing include the tacit knowledge-capturing process, the activities/methods involved, the

responsibilities expected of the scientist/retiree, and the add-on incentives they will receive.

3. The briefing will end with the scientist/retiree signing the consent letter to undergo the process and the final schedule of the storytelling session, lessons learned session, and legacy talks.
4. The ACD will provide the scientist/retiree with the guide questions at least five (5) days before the lessons learned sessions to give them more time to recall, process, take notes, and ponder their answers. The lessons learned session will happen during the 3rd week of the last month of relief, after the conduct of the storytelling session.
5. The facilitators will prepare the LSS materials at least three (3) days before the LLS, which include manila papers, markers, ball pens, color-coded meta cards, adhesive tape, and the audio recorder. Also, the food for the participants should be secured for a maximum of two hours of activity.
6. During the actual LLS, ACD will serve as the facilitator. The facilitator will instruct the participants on the flow and activities of the LLS, using the facilitator's guide (separate sheet). Ensure that the recorders are functional and recording.
7. After the LLS, ACD will transcribe the recording and process it into an easy-to-follow manual.
8. ACD will then package it into a printable and uploadable prototype. The layout artist may refer to PHilMech's existing procedure for

packaging IEC popular print materials with document control number PHilMech-AC-IMSP-001.

9. Printed manuals will be uploaded to the Knowledge Pantry Google Site of PHilMech, the online repository of legacy knowledge materials. In contrast, the printed ones will be made available through the Scientific Literature Services of PHilMech for easy access to the intended users.

Pertinent Records

The records needed for this procedure are the Letter of Consent for Tacit Knowledge Capturing Protocol, which the scientist/retiree will sign and fill out, the Facilitator's Guide for Conducting the LLS, and the Guide Questions for the Lessons Learned Session.

3. Legacy Talks Procedure

This procedure included briefing the scientist or retiree, conducting the Legacy Talks, conducting a forum and evaluation, packaging it into a video series, uploading it to YouTube, and embedding the link to the agency's online repository–the "knowledge pantry."

Legacy Talks is another knowledge management tool for capturing the tacit knowledge of PHilMech scientists and retirees. The approach involved conducting a mini seminar-type activity where the scientist or retiree shares his or her legacy of best practices with the next-in-line staff, followed by a forum and evaluation. This method was captured using an audio and video recorder.

Key People Involved

Human Resource Management Section (HRMS). They shall forward the scientist/retiree's name, updated CSC Form 212 (Revised 2017)—Personal Data Sheet, and the relief period to the ACD. They shall coordinate the scheduling of the briefing on the tacit knowledge-capturing protocol. They shall be responsible for conducting a briefing with the ACD to familiarize the retiree with the tacit knowledge-capturing protocol as an additional requirement for offboarding.

Applied Communication Division (ACD). They shall assist the HRMS in conducting a briefing on the tacit knowledge-capturing protocol for the scientist/retiree. They shall schedule and facilitate the actual Legacy Talks. They will also be responsible for crafting the guide questions and forwarding them to the scientist/retiree. Also, they will facilitate the forum during the legacy talks. After the legacy talks, they will also evaluate and consolidate it. They will also package it into a video series uploaded to YouTube for easy access. Finally, they will handle uploading the knowledge product to the Knowledge Pantry.

Office of the Director. This office shall oversee the entire process and serve as the editor and approval body before uploading the KP to the repository.

Process Flow

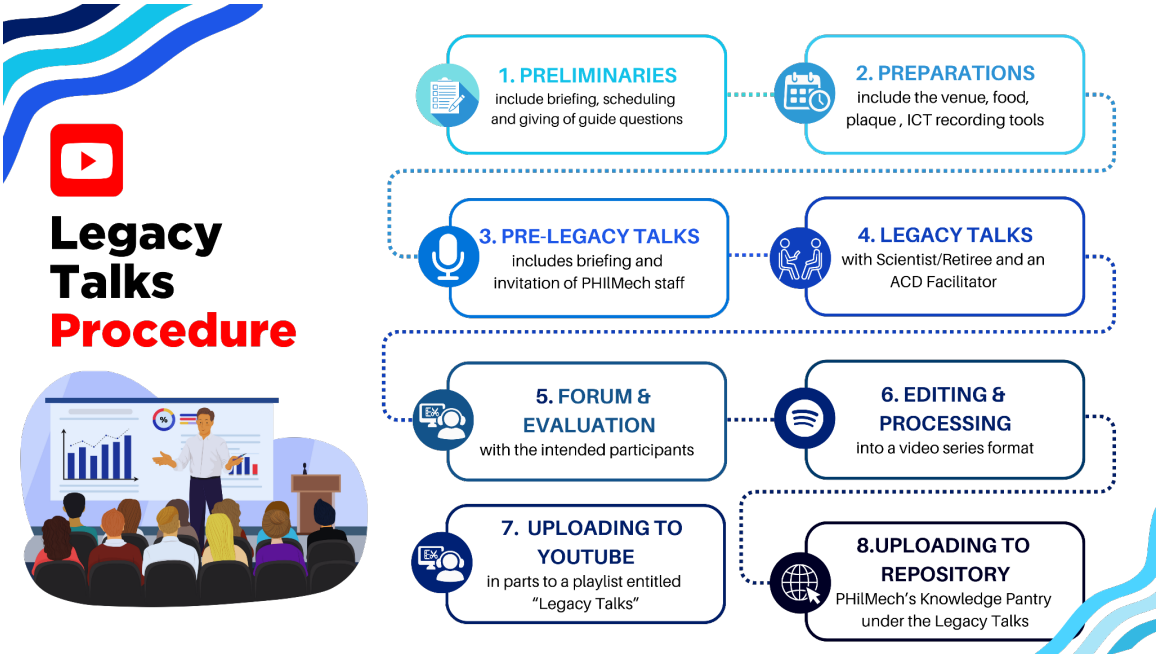


Figure 7. Legacy Talks Process Flow

Designed Procedure

1. The HRMS will forward to the ACD the name and personal details of the relieved scientists/retiree through his or her CSC Form 212 (Revised 2017)—Personal Data Sheet. The HRMS will also contact the scientist/retiree to schedule him/her for a briefing on the agency's Tacit Knowledge Capturing Protocol.
2. Once the scientist/retiree agrees to the schedule, the HRMS and ACD will conduct the briefing, preferably during the first week of his/her last month of relief. Topics to be discussed during the briefing include the tacit knowledge-capturing process, the activities/methods involved, the

responsibilities expected of the scientist/retiree, and the add-on incentives they will receive.

