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The Integration of Knowledge Management and Design Thinking forImproving Problem-Solving Skills: A Case Study of a Service Agency

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Abstract

Problem- solving skills were particularly important to innovative organizations to sustain their competitive advantage. Knowledge Management (KM) covers the processes of acquiring, creating, organizing, sharing, and using knowledge to enhance decision-making and problem-solving. Design thinking(DT) is a problem-solving approach to understand, track complex problems, and create human- centered solutions.

The study was based on a case study of a service agency in Thailand, which applied design thinking in the knowledge management process. The study consisted of three phases: 1) conducting a three-day KM- DT workshop, 2) monitoring the ideas and activities in the problem-solving process, and 3) presenting
innovative solutions. The results of KM were evaluated by the KM team of service agencies and two experts.

The results revealed that the integration of KM and DT helped them improve the employees' problem-solving skills. They understood and defined actual problems more clearly and created several innovative solutions. DT allowed the KM processes to be more systematic. At the same time, good KM provided required essential knowledge for more effective DT. However, employees had to understand the integration of DT and KM concepts and change their mindset regarding the problem-solving process.

In addition, an online KM System based on the integration of KM and DT concepts was developed to share ideas and knowledge for problem-solving.

Keywords: design thinking, knowledge management, problem-solving, service agency

INTRODUCTION

Modern organizations must adjust their business strategies, operations processes, and mindset in order to maintain their competitiveness. The ability of key employees to effectively solve several urgent and unexpected problems has become an essential factor of success. Solutions of problems may vary depending on problem's types, complexity, and different points of views.

Problem-solving is defined as the process of finding the best solution to overcoming difficulties encountered when reaching a target and requires benefiting from not only knowledge but also methods related to creativity and solution (Yalçın, Tetik and Açıkgöz, 2010). Problem-solving skills refer to the ability to identify, analyze, and find effective solutions to challenges or obstacles. It involves a combination of cognitive abilities, analytical thinking, creativity, and practical decision-making.

Problem-solvingp skills have been addressed as essential skills that need to be acquired for innovative organizations in the 21st century. These skills enable organizations to overcome challenges, seize opportunities, and maintain their competitive advantage. Thus, problem-solving skills are particularly important for innovative organizations. Therefore, organizations must create their own strategies and methods to improve problem-solving skills for employees.

Despite understanding the fundamentals of problem-solving at work, it is frequently discovered that familiar methods are adopted without hesitation when confronted with unexpected outcomes. As a result, the real complex problems remain unresolved, resulting in costly and inefficient organizational performance. Furthermore, dealing with today's work challenges in the service sector requires interdisciplinary approaches. The garbage can model is no longer applicable.

To enhance the quality of problem-solving, several approaches have been studied, including the knowledge management (KM) and design thinking (DT) concepts. Effective knowledge management has been shown to improve organizational performance. It is responsible for a company's efficiency, effectiveness, and innovation (Chen et al., 2022) and enables competitive advantage (Horng et al.,2022). DT fosters ideas and knowledge exchange to discover real- world solutions to complex problems. Liedtka (2014: 44) addressed that DT applied collaborative methodology and tools that helped teams to actively leverage their differences in positive ways. Accordingly, KM and problem-solving would be more effective if DT is applied in the problem-solving process.

This study proposes the integration of KM and DT in the problem-solving process, from the initial stage of problem identification to solution development, to improve the problem-solving skills of employeesin a service agency.

LITERATURE REVIEW

Knowledge Management (KM) is the management of information and knowledge within both private and public organizations to enhance decision-making and promote efficiency, effectiveness, innovation, and problem-solving (Numprasertchai et al.,2009; Idrees et al.,2023). Effective KM plays a significantrole in improving and sustaining the innovative activities of organizations to achieve their overall goals (Wahid et al, 2014, Numprasertchai et al., 2009). KM processes can be generally categorized beyond different sets of activities in terms of knowledge identification, knowledge acquisition, knowledge development, knowledge integration, knowledge transfer, knowledge utilization and knowledge storage(Numprasertchai & Igel, 2003).

Design Thinking (DT), a non-linear, collaborative, and iterative process, is a problem-solving approach to tracking complex problems and creating new human-centred solutions (Boersma, 2017). DT was often called "human-centred" because targeted users and their needs are at the epicentre of this approach. There are five key stages: (1) *empathize:* know the targeted users and understand what they need, (2) *define the problem:* gather relevant knowledge related to the problem, (3) *ideate* - challenge an

assumption and create innovative ideas to solve problems, (4) *create a prototype* - start to create the best possible solution for each problem and (5) *test* - try out the solutions with real users. DT is considered a versatile and human-centric problem-solving approach that is applicable across various disciplines. DT can support shaping, planning, and delivering successful complex projects (Liedtka and Locatelli, 2023). DT is also considered predominant and being applied across various business domains due to its effectiveness in fostering innovation.

