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ABSTRACT

Data literacy is increasingly recognized as a cornerstone for effective decision-making in the contemporary landscape, particularly for Thai officers engaged in diverse professional domains. This abstract delves into the pivotal role of data literacy in the context of Thai officers and underscores its indispensability in education settings, especially in the program development phase. Officers across various sectors in Thailand grapple with abundant data that demands adept interpretation. Navigating and deriving meaningful insights from this data is a critical competency. Data literacy empowers government officers to make informed decisions, fostering efficiency, transparency, and innovation within their respective roles [1].

Integrating data literacy into educational curricula emerges as a strategic imperative. As the demands of the digital age evolve, education plays a central role in equipping Thai officers with the necessary skills to harness the power of data. Structured courses should be designed to impart technical proficiency and a nuanced understanding of data's implications, ethical considerations, and its role in driving positive organizational outcomes.

The primary goal of this research is to enhance the data skills of government officials in Thailand by synthesizing insights from various frameworks aligned with global standards on digital and data skills. The research identifies effective strategies for developing customized data frameworks for government agencies. The study utilizes a comparative gap study model, incorporating three interviews. The first interview assesses needs and preferences, followed by a second interview where nine experts provide definitions and conduct thorough, in-depth interview assessments.

The resulting framework comprises: 5 skill sets, 25 competencies, and 45 subjects, aligning with the skills required for extensive data utilization within government operations. Through gap analyses, the study identifies practical approaches for crafting a data framework uniquely suited for government agencies. The interviews and experts' opinions gathered uncovered and confirmed the strategies that address the skills needed for comprehensive data utilization within government operations. These efforts aim to formulate a skill development plan that bridges existing gaps and enhances the proficiency of data utilization by government agencies.

KEYWORDS: government agencies, competencies, data literacy, educational curriculum integration, data skills

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INTRODUCTION

The fourth industrial revolution hinges on data proficiency. Organizations worldwide understand the mounting value of data literacy, with some estimates predicting that 70% of employees will engage heavily with data by 2025 [2] (a significant increase from 2018). Companies prioritizing data literacy will undoubtedly gain a competitive edge in the rapidly evolving global marketplace.

While educational curricula now often include fundamental digital literacy, specialized data literacy for government work remains lacking. Data literacy encompasses the capacity to read, manipulate, analyze, and present data-driven insights. It includes communicating data effectively and using data strategically to guide decision-making.

Digital competence encompasses using information and communication technologies to locate, assess, create, and disseminate content. Data literacy focuses on collecting, transforming, analyzing, and communicating data findings. These skills form a robust toolkit: digital interfaces generate data, which can be transformed and interpreted to support data-literate actions.

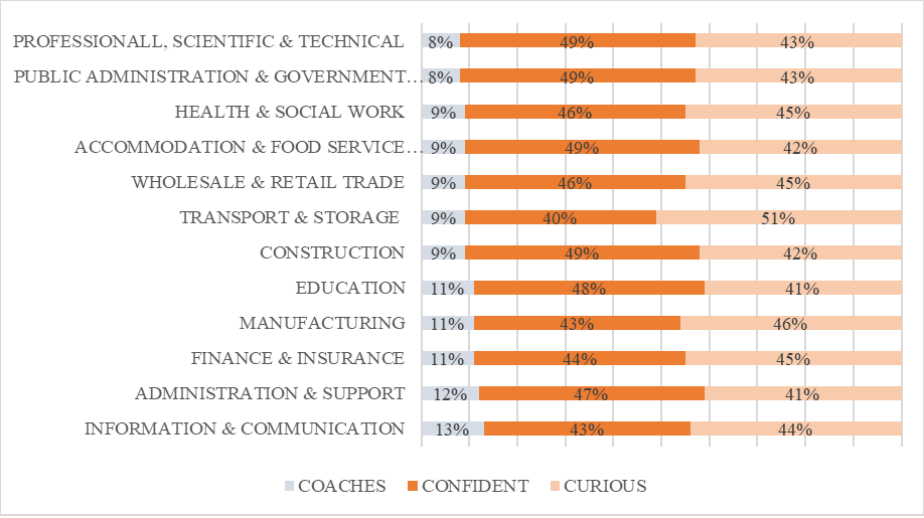
Thailand's Office of the Civil Service Commission (OCSC) recognizes the urgent need for 'Digital Literacy' training to achieve its digital government ambitions. This involves cultivating data fluency alongside the necessary mindset shifts for effective public service. These efforts align with the three pillars of a true digital government: openness, citizen-centricity, and a data-driven culture.