3. The briefing will end with the scientist/retiree signing the consent letter to undergo the process and the final schedule of the storytelling session, lessons learned session, and legacy talks.
4. The ACD will provide the scientist/retiree with the guide questions at least five (5) days before the legacy talks to give them more time to recall, process, take notes, and ponder their answers. The legacy talks will happen during the last week of the last month of relief after the lessons learned session is conducted.
5. At least five (5) days before the legacy talks, the facilitators will prepare the following:
    a. Reservation of the facility within PHilMech that is good for a maximum of 20 participants. The arrangements will be forum-type, each with a table and chair facing the speaker.
    b. Filing of online request to the ICTS team for the TV or LED wall background for the speaker's presentation and the audio-video recording set-up to capture the legacy talks.
    c. Purchase requests for food for the participants (30 pax including the assistants and facilitators) will be charged to the HRMS fund.
    d. Certificate/Plaque and other tokens for the scientist/retiree
6. On a Monday of the week of the legacy talks, the Legacy Talks host will announce on the H-Hour of the Flag Raising Ceremony Program the

briefer of the Legacy Talks and the background of the speaker–(1) name of the speaker, (2) his/her major accomplishments, (3) the legacies he/she will leave to PHilMech.

7. The HRMS will release an internal memo inviting the following people to the Legacy Talks: (1) the next in ranks according to succession planning, (2) other R&D researchers/ESETS staff/Admin staff (depending on the cluster the retiree belongs), and (3) other interested. The confirmation of participants will be at most two days before the activity.
8. During the Legacy Talks, the ICTS will prepare the video recorders with good-quality audio input to capture the whole talk.
9. The ACD will host the talk. The host will give a brief overview of the activity and introduce the Legacy Talks Speaker.
10. The speaker will present the prepared presentation based on the guide questions given to them, using a powerpoint presentation format.
11. A forum will follow where, at most 10 questions will be entertained by the speaker.
12. The host will then distribute the evaluation form for the legacy talks (see separate sheet) to gauge their effectiveness and ensure that the legacy has been passed on well.
13. After the Legacy Talks, the ICTS team will forward the raw video footage to the ACD for editing and processing into a video series format divided by topic. This is in accordance with PHilMech's existing procedure for

packaging IEC popular video materials with document control number PHilMech-AC-IMSP-001.

14. ACD will then upload it to YouTube with a playlist named “Legacy Talks.” Each subpart of the video will be named after the topic and have a part number so viewers can easily follow the sequence of the videos.
15. The ACD will embed the video links in the Knowledge Pantry Google Site of PHilMech, which will serve as the online repository of legacy knowledge materials.

Pertinent Records

The records needed for this procedure are the Letter of Consent for Tacit Knowledge Capturing Protocol, which the scientist/retiree will sign and fill out, the Guide Questions for the Legacy Talks, and the Evaluation Form for the Legacy Talks.

B. Developed Tacit-Knowledge Capturing Protocol

This protocol was developed with inputs from the PHilMech PRAISE committee members and the scientists during different focus group discussions. Existing protocols, procedures, and laws, especially from the Civil Service Commission, that will enable the embedding of this protocol into PHilMech's organizational system were considered during protocol development.

As a result of the consultations with the management, this protocol was decided to be included in the offboarding requirements of the retiring staff of PHilMech, which holds critical tacit knowledge, including the scientists.

Qualified Staff

PHilMech retiring staff who belong to, but are not limited to, the following:

- scientists or high-ranking employees who are holding supervisory positions;
- have shared significant contributions and innovative ideas during their stay in PHilMech;
- those holding critical tacit knowledge related to PHilMech operations and major final outputs;
- or other individuals as may be identified by the management.

Key People

Human Resource Management Section (HRMS). They shall forward the scientist/retiree's name, updated CSC Form 212 (Revised 2017)—Personal Data Sheet, and the relief period to the ACD. They shall coordinate the scheduling of the briefing on the tacit knowledge-capturing protocol. They shall be responsible for conducting a briefing

with the ACD to familiarize the retiree with the tacit knowledge-capturing protocol as an additional requirement for offboarding.

Applied Communication Division (ACD). They shall assist the HRMS in conducting a briefing on the tacit knowledge-capturing protocol for the scientist/retiree. They shall schedule and facilitate all the tacit-knowledge-capturing methods under the protocol. They will also package the captured knowledge into various products such as podcasts, manuals, and video series. Finally, they will upload the knowledge product to the Knowledge Pantry and disseminate it to the intended users to ensure its utilization.

Information and Communication Technology Section (ICTS). They are responsible for the technical aspects of the storytelling session, such as setting up the recording booth and using audio or audio-visual ICT tools to capture the event.

PRAISE Committee. They will facilitate the awarding of the add-on incentives (certificates/plaques, and a premium of 5,000 pesos) for the retiree/scientist who has undergone the Tacit Knowledge Capturing Protocol. They will also prepare and conduct with HRMS, the “Salamat, Mabuhay” program for the retiree/scientist.

Office of the Director. He shall award the add-on incentives to the retiree during the program intended for him or her. He will also oversee the entire process and serve as the editor and approval body before uploading the KP to the repository.