Davis et al (2016) suggested that DT connects to concepts of knowledge creation and innovation through knowledge sharing network in the social services sector. Knowledge Design Thinking (KDT) was proposed by Boersma (2017) as the future of KM, which could support practitioners create solutions thatresonate more with targeted users.

The current difficulties in the service sector are complicated, multifaceted, and not one-sided, particularly when interacting with clients. Speed and precision are common keys to customer satisfaction. Making it fast and precise at the same time is a difficult but achievable undertaking. Collaboration and interaction among involved parties with diverse knowledge and expertise is necessary.

DT, which demands extensive and patient exploration of the question, proved useful. " The highest payoff from adopting a design-thinking approach was not necessary in identifying a solution, but rather in innovating how people worked together to envision and implement the new possibilities they discovered (Liedtka, 2014: 44)." In addition, DT expands the solution space by allowing for human-centred problem framing and in so doing gives rise to greater diversity in solutions generated (Willmott et al, 2022).

KM is a pathway for knowledge exchange and promotes the flow of information from the initial question to revolving outcomes. However, it is often found that KM has been applied in a passive rather than proactive manner, with one-way rather than two-way communication. This can lead to a stalemate, withno future problems detected or existing ones addressed.

Accordingly, KM and DT should complement each other, leading to root-cause solutions to problems. Ones can improve their problem-solving skill by sharing and learning from each other. These can strengthen and help organizations improve.

Based on the literature review, the integration of KM and DT in this study is defined as *the processes of managing knowledge in the DT stages by enabling employees to access and apply shared relevant knowledge to improve the efficiency of DT processes for creating innovative ideas and solutions.*

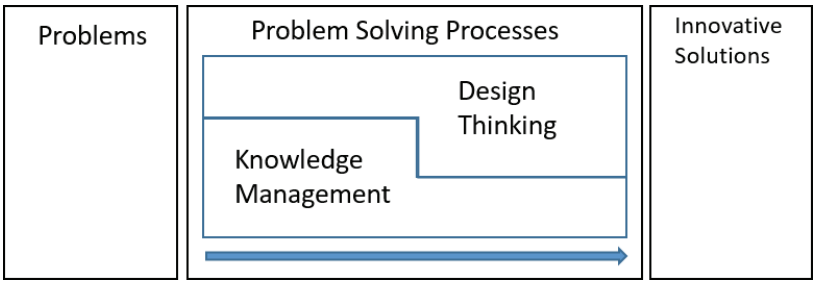
BACKGROUND OF A SERVICE AGENCY

The service agency is an organization with six service sites located in major provinces around the country of Thailand. All service sites have generally experienced varying numbers of customers at different times. In this situation, the service cannot meet the needs of targeted users, for example, insufficiency of waiting areas, parking lots, service shops, food and beverage outlets, public transportation vehicles, etc.

In most cases, staff of the service sites defined the state of problems based on simple and basic evidence only. They tried to find a solution based on their own perspectives and former experiences, using their personal judgments. They hardly focused on the actual problems that occurred to target users. This caused a mismatch between problems and solutions. Inevitably, these unsolved problems keep repeating.

Therefore, this service agency tried to apply the principles of KM and DT to solve problems, improve service quality, and provide new innovative services. For research understanding, Picture 1 demonstrates the concept of DT-KM integration for service agency problem-solving.

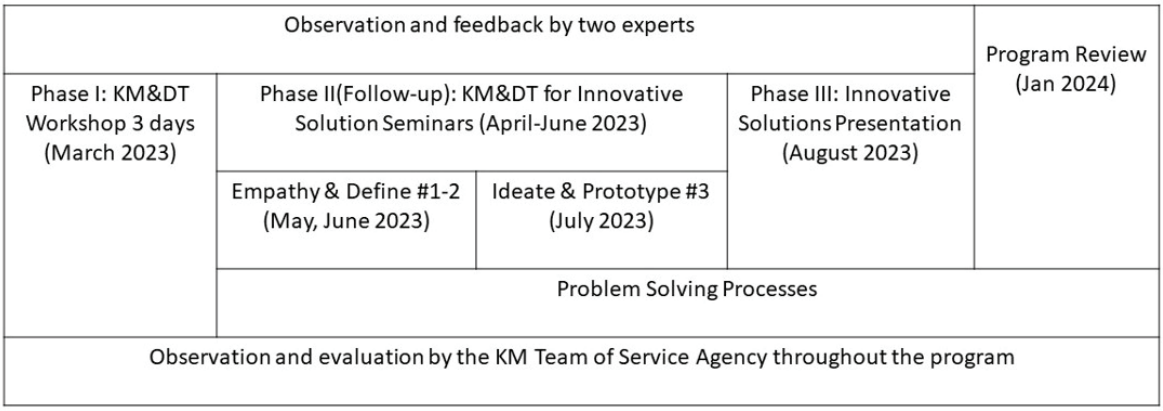
Picture 1: The concept of the integration of DT and KM for problem-solving