Despite these initiatives, the 2022 Global Data Literacy Benchmark report, surveying over 5,000 employees worldwide, highlighted concerns regarding data fluency among professionals. Responses segmented respondents into 'Coaches', 'Confident', and 'Curious' categories, revealing ongoing obstacles to robust data utilization.

The prior report highlights limited data proficiency across nations, with only 8-19% of individuals feeling equipped to guide others in data usage [3]. Some employees experience significant difficulty when handling data. This lack of fluency translates to an estimated 43 hours of lost productivity per employee, stemming from data-related delays and frustrations.

Interestingly, countries that have adopted data literacy frameworks demonstrate an overall positive impact. These frameworks are often tailored to specific industries. Within government agencies, 49% of surveyed individuals from these countries reported increased confidence in handling data, suggesting the effectiveness of such frameworks.

Figure 1: Classified skills categorized by industry.



Earlier research indicates that data literacy frameworks boost workers' confidence when handling data. Qlik's study reveals that 85% of data-informed employees report strong work performance, significantly exceeding the 54% found among the general workforces. This highlights a compelling chance for organizations to foster data-driven cultures without facing significant resistance. Companies that prioritize data literacy demonstrate tangible financial benefits, often showing up to 5% greater enterprise value.

Considering this, the researcher seeks to compile survey data and develop a framework to thoroughly identify the core skills needed for effective data literacy initiatives. This includes crafting tailored training programs to upskill the workforce. The project will also compare existing frameworks with Thailand's unique context, ultimately creating standards and a roadmap for systematic skill development within the country.

OBJECTIVES

This study seeks to propel technology education within the Thai government by designing a robust data literacy framework for its officers. Informed by international standards and national digital literacy requirements, the framework will bridge identified competency gaps. In doing so, it will bolster Thailand's governance effectiveness by cultivating a data-savvy workforce equipped for informed decision-making and responsive service delivery.

SCOPE OF WORKS

- Target Audience: The primary focus of this study is the entirety of Thailand's government workforce.
- Research Domain: This study will concentrate on established international frameworks and standards specifically designed for the advancement of data literacy skills within governmental contexts.

LITERATURE REVIEW

Data literacy is the ability to access, understand, and strategically use data to make informed decisions and enhance knowledge. It's essential for both individuals and organizations, supporting data-driven cultures were insights guide operations and growth.

Data Literacy Frameworks and Standards

Numerous frameworks exist to guide data literacy development. Key considerations and recurring themes include:

- International: Various definitions of digital literacy are used globally, often including data skills along with broader competencies like communication, critical thinking, and technology use.
- Data Literacy Body of Knowledge (DLBOK) [4]: Offers a structured framework with five key areas, covering data fundamentals, governance, resource management, provisioning, and analysis.
- Data-Specific Frameworks: Frameworks like the Digital Competence Framework for Citizens and the APS Data Capability Framework provide [5] detailed breakdowns of data-related knowledge, skills, and behaviors.

- DQ Framework [6]: Identifies eight components of digital intelligence quotient, including digital literacy skills.
- DigComp [7]: Defines digital literacy as encompassing information literacy, media literacy, and computer literacy.
- Thailand: While digital skills frameworks exist [8], they lack a strong emphasis on specific data literacy skills and ethical data practices. Call Digital Competence Framework: Highlights information skills, including data usage and analysis.

Related Research

Prior studies highlight key aspects and challenges of data literacy:

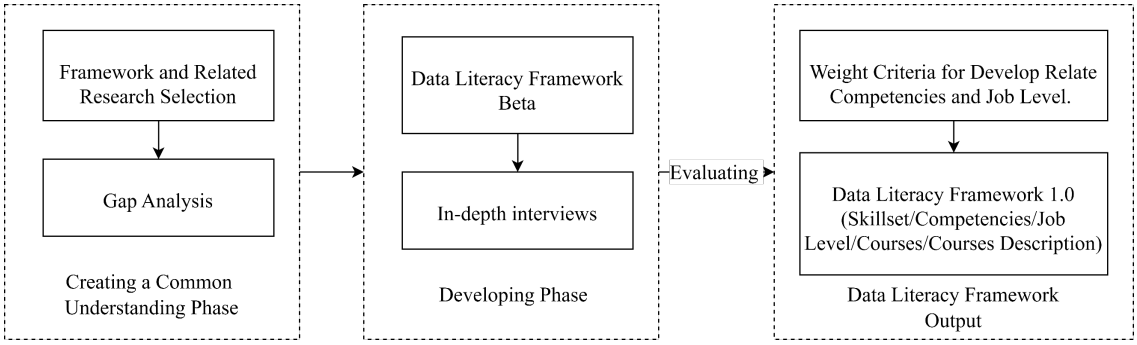
- Research-focused: Data literacy programs must adapt to the specific needs of researchers and the processes involved in research data management [9].
- Data Citizenship [10]: Critical thinking about data use is needed in an era of misinformation. Literacy must extend beyond skills to understanding power dynamics, platforms, and the need for citizen participation in the data economy.
- Development Goals: Data literacy is vital for achieving Sustainable Development Goals (SDGs) [11], emphasizing real-world problem-solving through data.
- Healthcare [12]: Medical professionals need literacy not just in handling data, but in understanding its collection and how it shapes decision-making.

By addressing these points, a comprehensive data literacy framework can significantly enhance the abilities of Thai government officers in a data-driven world. Data literacy, beyond mere data access and consumption, empowers individuals to interpret and strategically leverage data for knowledge creation. This review explores the concept, its importance, and existing frameworks to support its development. Data literacy is essential for individuals and organizations to thrive in the data-driven world [13]. By understanding existing frameworks and addressing local gaps, we can empower future generations to make informed decisions and contribute to a data-literate society.

METHODOLOGY

This part shows the methodology which was employed during the study. The methodology adopted in this research is separated into three steps, creating a common understanding phase, creating the Beta version, Data Literacy Framework Output, as shown in Figure.

Figure 2: Research Methodology



Framework and Related Research Selection

As outlined in the introduction, this research focuses on improving data literacy practices. Recognizing the need for targeted skill development, the following steps have been employed: Research Selection: Relevant research papers on data literacy were carefully analyzed. International Framework Alignment: To establish clear research classifications, types, and assessment methods, internationally recognized frameworks will provide guidance. Standards that ensure consistency across job duties in data-related work will be incorporated, subject to expert review, enabling accurate measurement and alignment with existing data literacy courses.

Gap Analysis

Methodology: To identify discrepancies, several internationally accepted frameworks will be used in the gap analysis process (including APS Data Capability Framework, EU DigComp, Thailand's OCSC Digital Literacy Guidelines, and TPQI for Data Analyst/Data Scientist standards).

Structure: This analysis will inform the creation of a comprehensive Data Literacy Framework with well-defined levels of proficiency.

Assessment Focus: This assessment will center on five core data components: Collection, Management, Governance, Evaluation, and Application.

Table 1: Framework Comparison Analysis

Component/Framework	APS Data Capability Framework	The Data Literacy Body of Knowledge (DLBOK)	EU DigComp	Thailand the Office of the Civil Service Commission (OCSC)	TPQI (Thailand Professional Qualification Institute)
Data Collection	✓	✓	✓	✓	✓
Data Management	✓	✓	✓	×	×
Data Governance	✓	✓	×	×	×
Data Evaluation	✓	✓	✓	✓	✓
Data Application	✓	✓	✓	×	×

In the table provided, you'll encounter the APS Data Capability Framework with its fundamental elements. The Data Processing Toolbar accommodates up to 26 distinct data workflows, while the EU DigComp Scanner identifies the necessary data workflows to fulfill these requirements. Notably, the Digital Literacy Skill overlooks Data Governance, leaving it unspecified within the skill set. In the context of Thailand, the Office of the Civil Service Commission (OCSC) and TPQI (Thailand Professional Qualification Institute) are deficient in areas such as Data Management, Data Governance, and Data Application due to the unique Thai context. The focus primarily revolves around digital literacy, neglecting crucial aspects of working with and preparing data, such as data organization, manipulation, Governance, culture, and ethics, which are fundamental to data-centric operations.