Protocol's Process Flow

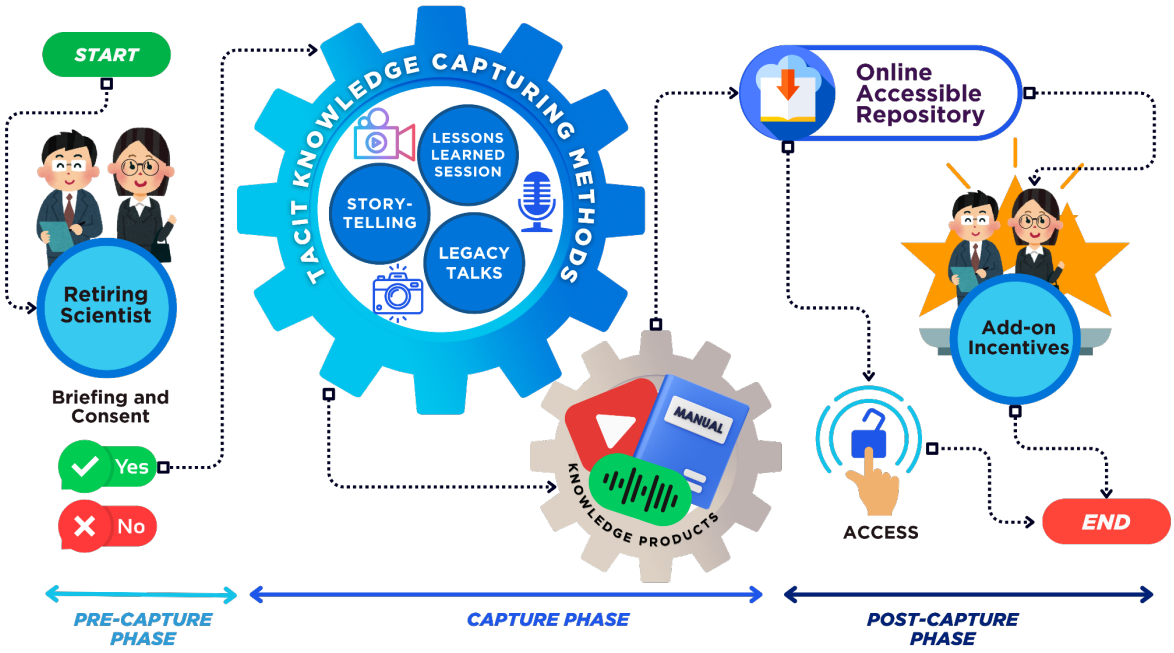


Figure 8. Protocol's Process Flow

The Tacit Knowledge-Capturing Protocol consists of three phases: the pre-capture, the capture, and the post-capture. This is done during the last month of the 90-day preparatory period of a retiring scientist/staff to ensure that their valuable tacit knowledge is captured before they leave. This will be part of the offboarding requirements of those qualifying for the protocol.

Pre-Capture Phase

The pre-capture phase involves briefing the scientist or retiree on the protocol she or he will undergo as part of the offboarding requirements. This will progress as the scientist or retiree signs the consent form to proceed with the process.

Capture Phase

The capture phase includes three (3) Knowledge Management (KM) methods/tools procedures in PHilMech's Tacit Knowledge Capture Protocol for its scientists/retirees. These are storytelling sessions, lessons learned sessions, and legacy talks.

The capture will involve using various ICT recording tools and software to package the KPs into different formats: a podcast from storytelling, which will be named the legacy podcast; a manual from lessons-learned sessions, which will be named the legacy manual; and a video series for legacy talks, which will be named after the KM tool itself.

Post-Capture Phase

Repository. In this phase, the packaged KPs will be uploaded to different free online platforms (like Spotify, online flippable book converter, and YouTube) for easy embedding to the agency's knowledge pantry–an online repository Google site–for easy access to the intended audience.

Dissemination. The shareable links or quick response (QR) codes will be posted in the scientific literature services facility (library) of PHilMech and in the offices of researchers, extension staff, operations staff, or admin staff who need the materials for easy access.

Rewards/Incentives. Meanwhile, for those retirees or scientists who have undergone the tacit knowledge-capturing protocol, the HRMS will facilitate the awarding of additional incentives to them. This includes certificates, plaques, and an additional premium of P5,000, in addition to the P20,000 cash incentive from the agency through

the PRAISE committee. These rewards will be granted to retirees who have shared and facilitated the capture of their tacit knowledge. This will be part of the “Mabuhay, Salamat” program for the retiree.

Protocol Procedure

1. The HRMS will evaluate the credentials and contributions of retiring staff and determine if he or she qualifies for the protocol requirements.
2. The usual offboarding procedure applies if the retiree does not belong to any of the criteria given. But if they qualify, they will undergo this protocol as part of the retirement requirements.
3. The HRMS, with the ACD, will conduct a briefing for the retiree/scientist regarding the protocol. Topics to be discussed during the briefing include the tacit knowledge-capturing process, the activities/methods involved, the responsibilities expected of the scientist/retiree, and the add-on incentives they will receive.
4. The signing of the consent letter will follow, which allows the PHilMech team to proceed with the protocol. Otherwise, the process ends here.
5. If the retiree/scientist allows PHilMech to proceed with the protocol, the KM methods/activities will be scheduled: storytelling sessions, lessons-learned sessions, and legacy talks.
6. The three methods will be conducted during the third and fourth weeks of the last month of the preparatory period for retirement (see separate procedures discussed in part A).

7. All the processed knowledge will be formatted into different knowledge products and will be uploaded to the online repository of PHilMech–the
8. Knowledge Pantry Google Site–for easy access to the intended users. Printed Manuals will be accessible through the scientific literature services (library) of PHilMech.
9. The protocol will end with the awarding of add-on incentives to the retiree/scientist through the "Salamat, Mabuhay" program. The retiree/scientist will receive a plaque and a P5,000 premium for sharing knowledge.

Lessons Learned from Protocol Development

The researcher learned the following lessons in designing, developing and testing a protocol:

(a) The support of the leadership and management of the organization is the most important enabling factor for its success. In the case of this study, the Director IV's approval and the contributions of the finance and human resource heads made the protocol development possible.

(b) Choosing the right and qualified participants is another huge factor for success. Once they grasp the essence of why the protocol is needed, you can expect them to satisfy you with the necessary knowledge they are required to share. The researcher has also found that scientists are very open to sharing their knowledge even without monetary incentives only if

you will link their contribution to helping the next generation. They are more after a good cause than a good price.

(c) In conducting the legacy talks, choosing the right audience (junior researchers) can enable the smooth transfer of knowledge from the source (scientists). The audience will find it relevant, clear, useful and doable. With this, the tacit that became explicit to them will now form a better tacit knowledge they can apply in their workplace.