RESEARCH METHODOLOGY

This study used a case study approach to prove that the integration of KM-DT can improve the effectiveness of problem-solving. The case study was a 6- month program, namely, " KM and DT for innovative solutions", conducted for a service agency in Thailand. The program consisted of three phases, as shownin Picture 2.

Picture 2: Research design of the study



The first phase was the 3- day workshop which was conducted to provide the concepts of KM and DT for creating innovative solutions. The second phase was a series of monthly seminars which were arranged for tracking and brainstorming among participants from 6 worksites about existing problems related to customers. At this stage, ideas and possible solutions were suggested. All participants had to show and share "*what they know & what they have & what they think*" about the problems and customers'

needs based on stakeholders' perspectives. Then, they defined actual problems and proposed their ideas for solving those problems. The third phase was the final meeting, which was conducted for summarizingall selected ideas based on the integration of KM and DT and results.

60 participants from 6 sites of the service agency were invited to join this program from March 2023 to August 2023. Two academic experts from related areas were also invited to observe this program to provide comments and suggestions. The final results were evaluated by the KM team of service agencies using questionnaires to gather employees' opinions, expert opinions, and effective solutions as outputsof the program.

RESULTS AND DISCUSSIONS

The service agency implemented the new problem-solving processes based on the integration of DT and KM. All DT stages were applied and considered as problem-solving processes. Each DT stage focused on different activities which required different supporting KM processes to achieve its goals. Therefore, various types of KM processes were applied in DT stages: empathy, define, ideate, prototype and test, as shown in Table 1.

Table 1: DT stage and KM processes for problem-solving

The integration of KM and DT for problem-solving	
Design Thinking	Knowledge Management
Empathy: understand users' needs	Knowledge acquisition: Acquiring information andknowledge about users' needs
Define: understand and define clear actualproblems	Knowledge identification: identify knowledge andknowledge sources related to actual problems. Knowledge sharing: sharing information and knowledge among participants through formal and informal meetings. Knowledge integration: brainstorming ideas and knowledge to define actual problems
Ideate: Create new and innovative ideas forsolving the problem	Knowledge acquisition: acquire knowledge and ideasfrom external sources. Knowledge sharing: exchange information andknowledge among teams Knowledge use: apply existing knowledge to create ideas. Knowledge integration: Integrate knowledge from several sources for creating new ideas
Prototype: develop prototypes for testingideas	Knowledge integration: integrate knowledge forcreating prototypes. Knowledge acquisition: request external experts to test and evaluate prototypes
Test: try the solutions out with real users	Knowledge development: learn from the actual results

Empathy and Define

Design thinking begins with empathy with target users. Empathize focused on what we do and what target users want. In this stage, organizations can acquire truth to better understand actual problems, needs and expectations. Knowledge acquisition from several sources including target users helps

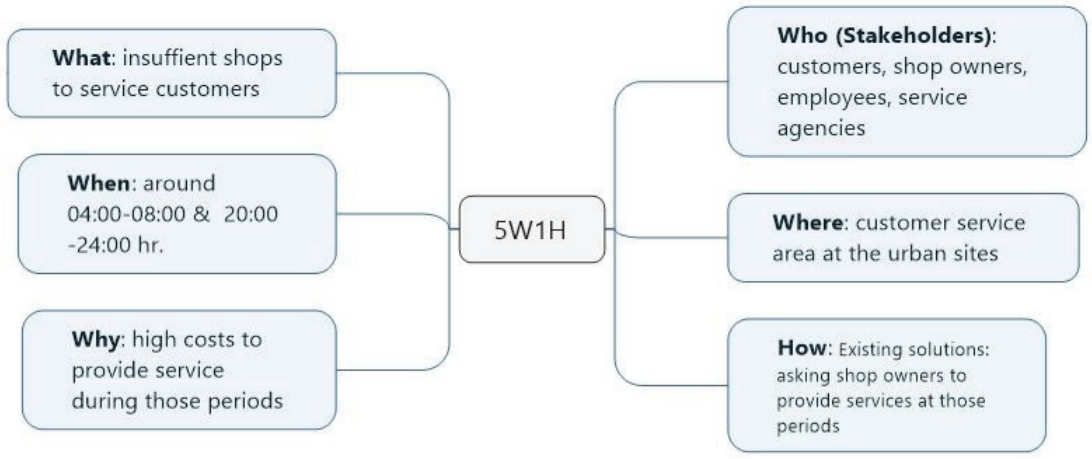
organizations not only understand actual problems and needs more clearly but also learn from solutions or guidelines suggested by users in different perspectives.