Data Literacy Framework Beta Version

Continuing from the gap analysis in Gap Analysis section, the researcher proceeds to develop and delineate a process outlining the basic information knowledge that government agencies should possess at an introductory level. Drawing from various established frameworks such as the EU DigComp, APS Data Capability Framework, Thailand's Office of the Civil Service Commission (OCSC) Digital Literacy [8], and TPQI (Data Analyst/Data Scientist [14]), the researcher aims to construct the Beta Version of the Data Literacy Framework.

The Data Literacy Framework Beta Version encompasses defined definitions and skill development levels for officers within the organization, categorized into six initial levels: Executives, Management, Academics, Services, Technologists, and Others. These levels are referenced from the Thailand Office of the Civil Service Commission (OCSC) Digital Literacy Framework, designed for advancing digital government initiatives. The government agencies will subsequently undergo further evaluation based on this framework, as depicted below.

- Executive (E): Stimulate IT awareness, review policies, and drive process changes.
- Management (M): Modify procedures, lead policy implementation, and develop operational plans.
- Academic (A): Analyze data, propose policies, and align with organizational strategy.
- Service (S): Provide IT-enabled services to citizens and other agencies.
- Technologist (T): Develop data technology, manage projects, and enhance inter-agency connectivity.
- Others (O): Utilize government IT resources effectively. the technology. Information for managing assigned tasks appropriately.

Table 2: Data Literacy Framework Beta Version

Components	Competencies	Definitions	Officers Level
Data Collection	Data Discovery and Collection	Identifying and gathering data ethically and responsibly, ensuring compliance with data privacy regulations and best practices.	M, A, S, T and O
	Evaluating and Ensuring Quality of Data	Assessing the accuracy, completeness, and reliability of data sources, implementing methods to improve data	M, A, S, T and O

Components	Competencies	Definitions	Officers Level
	and Sources	quality when necessary.	
Data Management	Data Organization	Structuring raw data by categorizing and grouping it based on relevant criteria, making it easier to find, access, and analyze.	A, S, T and O
	Data Manipulation	Transforming data through processes like cleaning, formatting, and restructuring to enhance its clarity, usability, and suitability for analysis.	A, S, T and O
	Data Conversion (from format to format)	Transforming data from one format (e.g., PDF) to another (e.g., Excel) to ensure compatibility and accessibility.	E, M, A, S, T and O
	Meta Data Creation and Use	Adding information about data (like its source, creation date, and description) to aid understanding and organization.	A, S, T and O
	Data Curation, Security and Reuse	Managing data throughout its lifecycle, ensuring its accuracy, security, and availability for future use and integration with other sources.	S, T and O
	Data Preservation	Taking steps to maintain data integrity and accessibility over time, following best practices and regulations.	S, T and O
Data Governance	Data Governance Basics	Understanding principles and policies to ensure data security, privacy, accuracy, availability, and compliance with legal and ethical requirements.	E, M, A, S, T and O
	Role and Responsibilities Data Governance	Defining and assigning duties within an organization to uphold data governance practices.	E, M, A, S, T and O
	Data Governance Activities	Implementing essential tasks like data classification, access control, and quality assurance to manage data effectively.	M, A, S, T and O
	Data Governance Framework	Following a structured approach to define data governance practices and achieve organizational goals.	E, M, A, S, T and O
Data Evaluation	Data Tools	Utilizing software to manage data pipelines, collect configuration information, and perform other data-related tasks.	A, S, T and O
	Basic Data Analysis	Employing techniques like summarization, statistics, and logical reasoning to understand, describe, and analyze data.	A, S, T and O
	Data Interpretation	Applying various analytical methods to extract meaningful insights and conclusions from data.	M, A, S, T and O
	Identifying	Leveraging data analysis to detect and	A, S, T and O

Components	Competencies	Definitions	Officers Level
	Problems using Data	explain problems within an organization or system.	
	Data Visualizations	Presenting data in visual formats like charts and graphs to enhance understanding and communication.	A, S, T and O
	Presenting Data Verbally	Communicating data insights and findings effectively through spoken language.	A, S, T and O
	Data Driven Decision Making	Utilizing data evidence to inform choices and actions within an organization.	E, M, A, S, T and O
Data Application	Critical Thinking	Analyzing available information, evidence, and observations to form sound conclusions based on data.	A, S, T and O
	Data Culture	Fostering a shared belief and behavior around using data to improve decision-making and organizational outcomes.	M, A, S, T and O
	Data Ethics	Adhering to ethical principles throughout the data lifecycle, including collection, generation, analysis, and dissemination.	A, S, T and O
	Data Citation	Properly referencing data sources to ensure transparency and accountability.	A, S, T and O
	Data Sharing	Making data resources accessible to others within or outside the organization for authorized use.	A, S, T and O
	Evaluating Decision Bases on Data	Using data analysis to assess and compare different options before making crucial choices.	E, M, A, S, T and O