(d) It is important to be well-versed in the available and free resources on the internet to develop a good repository that is not boring nor conventional especially when your intended audience belongs to the millennial and Gen Z generations.

C. Testing (Pilot test/run) of the developed Tacit-Knowledge Capturing Protocol

The study did not assess the protocol but conducted pilot testing or pilot runs of the developed protocol. This has produced the kinds of tacit knowledge captured, the knowledge products packaged, and the knowledge repository developed–the Knowledge Pantry.

1. Captured Knowledge and Observations

a. Anecdotes of experiences

Most of the research participants have shared, in between points, the whys and the hows of their journey towards becoming scientists. The richest captured anecdotes were during the storytelling session with scientists. The

one-on-one interview approach effectively got substantial answers coupled with back stories that connected every piece of knowledge shared by the scientist. It was recommended that the facilitator knows the interviewee for a certain period so the connection between stories and the history of events will become more vivid in the storytelling session.

Emotions were also high during the interview as each story unfolded what the scientists felt or thought when the experience occured. While everything under the sun can be tackled through storytelling, limitations should be set. Stories linked to sensitive cases are too personal. The scientists' values and principles and the legacy they want to leave in the agency are best captured through meaningful anecdotes during the storytelling session.

Unlike the legacy talks, the storytelling session offered more personal and spontaneous anecdotes since the scientist had only one listener, compared with at most 20 with legacy talks. The lessons learned sessions, though, offered different points of view on an anecdote since this was in a focus group discussion.

b. Best Practices

With the right questions and methods, scientists' tacit knowledge of their best practices can easily be captured. Based on the results of the study, lessons learned session topped the KM methods for getting the best practices from the scientists. The resource mapping and the ranking matrix (Manalo, 2022) approaches effectively got the said type of tacit knowledge.

Resource mapping was originally used for farming communities so that researchers could instantly learn more about their place. This method can provide researchers with the insights they need through the drawing and processing exercises of the participants. The study applied this strategy with the scientists to better understand the context of their community and to easily identify the resources needed to become scientists. Although scientists opted not to draw, instead enumerating their answers, they still found the method effective.

On the other hand, matrix ranking aims to identify the issues that should be dealt with, serving as a starting point for discussion among participants. This strategy was used during the identification of best practices of the scientists. The study captured their best practice/tips on tapping the right resources, conducting research, publishing in an ISI-indexed journal, winning research, and finishing graduate studies. These are all required to apply to the Scientific Career System.

The Legacy Talks was also an effective tool for getting the best practice. A plus factor was the forum at the end, where participants can ask the scientist to explain their best practices further. Storytelling was also a good method for capturing the best practice since long anecdotes back it up as scientists went down memory lane.

c. Core Values

This knowledge was best delivered in the Legacy Talks, as the speaker has a PowerPoint presentation during the talk, which the participants can easily take note of and follow in an orderly manner.

Based on the results of the post-activity survey, participants of the Legacy talks perceived the topics as exceptionally lucid, extremely beneficial, and highly pertinent to their work and professional advancement as researchers. Overall, they expressed exceedingly high satisfaction with this knowledge management method.

Furthermore, according to the participants, the most valuable insights they gained from the talk were the speaker's core values, particularly honesty and perseverance, which they can apply to their research endeavors. They also emphasized gaining important knowledge on the significance of mentoring the next generation and finding a mentor. They also mentioned critical thinking and problem-solving as the essential skills required by a researcher.

2. Knowledge Products

After testing the protocol and the procedures with the PHilMech Scientists, the researcher was able to process and produce knowledge products ready for consumption by the intended users–the young researchers of PHilMech.

This research produced the Legacy Manual, a product of the lessons learned session, the Legacy Podcast streamed via the Spotify app, a product of the storytelling

session, and the Legacy Talks Video Series published on YouTube, a product of the Legacy Talks.