During the workshop, all participants were assigned to implement KM and DT to create innovative ideas and solutions to solve its problems and create new services based on their own problems. They started to solve the problem by defining various types of stakeholders. They were also assigned to acquire required information through several methods such as observation, in-depth interviews, and questionnaires to understand the problems and needs of targeted users. The information and knowledge obtained from target users were stored in the internal shared storage for sharing information and knowledge among participants.

In the " define" phase, the focus was on " need" and " have". Knowledge identification and knowledge integration supported 6 worksites to identify the real targeted users' needs. Knowledge sharing among staff of all sites helped them realize what they had. They utilized shared information available in the internal shared storage to understand and define the high-impact problems and select the appropriate problems to solve.

The concept of analytical thinking which consists of what, who, when, where, why, and how (5W1H) was introduced in this phase as shown in Picture 3. It helped participants understand and define problems clearly. For instance, questions were developed based on the problem that customers encountered: they received inappropriate service from shops.

Picture 3: 5W1H for analytical thinking



The more information obtained through the analytical thinking approach helped the service agency clarify the real situation in several perspectives. The problems and impacts were clearly defined. All selected defined problems have been stored and shared in the online shared storage.

The first expert stated that "*at the beginning of the KM-DT workshop, most staff simultaneously defined problems and solutions based on their own experience. After a series of follow-ups, they just changed approaches to understand and define the actual problems by acquiring problem-related information,*

needs and expectations from targeted users after obtaining good ideas and examples from others in the first follow-up seminar."

The second expert noticed that *most staff started to change their problem-solving mindsets. They obtained information and listened to other involved parties before they defined the actual problems*.

In summary, empathy and defining are the two of five components in DT stages for understanding real problems which leads to an insight. Empathy and acquiring knowledge from targeted users helped the service agency understand the stakeholders' needs and real problems.

Ideation through Knowledge Sharing and Integration:

In general, to improve service quality, the staff of the service agency simply initiated ideas which often require a huge budget to implement. Therefore, most ideas were not implemented due to budget constraints. However, some proposed ideas were modified to simple solutions that could be implemented in a short time and did not require an additional budget. Some examples are shown in Table 2.

Table 2: Previous ideas vs. new proposed ideas based on the integration of KM and DT

Problems	Previous ideas /solutions	New proposed ideas/solutions through the integration of DT&KM
Not enough service shops	Change agreements or contacts with shop owners.	Use vending machines. Support local & halal products.
Not enough car park	Build new car park buildings.	Define new traffic direction in the service area. Define a new parking policy. Implement a carpool project for employees.
Not enough waiting areas	Build a new building. Buy additional chairs.	Decorate appropriate spaces for waiting areas at different times and festivals.

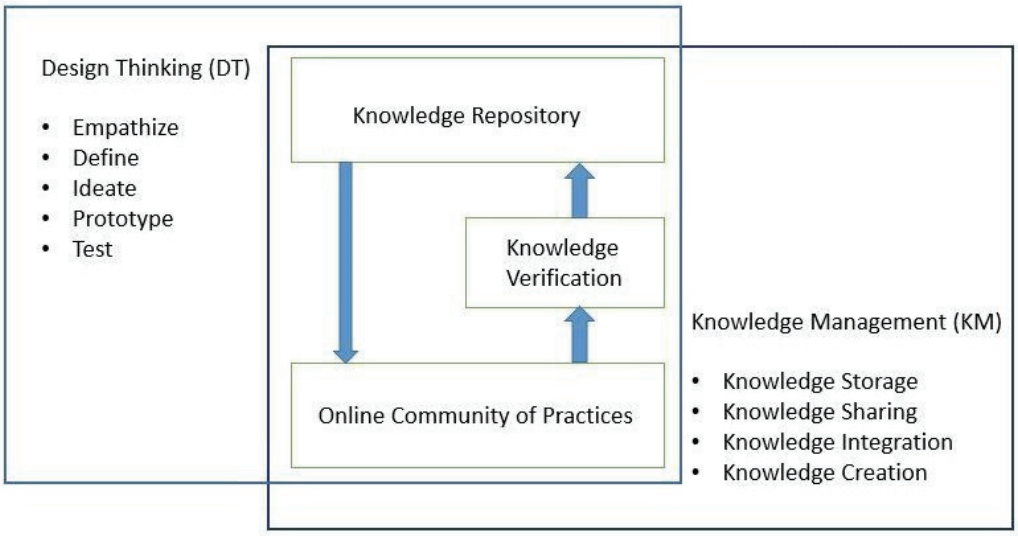
In the third seminar, all representatives from 6 sites presented new ideas or solutions based on the integration of KM and DT especially knowledge sharing, creation, and integration by encouraging cross- functional collaboration. Comments and suggestions from other service sites brought diverse perspectives, leading to more comprehensive and innovative ideas and solutions.