Expert Review

The development of the Data Literacy Framework Beta Version involved the researcher gathering and selecting data experts to provide specific evaluations and opinions. Purposive sampling was employed to select interviewees with expertise in working with data, human resource development, and government sectors. These experts were interviewed using a questionnaire to assess their perspectives on the framework's development and its alignment with the needs of digital government initiatives.

Additionally, the researcher conducted interviews with experts involved in the development of digital government to gather feedback and insights on the preliminary skill levels assessed within the framework. Following this, an assessment was conducted at the preliminary level, accompanied by clarifying the recommendations integrated into the Data Literacy Framework Beta Version. Subsequently, the framework was reviewed by experts through a questionnaire in the next step, allowing the researcher to incorporate the feedback received into the creation of the next version before deployment.

Questionnaires Pattern for Experts

Data literacy – the skills to collect, manage, analyze, interpret, and ethically use data – has become essential for informed decision-making, problem-solving, and improving

services within government agencies. To assess the current state of data literacy among government officers, a comprehensive questionnaire has been designed. This questionnaire covers key areas of data literacy, including data fundamentals, data analysis and use, and the data culture and ethics that underpin responsible data practices, for example.

Data Fundamentals: Collection, quality, organization, manipulation, metadata, security, preservation, governance principles, roles, and appropriate tools.
Data Analysis and Use: Basic analysis techniques, interpretation, problem identification, visualization, presentation, and data-driven decision-making.
Data Culture and Ethics: Critical thinking, cultivating a data-focused organizational culture, ethical use, data citation, and responsible data sharing.

These questions aim to assess whether government officers possess the essential data literacy skills needed to work effectively in a data-driven environment. The questions evaluate knowledge of data collection, organization, and security, along with the ability to analyze, interpret, and visualize data. Additionally, they address ethical considerations, data-informed decision-making, and the understanding of fostering a data-centric culture within government organizations.

Assessment by Stakeholders

The researcher is currently evaluating and selecting stakeholders, including the six identified officer levels (Executives, Managements, Academics, Services, Technologists, and Others), based on expert review of the questionnaire. This ongoing assessment focuses on the operational level of personnel skill development within the organization, specifically involving early-term executives of government agencies.

In this research, the questionnaire format for assessment was tailored to correspond with competencies. The researcher devised a questionnaire utilizing a Rating Scale (Likert, 1961) with three levels: Agree, Moderate, and Disagree.

The provided questions for evaluating data literacy skills among government officers. The goal is to assess their competency in various areas of data management and use.

Assessment Structure

Scoring: A simple agree/disagree scale (1, 0.5, 0) gauges the perceived importance or skill level for each data competency.
Components: The assessment covers data collection, management, governance, evaluation, application, and the ethical considerations inherent in data work.
Sample Questions: Example questions demonstrate how the assessment translates specific competencies into inquiries for government officers.

Focus Areas

The assessment centers on determining whether government officers have the skills to:

- Collect, organize, and secure data.
- Analyze and interpret data effectively.
- Apply data insights to decision-making.
- Create visualizations and presentations.
- Understand data governance principles.
- Use data ethically and responsibly.

Output (Skillset/Competencies/Job Level/Courses/Courses Description)

After receiving additional comment form Assessment by Stakeholders Sections, the researcher will create produce results of the development of Data Literacy skills, courses, Learning Outcome (related on Bloom's taxonomy [21]) and developing into the level of skills for the subjects that should be studied and making definitions and meanings of knowing of data to be clear and there is the same point in defining it correctly.

Table 6: Samples of Skill and Courses related on Data Literacy Competency

Data Literacy Competency	Skills	Course
Basic Data Analysis	Ability to analysis data for report or working with analysis data skill	- Data Analytics for Data understanding and processing - Basic Data Analytics for government sectors.
Data Ethics	Ability to understand, follow the regulations and use the data as much as necessary for working and not infringe the privacy on data subject.	- Introduction to data ethics - Data Laws. - Data Science Ethics.