Legacy Manual

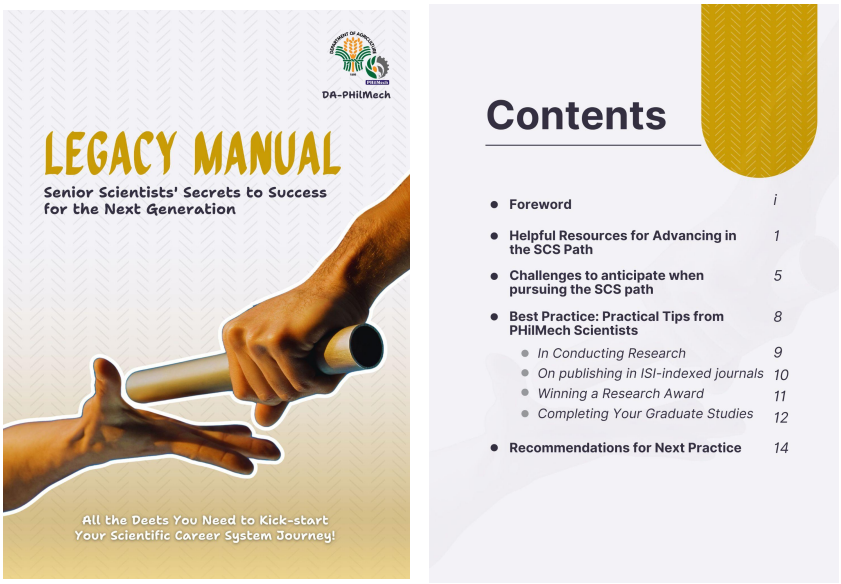


Figure 9. Legacy Manual Prototype

Legacy Podcast

Figure 10. Legacy Podcast

Legacy Talks Video Series

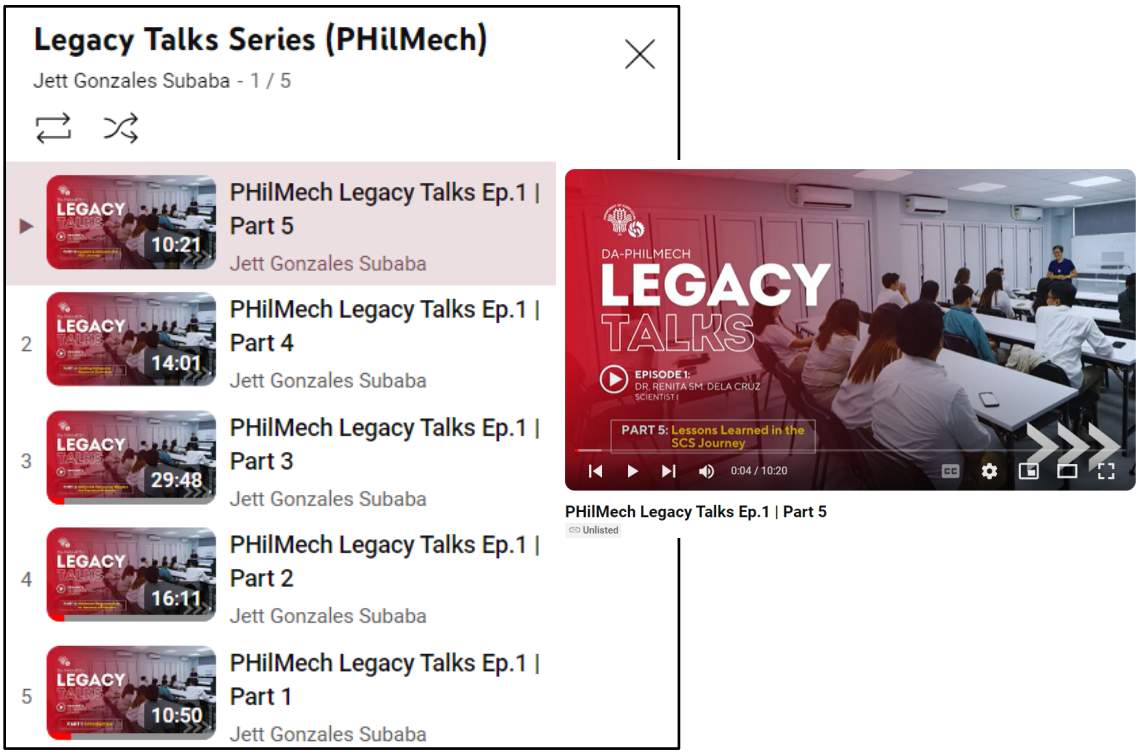


Figure 11. Legacy Talks Video Series

3. Online Repository: Knowledge Pantry

The researcher designed and developed a free online repository using Google Sites entitled “Knowledge Pantry.” This will house the knowledge products and the developed protocol for capturing the tacit knowledge of PHilMech Scientists/retirees. It has two pages: the TCK protocol and the Legacy Materials web pages. The repository can be accessed through a link (https://tinyurl.com/TKCprotocol) or a QR (quick response) code.

Knowledge Pantry

Figure 12. Knowledge Pantry interface

Implications of the study

The study has outlined very significant implications for the agriculture sector and the academe.

In the agriculture sector, what is available today in their research centers specifically their databases are mostly metadata and not exactly knowledge of agricultural practitioners. However, this study was able to capture or harvest the actual, practical, and applicable tacit knowledge that can be used by the next generation of practitioners. This has the potential to improve the interventions in the agriculture sector by using the captured tacit knowledge of seasoned staff as a takeoff point to better the services and practice in research, extension, and development work of an organization or institution.

Meanwhile, in the academe, one of the major problems this study can address is the intergenerational exchange of knowledge. Most of the researchers and professors in the academe who hold critical tacit knowledge usually go without leaving their respective legacy. They may be known for their work but how the university can use their contributions to move forward to be utilized by the later generation remains lacking. This study offers a practical and applicable protocol that even universities may adopt to capture the lessons learned, best practices, and the context in which their knowledge was acquired and applied. The captured tacit knowledge may be utilized by the next generation of university researchers and professors.

Moreover, the study has made a distinction between the traditional media or formats for packaging knowledge products and the introduced formats in the study for expliciting captured knowledge such as podcast, video series, and flippable manuals

which are recognizable forms among Millennials and GenZs. They can find these formats more relevant and friendly to them than browsing reports, and raw documents in their organization.

Lastly, the developed protocol, amid the artificial intelligence (AI) Era, cannot be fabricated nor replaced by various large language models present today because the process of converting of new knowledge in this protocol solely relied on the tacit knowledge of scientists, which can only accessed through their minds. While AI may generate some points or outlines, the most relevant and practical knowledge comes from seasoned practitioners like PHilMech Scientists. This valuable knowledge, accumulated through years of experience, best practices, and lessons learned, cannot be replicated or exactly reproduced by AI. It can only be shared and captured for reuse by those who possess it.

Chapter V

CONCLUSION AND RECOMMENDATIONS

Conclusion

The research problem is the potential knowledge loss in PHilMech as most of its scientists are retiring or nearing retirement. The impact of the loss may cost the agency money, resources and even efficiency problem since those who will be left (i.e. the next generation) would need more training courses, years of experience, and lessons from repeated failures because there was no documented tacit knowledge of those who came ahead of them.

Thus, the research addresses how tacit knowledge can be captured. The research utilized participatory action research to design, develop, and test (pilot test/run) an applicable tacit knowledge-capturing protocol for PHilMech Scientists.

Design

One of the research's salient findings is identifying the applicable KM methods designed to capture the tacit knowledge of the PHilMech scientist. The most efficient design possible for capturing tacit knowledge include KM tools like storytelling, lessons-learned sessions, and legacy talks. Using these methods, the study was able to capture knowledge themes on anecdotes of experiences, best practices, and core values of the scientists verified through surveys like the one conducted in the legacy talks.

Develop

With the help of both the Scientists and the members of the PRAISE committee of PHilMech, a protocol was developed with three phases: the pre-capture, the capture, and the post-capture. These phases include activities like the conduct of designed KM tools mentioned above, the briefing of the qualified staff for the protocol (those who are scientists or who hold critical organizational knowledge and technical know-how), the storage and retrieval of knowledge through the knowledge pantry (a google site-based online repository of PHilMech), and the recommended incentives. This protocol will be part of the offboarding requirements for the retiring staff, conducted during the last month of the retiree's 90-day preparatory period for retirement.