Several innovative and interesting ideas to solve the selected problems were discussed and selected by the work site committee. However, some ideas require a large budget and time to implement. Therefore, only some ideas were selected to implement as a pilot case study. For example, regarding the problem of insufficient service shop in the early morning and at midnight, instead of changing the conditions of supplier contacts, they decided to have food and drink vending machines available to customers.

In addition, in the third seminar, many participants proposed transforming internal shared storage into an organizational KM System. The KM system consisted of Online Community of Practices (CoPs) and knowledge repository (KR). CoPs were implemented to present, share, and discuss problems, ideas, and solutions among participants to find and select suitable ideas and solutions. Essential

information and knowledge of both success and failure projects were verifiedby the KM team and stored in the knowledge repository for sharing and reusing. The concept was presented in Picture 4.

Picture 4: KM system based on the integration of KM and DT for problem-solving



The second expert stated that many participants had realized the benefits of the integration of KM and DT for creating innovative solutions. Therefore, they asked to develop the online CoPs as a knowledge pool for sharing and reusing the related and necessary information, knowledge, ideas, and solutions.

Prototyping and Testing:

During the Design Thinking process, prototyping and testing are integral parts of refining solutions. Prototyping mindsets can be adopted by organizations by integrating knowledge from various sources. The iterative process ensures that knowledge remains effective for addressing evolving servicechallenges.

Food and drink vending machines were launched as one of the solutions for solving the problem of insufficient service shops in the pilot site for testing. They found that the number of complaints decreased.

Online CoP components were developed through brainstorming by representatives from the six work sites in the third seminar. It included group discussion, comments, news, announcements, and management tools. A concept and user interface for online CoPs was designed and delivered to the IT team for further development.

The CIO and IT staff were invited to be a part of this project. The prototype was transformed into the online CoPs within the mobile application platform. KM and IT worked closely together in system development processes based on agile principles.

An online community of practices (CoPs) was demonstrated to the staff during the final meeting. KM team invited all staff to use and test this mobile application for sharing information, ideas, and solutions. Good practice and related knowledge from other internal sources were transformed to collect in the repository of CoPs. However, the project was just recently launched and used by a limited number of staff as a pilot study. There was not enough required information and knowledge to support all users. The efficiency of these CoPs will be evaluated and continuously implemented. Its outcome will be presented in the near future.

Evaluation of The Integration of KM and DT for Innovative Solutions

In this study, the results of the integration of DT and KM were evaluated by the KM team of service agency using a questionnaire survey with 56 out of 60 participants and suggestions from two experts.

The result presented that the organization could gain benefits from the integration of KM and DT to solve the complex problems with the score 4.52 out of 5. The score of participants understanding the concept of the integration of KM and DT was 4.44, while the score of participants who can apply the concepts to create innovative ideas and solutions was 4.11.

The first expert commented that the staff applied the integration of KM and DT in their problem-solving processes. They focused on customers' and stakeholders' needs to define the actual problems. They tried to acquire related knowledge to propose innovative solutions based on the new suggestions for solving the organizational problems in the final meeting where innovative solutions would be presented.

CONCLUSION

Based on the case study, KM processes were embedded in each DT stage for problem-solving. The service agency's employees demonstrated empathy for their clients and considered their viewpoints in order to identify the true issues before developing solutions. Thus, clients' concerns and problems were well defined, making it possible to find the appropriate solutions and create new and innovative ideas for solving problems.

This offered a powerful framework for organizations seeking to elevate the quality of their solutions. By integrating required knowledge in all iterative processes of design thinking (DT), organizations can create innovative solutions that adapt to evolving customer needs and deliver better solutions. However, continual follow-up and a culture that values learning from both successes and failures are required to ensure improvement along the way.

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