EXPERIMENTAL RESULTS

In this part we will discuss the conclusions. and summary results from interviews with experts working on data. By receiving comments Suggestions and adjustments are made. Meanings and definitions to be consistent and communicated in the same direction. For experts who agree, including adding There are some substances that experts have said should be added. Knowing the results of the interviews, each expert gave an opinion. The addition is a second version of the knowledge framework. Data Literacy Framework1.0, there will be meanings and definitions from the review as follows.

Data Literacy Framework 1.0

Table 7: The Data Literacy Framework 1.0

Skillset	Competencies	Definitions
Data Collection	Data Discovery and Collection	the process of extracting meaningful patterns from data.
	Evaluating and Ensuring Quality of Data and Sources	A data quality evaluation is a process to determine how well final products meet the original objectives of the statistical activity, in terms of the reliability from an accuracy, timeliness and coherence point of view.
Data Management	Data Organization	the process of sorting raw data into several categories and then arranging them.

Skillset	Competencies	Definitions
	Data Manipulation	the process of organizing or arranging data to make it easier to interpret
	Data Conversion (from format to format)	changing the data in one file format to another format.
	Meta Data Creation and Use	ability to modified, including its deletion
	Data Curation, Security and Reuse	Understand the meaning of data curation and why it is essential to maximize the value of enterprise data.
	Data Preservation	the act of conserving and maintaining both the safety and integrity of data
Data Governance	Data Governance Basics	to ensure data is secure, private, accurate, available, and usable.
	Role and Responsibilities Data Governance	Oversees the implementation of the entire Data Governance program
	Data Governance Activities	Understand activity to relate on Data Governance
	Data Governance Framework	Understand basic Data Governance Framework
Data Evaluation	Data Tools	an ability to use software that helps an organization collect and analyze data.
	Basic Data Analysis	the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense, and recap, and evaluate data.
	Data Interpretation	the process of reviewing data and arriving at relevant conclusions using various analytical research methods
	Identifying Problems using Data	ability to identify problems while working with data
	Data Visualizations	ability to create and understand Data Visualizations
	Presenting Data Verbally	ability to verbally presenting data
	Data Driven Decision Making	can make decisions based on data
Data-Driven Decision Making	Critical Thinking	using data for critical thinking in their jobs
	Data Culture	government officers using data naturally in their work
	Data Ethics	abilities to avoid violating personal data and using data ethically
	Data Citation	ability to use data as a reference in their work?
	Data Sharing	ability to understand the principles of proper data sharing
	Evaluating Decision Bases on Data	ability to use data for work-related purposes effectively

Interview and Assessment Result

In this section, researcher delve into the hierarchical positions of the interviewees, the nature of their business affiliations, a thorough delineation of their duties and responsibilities, and an account of their professional experiences in fields pertinent to data. The purpose is to conduct a comprehensive analysis and elicit opinions that can be utilized for the evaluative process. The specific details are outlined in the table presented below.

Interviewee Background and Experience

The interviewees represent a diverse range of backgrounds and experience levels. Participants hail from private businesses, legal consulting, state enterprises, and government sectors. They hold positions ranging from middle executives and officers to department heads and senior experts. Their collective experience spans 6-15 years, indicating substantial knowledge and expertise within their respective fields. This variety of backgrounds offer valuable insights from multiple perspectives within the context of their work.

After receiving feedback from experts, opinions will be categorized into three levels: Agreement, denoted by a score of 1; Partial agreement, indicated by a score of 0.5; and Disagreement, represented by a score of 0. The determination of these levels is based on the majority consensus, with more than 50% agreement among the expert opinions considered for drawing conclusions and results. This selection criterion is applied due to the nature of the interview involving a sample group with specific recommendations and comments. Instances where agreement falls below 50% imply expert reservations regarding the alignment of job levels and subjects, suggesting potential increased individual workload. only scores surpassing the 50% threshold will be acknowledged and subjected to analysis as indicative of trends in knowledge, skill development, and recommendations for future courses.

Weight Criteria for Develop Relate Competencies and Job Level.