Testing

The developed protocol was tested with the PHilMech Scientists and conducted within the office. The protocol produced various knowledge products like best practices manual, a podcast on becoming a scientist and their success secrets, and a comprehensive legacy talks video series. These are uploaded in free streaming applications like YouTube and Spotify, considering that the intended users, the young researchers of PHilMech are mostly Millennials and Genzers. These knowledge products were consolidated and uploaded into one online repository, the Knowledge Pantry of PHilMech. A Google-based site that is free and accessible via mobile phones, computers, and tablets.

In conclusion, the study indicates that the developed protocol has the potential to significantly impact the agriculture sector and the academic community. The tacit

knowledge obtained from the protocol can offer agricultural research centers not only metadata but also valuable and practical tacit knowledge that can enhance their services. Additionally, this protocol can help address the challenge faced by academic institutions regarding the intergenerational exchange of knowledge.

Lastly, in the era of AI, this protocol remains valuable and irreplaceable as it leverages the tacit knowledge of human assets such as PHilMech scientists.

Recommendations for Further Research

This study focused on designing, developing, and testing a protocol for staff holding critical knowledge of the agency or organization. Other research may use the outputs of this research to evaluate the effectiveness of the KM intervention developed for PHilMech after three or more years.

Based on the SECI model by Nonaka and Takeuchi (1995), this study focuses more on the externalization phase, which converts tacit to explicit. However, future research may also develop protocols that will sustain the cycle up to the next generation, through other KM tools like the community of practice, mentoring, or regular knowledge cafes within organizations to facilitate the internalization and socialization phases of knowledge within the organization.

The study did not focus on the knowledge captured. It dealt on the development of the protocol itself. It is recommended that the same study be made on the interpretation and analysis of knowledge captured to ensure that these are of high quality and effectiveness.

It is also recommended for PHilMech to adopt and utilize the developed protocol and improve it if necessary so the tacit knowledge of future retirees can be captured and kept at PHlMech, so that the next in the rank may benefit from it.

For the agriculture sector and the academe, it is recommended to look into the protocol developed in this study and how this can be applied in the offboarding requirements of their organization's or university's retiring staff. This will enable them to capture and utilize their experts' tacit knowledge for the advantage of their organization's work force.

Finally, to decentralize this KM initiative and make it more sustainable not just within the agency, it is recommended to create a network of career scientists specifically in the Science City of Muñoz so that the contribution of knowledge captured in the repository will become wider, and this should be accessible to all the agencies involved to achieve ensuring exchanges on more equal terms or horizontalization (Galtung, 1971).

REFERENCES

ADB. (2017). *Knowledge Management Strategy 2017-2020*. Asian Development Bank.

ADB. (2018). *Annual Report 2018*. Asian Development Bank.

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. MIS Quarterly, 25(1), 107-136.

Albert, J., Yasay, D., & Gaspar, R. (June 2015). Examining Processes in Research and Development at the Department of Science and Technology. Department of Science and Technology. Retrieved from https://www.dbm.gov.ph/wp-content/uploads/DBM%20Publications/FPB/ZBB-2014/2.%20Examining%20Processes%20in%20RandD.pdf

Argote, L., & Miron-Spektor, E. (2011). Organizational learning: From experience to knowledge. Organization Science, 22(5), 1123-1137.

Ashish, D & Kumar, S. (2004). Harnessing Tacit Knowledge in Organizations. HRM Review, The ICFAI University Press, 12-19.

Asian Productivity Organization. (2008). Knowledge Management in Asia: Lessons and Experiences. Retrieved from https://www.apo-tokyo.org/publications/ebooks/knowledge-management-in-asia-experience-and-lessons-pdf-6-3mb/

Bartol, K. M., & Srivastava, A. (2002). Encouraging knowledge sharing: The role of organizational reward systems. Journal of Leadership & Organizational Studies, 9(1), 64-76.

Becerra-Fernandez, I., Gonzalez, A.J., & Sabherwal, R. (2004). Knowledge management : challenges, solutions, and technologies.

BSP. (2018). Bangko Sentral ng Pilipinas Annual Report 2018. Bangko Sentral ng Pilipinas. Manila, Metro Manila.

BSP. (2020). Knowledge Management Framework. Bangko Sentral ng Pilipinas. Manila, Metro Manila.

Dalkir, K. (2005). Knowledge Management in Theory and Practice. Elsevier Inc. Oxford, United Kingdom.

Dalkir, Kimiz. 2005. Knowledge management in theory and practice. McGill University. 132-134. Retrieved from https://docs.google.com/document/d/12W3PBGto4njiYB7_ATS_Cvow1kTFodzs/edit?usp=sharing&ouid=109444602490796036181&rtpof=true&sd=true

Davenport, T. H., & Prusak, L. (1998). Working knowledge: How organizations manage what they know. Harvard Business School Press. Brighton, Massachusetts

DTI. 2020. Handog Pamana Program. https://dtiwebfiles.s3-ap-southeast-1.amazonaws.com/elibrary/Main+Publications/What's+Up/2021/What's+Up+No.+8.pdf

Earl, M. J. (2001). Knowledge management strategies: Toward a taxonomy. Journal of Management Studies, 38(1), 61-84.

Fresco, M.C. (2014). Scientific career system confers scientist rank to 11 gov't researchers. Scientific Career System. Retrieved from https://scientificcareersystem.nast.ph/

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. Journal of Management Information Systems, 18(1), 185-214.

Henard, David & McFadyen, M.. (2006). R&d Knowledge Is Power. Research-Technology Management. 49. 41-47. 10.1080/08956308.2006.11657377. Retrieved from https://www.researchgate.net/publication/233665406_Rd_Knowledge_Is_Power

IBM Research. (n.d.). IBM Knowledge Socialization Project. Retrieved from http://www.research.ibm.com

Joe, C., and Yoong, P. (2006). Harnessing the expert knowledge of older workers: Issues and challenges. Journal of Information and Knowledge Management, 05(01), 63-72.

Kalid, Khairul & Saifullah, Mohd. (2013). Project Story Capturing System: The Use of Storytelling to Capture Tacit Knowledge in Government Projects. 315-325. 10.4018/978-1-4666-4434-2.ch014.

Kamasak, R., and Yucelen, M. (2010). The Relationship Between Knowledge Assets And Organizational Strategy Development. International Journal of Business and Management Studies, 2(2). p. 65 Retrieved from https://www.sobiad.org/eJOURNALS/journal_IJBM/arhieves/IJBMS2010_2/09rifat_kamasak.pdf

Kotter, J. P. (1996). Leading change. Harvard Business Review Press. Brighton, Massachusetts.

Krogh, G. (1998). Care in knowledge creation: A process perspective. Organization Science, 9(4), 459-473.

Levallet, N. &Chan, Y.E. (2019). Organizational knowledge retention and knowledge loss. Journal of Knowledge Management, Vol. 23 No. 1, pp. 176-199. https://doi.org/10.1108/JKM-08-2017-0358 Retrieved from https://www.emerald.com/insight/content/doi/10.1108/JKM-08-2017-0358/full/html

Linde, C. (2001). “Narrative and Social Tacit Knowledge”, Journal of Knowledge Management, 5 (2), pp. 160-170.

Manalo, J.A. IV., Alayza, B., Aya, R.M., Carlos, M.A., Dev, D., De Torres, M.R., Leron, P.J., Cruz, D., Ramirez, R., Yen, T. B. (2022). *Manual on the use of participatory approaches in agriculture studies.* Philippine Rice Research Institute. Muñoz Science City , Nueva Ecija.

Massingham, P.R. (2018). Measuring the impact of knowledge loss: a longitudinal study. Journal of Knowledge Management, 22 (4), pp. 721-758. https://doi.org/10.1108/JKM-08-2016-0338 Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/JKM-08-2016-0338/full/html?skipTracking=true

Meixell, M. J., Shaw, N. C. and Tuggle, F. D. (2002). The use of knowledge management methodologies to improve the practice of supply chain management - the case of the bullwhip effect. ECIS, Gdańsk, Poland. Retrieved from https://www.researchgate.net/publication/220363358_Knowledge_communication_and_translation-A_knowledge_transfer_model.

Murumba, Joan & Kwanya, Tom & Maina, Jane & Wangamati, Aleso. (2020). Tacit knowledge management at universities in Kenya. 8. 137-139 10.36965/OJAKM.2020.8(1. Retrieved from https://www.researchgate.net/publication/342611707_Tacit_knowledge_management_at_universities_in_Kenya

Muthuveloo, R., Shanmugam N., & Teoh A. (2017). The impact of tacit knowledge management on organizational performance: Evidence from Malaysia. Asia Pacific Management Review, 22(4),192-201. Retrieved from https://www.sciencedirect.com/science/article/pii/S1029313216304213

Ndagire, L.R. (2018). A Short History of Knowledge Management. Knowledge Management for ARD. Retrieved from https://km4ard.cta.int/2014/11/20/short-history-knowledge-management/index.html

Nonaka, I., & Takeuchi, H. (1995). The knowledge-creating company: How Japanese companies create the dynamics of innovation. Oxford University Press.

Nonaka, I., and Takeuchi, H. (1995). The knowledge-creating company: how Japanese companies create the dynamics of innovation. New York: Oxford University Press.

O'Leary, D. E. (2002). Knowledge management across the enterprise resource planning systems O'Leary life cycle. International Journal of Accounting Information Systems, 3(2), 99-110. doi:10.1016/S1467-0895(02)00038-6

Official Gazette. (June 2013). PHilMech takes an expanded role in farm mechanization under AFMech. Retrieved from https://www.officialgazette.gov.ph/2013/09/06/PHilMech-takes-expanded-role-in-farm-mechanization-under-afmech/

Official Gazette. (June 2013). Republic Act No. 10601: Agricultural and Fisheries Mechanization (AFMech) Law. Art. 3, Section 7. Retrieved from https://www.officialgazette.gov.ph/2013/06/05/republic-act-no-10601/

Organisation for Economic Co-operation and Development. (2001). OECD Frascati Manual.

http://www.oecd.org/innovation/inno/frascatimanualproposedstandardpracticeforsurveysonresearchandexperimentaldevelopment6thedition.htm

Panahi, S., Watson, J., & Partridge, H. (2012). Social media and tacit knowledge sharing: Developing a conceptual model. World Academy of Science, Engineering and Technology, 64, 1096–1102. Retrieved from https://eprints.qut.edu.au/50068/

Parsaye, K. (1988). Acquiring and verifying knowledge automatically. AI Expert, 3(5): 48–63

Pasternack, B., and Viscio, A. (1998). The centerless corporation. New York: Simon & Schuster.

Pfeiffer, J., and Sutton, R. (1999). The knowing-doing gap: How smart companies turn knowledge into action. Boston: Harvard Business School Press.

Polanyi, M. (1966). The tacit dimension (1st ed.). Doubleday. Retrieved from https://books.google.co.ke/books

Quebral, N. C. 1988. Development communication. Los Baños: UPLB.

Reason, P., & Bradbury, H. (Eds.). (2001). Handbook of action research: Participative inquiry and practice. Sage Publications.

Ruggles, R., and Holtshouse, D. (1999). The knowledge advantage. Dover, N.H.: Capstone Publishers.

Santoro, Flávia & Brézillon, Patrick. (2005). Group Storytelling Approach to Collect Contextualized Share Knowledge. 2006. 388-392. 10.1109/DEXA.2005.102.

Sapienza, Alice & Lombardino, Joseph. (2002). Recognizing, appreciating, and capturing the tacit knowledge of R&D scientists. Drug Development Research. 57. 51 - 57. 10.1002/ddr.10109.

Seidler, Ragna & Hartmann, Evi. (2008). The use of tacit knowledge within innovative companies: Knowledge management in innovative enterprises. J. Knowledge Management. 12. 133-147. 10.1108/13673270810852449.