Table 9: Assessment Review by Expert

Skillset	Competencies	Executive Weight Criteria	Officer Weight Criteria
Data Collection	Data Risk Assessment	55.56 ~ 66.67	44.44
	Data Discovery and Collection	44.44 ~ 66.67	77.78 ~ 100.00
	Evaluating and Ensuring Quality of Data and Sources	22.22 ~ 44.44	44.44 ~ 100.00
Data Management	Data Organization	0 ~ 11.11	66.67 ~ 100.00
	Data Manipulation	0 ~ 22.22	11.11 ~ 100.00
	Data Conversion (from format to format)	0	22.22 ~ 100.00
	Meta Data Creation and Use	22.22 ~ 66.67	11.11 ~ 77.78
	Data Security	11.11 ~ 33.33	22.22 ~ 100.00
	Data Curation	22.22 ~ 66.67	22.22 ~ 100.00
	Data Preservation	0 ~ 22.22	22.22 ~ 100.00
Data	Data Governance Basics	88.89 ~ 100.00	88.89 ~ 100.00

Skillset	Competencies	Executive Weight Criteria	Officer Weight Criteria
Governance	Role and Responsibilities Data Governance	100.00	22.22 ~ 100.00
	Data Governance Activities	88.89 ~ 100.00	77.78 ~ 100.00
	Data Governance Framework	100.00	100.00
Data Utilization	Identifying Problems using Data	77.78	77.78 ~ 100.00
	Basic Data Analysis	77.78 ~ 88.89	88.89 ~ 100.00
	Data Software and Tools	44.44 ~ 55.56	66.67 ~ 100.00
	Data Interpretation	55.56 ~ 66.67	66.67 ~ 100.00
	Data Visualizations	55.56 ~ 88.89	77.78 ~ 88.89
	Presenting Data Verbally	77.78	77.78 ~ 100.00
	Data Driven Decision Making	100.00	33.33 ~ 88.89
Data-Driven Decision Making	Critical Thinking	77.78	55.56 ~ 88.89
	Data Culture	88.89	55.56 ~ 100.00
	Data Ethics	88.89	100.00
	Data Citation	22.22	55.56 ~ 100.00
	Data Sharing	33.33 ~ 55.56	44.44 ~100.00

Experts share the same opinion that building skills may require expanding definitions. In-depth details and creating course details that are divided into formats that are appropriate for both administrators Definition and adding skills that should be added in line with the courses Each course will have its suitability assessed to establish the necessity of the course for each position. Subjects studied to build skills The definition of the knowledge framework and results.

Evaluation Results

Assessing Data Literacy components requires a solid understanding of data or data analysis, backed by knowledge, expertise, and hands-on experience in the field. After gathering insights from experts, the next phase entails evaluating and producing additional outcomes, including:

- Formulating Course Codes and Names.
- Determining the Weight of Essential Courses and their relevance to different Job Levels, particularly in areas such as Data Collection, Data Management, Data Governance, Data Evaluation, and Data-Driven Decision-Making Skills and Competencies.
- Developing Course Descriptions.
- Establishing Learning Outcomes for Data Literacy Courses.

Table 10: Competencies and Course Name

Competencies	Course Name
Data Discovery and Collection	Data Acquisition, Risk, and Estimation for Executive
	Data Collection and Analytics for Executives
	Survey Data Collection and Analytics for Officers
Evaluating and Ensuring	Framework for Ensuring Quality of Data and Sources

Competencies	Course Name
Quality of Data and Sources	
Data Organization	Data Organization Essentials for Officers
Data Manipulation	Data Manipulation with Tools
Data Conversion (from format to format)	Data Conversion Essentials for Officers
Meta Data Creation and Use	Metadata Management Fundamentals for Executives
	Metadata Management Essentials for Officers
Data Curation, Security and Reuse	Data Security strategy for organizations management
	Data Curation Understanding for Executives
	Data Curation for General Officers
Data Preservation	Data Preservation Methods & Best Practices for Officers
Data Governance Basics	Data Governance Basics for Management
	Data Governance Basics for Officers
Role and Responsibilities Data Governance	Introduction to Data Governance for Executives
	Introduction to Data Governance
Data Governance Activities	Data Governance Activities for Management
	Data Governance Activities for Officers
Data Governance Framework	Data Governance for Executives
	Data Governance in Practice for Officers
Basic Data Analysis	Data Utilization for Identifying Problems in Management
Identifying Problems using Data	Data Utilization for Identifying Problems
Basic Data Analysis	Data Analytics Essentials for Executives
	Data Analytics for Officers
Data Tools	Data Software and Tools for Management
	Data Software and Tools Essentials
Data Interpretation	Data Analysis and Interpretation Specialization for Management
	Data Analysis and Interpretation Specialization for Officers
Data Visualizations	Data Visualizations for Communication in Management
	Data Visualizations for Officers
Presenting Data Verbally	Data Communications for Management
	Verbal Communications and Presentation with Data
Data Driven Decision Making	Data Driven Decision Making for Manager
	Data Driven Decision Making for Officers
	Critical Thinking for Data Analytics and Management
	Critical Thinking for Data Analytics and Data Work
Data Culture	Introduction to Data Culture for Management