Serrat, Olivier. 2010. Harvesting Knowledge. Asian Development Bank. Retrieved from: https://www.adb.org/sites/default/files/publication/27597/harvesting-knowledge.pdf

Sternberg, Robert J. (1999). Tacit Knowledge in the Workplace. U.S. Army Research Institute for the Behavioral and Social Sciences. 158-161. Retrieved from https://apps.dtic.mil/sti/pdfs/ADA362656.pdf

Sullivan, Maureen. (July 2016). KM: definition, history, & current trends [Personality & TKMS series]. Retrieved fromhttps://realkm.com/2016/07/19/km-definition-history-current-trends-personality-tkms-series-part-2/#fn-3927-13

Szulanski, Gabriel. (2003). Sticky Knowledge: Barriers to Knowing in the Firm. 10.4135/9781446218761.

Talisayon, S. (n.d.a,b). Lecture on the Definitions and KM Framework. Community and Corporate Learning for Innovation (CCLFI). Retrieved from https://sites.google.com/view/cclfi-kmpcc22/learning-sessions/1--definitions/1--text?authuser=0

Talisayon, S. (n.d.c). Lecture on KM in the Development Sector. Community and Corporate Learning for Innovation (CCLFI). Retrieved from https://sites.google.com/view/cclfi-kmpcc22/learning-sessions/1x--km-in-the-development-sector?authuser=0

Tri-Merit. (2021). Research and Development in Agriculture: How Technology Has Changed the Farming Industry. Retrieved from https://tri-merit.com/research-and-development-in-agriculture-how-technology-has-changed-the-farming-industry/

UNESCO Institute for Statistics. (September 2021). Retrieved from https://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6?end=2015&locations=PH&start=2002&view=chart

Wiig, K. M. (1997). Knowledge management: An introduction and perspective. The Journal of Knowledge Management, 1(1), 6-14.

Zack, M. (2002). A Strategic Pretext for Knowledge Management. Research Gate. Retrieved from https://www.researchgate.net/publication/2833303_A_Strategic_Pretext_for_Knowledge_Management

Appendices

APPENDIX A

INTERVIEW PROTOCOL

A. Guide Questions in Preparing the Legacy Talk:

1. What are the necessary resources one should have to become a scientist?

2. What are the skills one should have to be a scientist?

3. What are your guiding values or principles as a Scientist and Researcher?

4. What hurdles have you experienced in becoming a scientist or a scientist that you have overcome?

5. What are the important lessons you would like to impart to the next generation of PHilMech researchers?

B. Lessons Learned Session with PHilMech Scientists

1. **Resource mapping**
   Based on your personal experiences, what resources (networks, connections, institutions, training courses, opportunities or relationships) should one have to become a successful scientist

2. **Hurdles in a Scientist's Journey**
   What challenges one must expect, based on your personal experiences, in your journey of applying for or becoming a scientist?

3. **Good/Best Practices**
   Personal Tips or hacks in effectively/easily:
   a. *Conducting research or study?*
   b. *Publishing in an ISI and local publications?*
   c. *Winning a research award?*
   d. *Inventing/registering a Utility model/discovery/invention?*
   e. *Finishing a graduate degree (master/s or doctorate)*

4. **Next/Future Practices**

   What are the mistakes one should avoid in research and in becoming a scientist?

   a. *What did not work? Failure factors?*
   b. *What improvements do you suggest should be adopted next time?*

5. **Recommendations for offboarding protocols for scientists**

   a. *Rewards for sharing tacit knowledge*
   b. *Formats of knowledge products you prefer (Manuals? Booklets? Video?)*

C. Storytelling Guide Questions

As a researcher:

1. How do you conceptualize your discoveries, inventions, and projects? What is going on when you think of what to research next? For example, your award-winning technology?
2. Honestly, who do you consider when conceptualizing research? Is it the end users, the institution, or you?
3. Can you share your personal best practice in doing award-winning research? Can you share the important pointers to make your research a success?
4. How do you persuade other funding institutions to support and fund your research?
5. What is the hardest part of doing research, do you have a hack you can share to address it?

As a Scientist:

1. How did you figure out that you want to become a scientist? What did you do next?
2. Name three to five important resources an aspiring scientist needs to make his dream of becoming a scientist come true.
3. What are the top three hurdles you have encountered on your journey to becoming a scientist? How did you overcome it?
4. When you become a scientist, is there a personal checklist you need to maintain to keep you in the career system?
5. How do you manage your being a scientist and your roles in the office, what are your secrets?

As a person:

1. What are the skills one should need to become a scientist?
2. What are your guiding principles as a scientist?
3. What lessons do you want to share with the young researchers of PHilMech to succeed as scientists?
4. Personally, how did being a scientist change your life? Is it fulfilling?

APPENDIX B

Participant's Consent Form and Information Sheet

The "Design, Development, and Testing of Tacit Knowledge-Capturing Protocol of the PHilMech Scientists" thesis is part of my graduate course requirements for the Master of Development Communication at the University of the Philippines Open University.

This study generally aims to design. develop and test a protocol that will enable PHilMech to capture the undocumented knowledge of its scientists before their retirement. This will help the institution to further its practices and operations when it comes to doing research by basing on the proven and seasoned practices of the scientists. The process will include storytelling, lessons learned sessions, and legacy talks—the methods identified in the said protocol.

By participating in this study, the researcher would like to inform you that:

- The interviews and discussions will be recorded.
- You can back out anytime should you feel the need to.
- You will not receive monetary compensation, but the researcher will provide a token after the activities.
- The information the researcher will get from you will be used for the study only and will be presented to the thesis panel at the UPOU. Participants' identities and other personal information will not be disclosed in the study.
- Should you have any questions, feel free to ask the researcher.

Respectfully yours,

Jett Molech G. Subaba

Researcher

ettgsubaba@gmail.com

I agree to the following conditions:

_____

Name of the Research Participant / Signature / Date

Personal Information Sheet

Name of Participant: _____

Address:_____

Mobile Number: _____

Age: _____ Gender: ____Male ____Female

Educational Attainment: _____

Civil Status: _____

Current/Last Position in the government: _____

Length of years in service: _____

Conferment year as Scientist: _____

APPENDIX C

Documentations

Storytelling Sessions

The researcher during a recorded storytelling session with a PHilMech scientist.

Lessons Learned Session

The researcher during a recorded lessons learned with a PHilMech scientists.

The researcher during a recorded lessons learned with a PHilMech scientists.

Legacy Talks


One of the retired PHilMech scientists during the video recorded Legacy Talks