Competencies	Course Name
	Building Data Cultures and Communications
Data Ethics	Data Science Ethics for Management
	Data Science Ethics for Officers
Data Citation	Introduction for Data Citation in Officers
	Data Curation for General Officers
Data Sharing	Data Sharing for Management and Executives
	Data Sharing for Officers and Data Work

In the synthesis of the findings, it is essential to ensure that Data Literacy encompasses meticulously delineated elements. This conceptual framework is intricately tailored to align with the required skill sets at various job levels within government agencies, ensuring suitability for each position. The effectiveness of this framework relies on the clear definition of outcomes and plans, as previously discussed by the researcher. This entails establishing Learning Outcomes, crafting Course Descriptions, and developing a strategic plan that aligns skill development with budgetary constraints. Additionally, careful consideration is given to the structural characteristics of the agency, accommodating its unique needs in line with desired outcomes. This holistic approach guarantees the practical applicability and viability of the proposed framework within government agencies.

CONCLUSION

In conclusion, this study emphasizes the crucial role of data literacy in today's professional landscape, especially within the governmental sector. The proposed data literacy framework is a strategic initiative aimed at empowering government officers in Thailand with the necessary skills to navigate the complexities of the data-driven fourth industrial revolution. This research delves into the critical realm of data literacy within the government sector, recognizing its increasing importance in the era of the fourth industrial revolution. The study reveals a disparity between the emphasis on digital literacy in educational curricula and the insufficient integration of data literacy skills for government officers.

Various definitions of data literacy are explored, emphasizing its role in collecting, transforming, evaluating, and communicating data. Notably, the need for a holistic approach that intertwines digital and data literacy is highlighted, as these skills operate seamlessly and concurrently. The research, centered around the Office of the Civil Service Commission's initiative to upgrade government sector skills, aims to design a comprehensive data literacy framework for government officers in Thailand. The study's objectives include conducting a gap analysis between international data literacy standards and national digital literacy standards to formulate a framework tailored to the unique needs of government officers in Thailand. The methodology involves systematically selecting relevant research papers and developing a comprehensive framework based on international standards and expert assessments. The gap analysis, using established tools such as the APS Data Capability Framework, Digital Competences Framework (DigComp 2.2), The Office of the Civil Service Commission (OCSC) Digital Literacy, and The Data Literacy Body of Knowledge (DLBOK), aims to create a model for a Data Literacy Framework with distinct levels and core components.

This paper aims to contribute to enhancing data literacy among government officers in Thailand, recognizing the transformative potential of a well-designed framework. Bridging the gap between existing digital literacy initiatives and the evolving demands of data-driven governance is crucial for the continued success of government services in the digital age. And future work should focus on practically applying the established framework within the distinct organizational landscape of government offices in Thailand. Evaluating the framework's effectiveness over time, incorporating feedback, and adjusting to advancements in technology are crucial. Potential avenues for future research include

- Practical Application: Implement the framework within diverse government offices in Thailand.
- Evaluation & Adaptation: Assess the framework's effectiveness, gather feedback, and adjust it to reflect technological advancements.
- Collaboration: Explore partnerships with educational institutions and the private sector to develop data literacy training programs.
- Evolving Framework: Maintain adaptability to keep the framework relevant within the ever-changing data landscape.
  Impact Research: Investigate how improved data literacy affects government

  efficiency and decision-making.

  Practical Outcomes: Use the research to design skill-building courses and plan for

  future organizational needs within the Thai government.

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