

RESEARCH KNOWLEDGE MANAGEMENT SYSTEM ON PROBLEMS, NEEDS AND STRATEGIES OF SOUTHERN THAILAND

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Abstract

Purpose of the study: This study aims to develop a research knowledge structure according to problems, needs, and strategies of a community, to search for relationships, and to scope knowledge regarding problems, needs, and strategies of a community, to gather practical problem-solving guidelines, and to reflect and reconfirm existing body of knowledge of a community.

Methodology: This design of this study is content synthesis, knowledge organization as classification approach has been applied to this mixed-method research, the knowledge has been categorized into a tree structure according to the relationships of each concept, and therefore, it shows clear causes and effects also differentiates relationships in scope of related knowledge of the southern development.

Main Findings: The results of this study indicate that the knowledge structure of the research for the development of southern Thailand comprises 2 domains, 20 classes, 139 concepts, and 327 sub-concepts. It will let us see the relationships and trends of knowledge based on the research of southern Thailand by the scope of knowledge that reflects gaps in some research points and can be resolved or reused.

Applications of this study: The findings confirmed that we can develop it to the ontology for a recommender system or knowledge-based system of research for development based on problems, needs, and strategies of community in southern Thailand. It is a search engine tool for researchers on research for southern Thailand development. Further, this could explain more the relationships of information clearly, similarly; the knowledge structure will help the researcher's study scope area, reduce research redundancy, reduce costs on research redundancy and reconfirm knowledge to conduct research and innovations.

Novelty/Originality of this study: The findings confirmed that it can be applied in terms of the policy area and national strategies, or applied as a part of solutions, for example, the body of research knowledge on tourism and agricultural development which is crucial for the national economy and resource. The government could take the knowledge into account the research or tourism policies, agricultural production as start-ups: Smart Tourism and Smart Agro Technology.

Keywords: *Knowledge Management System, Problems Needs and Strategies, Southern Thailand, Knowledge Structure.*

INTRODUCTION

The south of Thailand is a coastal area along the Thai Gulf and the Andaman Sea. Also, it is located near the Malaysian border. Therefore, there are advantages of border trade, tourism and agriculture ([Nanuwong, 2017](#)). Most of the southern areas are forests and wetlands which is valuable for planting and ecotourism ([Saruno, 2017](#)). Besides, the southern economic structure consists of agriculture, fishery industry, trade, and tourism. Moreover, southern culture portrays its own identities as uniqueness and diversity which could be conveyed as multiculturalism. In accordance with multiculturalism, the south welcomes all tourists as a hub of diversity ([ONESDB, 2011](#); [Kewsuwun et al., 2019a](#)). These mentioned factors are strengths of the south and they also relate to the Thailand 4.0 policy in which the government encourages the people to have outstanding research and innovations along with creative culture and to create services that lead to effective product development and tourism services industrial ([Kewsuwun et al., 2019a](#)).

Southern development policy and strategic plan and the office of strategy management, southern province group focus on setting up Thailand's stability and sustainable development framework under the sufficient economic concept. Moreover, the Joint Development Strategic for Border Area (JDS) and Indonesia – Malaysia – Thailand Growth Triangle (IMT-GT) was asked to help Thailand with agriculture, food processing industry, and tourism development ([Kewsuwun et al., 2019a](#); [Chanocha, 2017](#)) These are based on economic expansions to increase various types of business, employment rate and value-added of products as well as enhance competitive manpower for industry development and marine transportation development.

Employing strategies into practice and driving the south is based on participation among the people, organizations, and departments in the southern province group (cover in the southern border, the Thai Gulf and the Andaman Sea) for the utmost development ([Arunmas, 2017](#); [Demarest, 1997](#)). This drive and development pay attention to the fundamentals, in other words, the developments in the basic structures of economy, society, and community along with research and development in innovations, gaining new knowledge, and solving problems systematically ([Demarest, 1997](#); [Kewsuwun et al., 2019b](#)). In terms of development, process, and problem-solving, it employs the studies of the needs and problem analysis to gain findings that lead to practical research methodology ([Podhisita, 2007](#)). Further research has been used as a

tool for reaching knowledge, answers, explanations. For the systematic development, further research is used to reconfirm whether the knowledge is existing, find the gap the knowledge, find the experts in the area and to see if the knowledge can be applied or solved problems ([Nanu Wong, 2017](#)).

Conducting research leads to freshly effective new knowledge and innovations which are used for further development and precise solutions to strengthen the region and the nation ([Kewsuwun et al., 2019a](#)).

To research and development in the south becomes an essential tool in constructing new knowledge which could lead to innovations especially in border trade, agriculture (rubber, palm oil, and rice) and fisheries industry as well as research on multiculturalism. It includes these 3 research topics in the 5 targets which are encouraged and launched by the government ([Chanocha, 2017](#)). The research procedure includes 8 elements: research problem, research area, literature and concept review, research framework, population and target group, research methodology, research findings, and implementation ([Prasitrathasin, 1998](#)). Each element needs the information to be part of the literature review and to support the working research ([Mueanrit, 2013](#)). Gathering related information expands the area of knowledge for it to be multidisciplinary, yet due to duplicate and information overload, it causes unreliability and unclear scope of knowledge ([Kewsuwun et al., 2019a](#)).

To ease the research information search, to confirm the knowledge, and to support research in the southern development, there should be systematic knowledge organization as categorization and classification ([Chan, 1985](#)) which is easy to access and to search for information. We have categorized the knowledge into a tree structure according to the relationships of each concept ([Panawong, 2015](#)), therefore, it helps to show clear causes and effects also differentiate relationships in the scope of related knowledge ([Archint, 2014](#)). Moreover, it helps in making a decision, presenting information, saving the cost for research redundancy, or conducting further research for development in the south.

Consequently, this research aims to invent a research knowledge structure in order to continue developing the ontology for a recommender system on research for the development of southern Thailand. The findings in this research will let us see the relationships and trends of knowledge based on research of southern Thailand by scope of knowledge that synthesizes fixed data process, additionally, it is beneficial in order to reflect gaps on some research points which can be resolved or reused for research in the future ([Kewsuwun et al., 2019a](#)). Further, this could explain more the relationships of information clearly, similarly; the knowledge structure will help the researcher's study scope area, search for information, reduce research redundancy, reduce costs on research redundancy and reconfirm knowledge to conduct research and innovations.

RESEARCH OBJECTIVES

The objectives of this research were to: (1) study knowledge on the policies, problems, and needs of the community. and (2) organize the knowledge structure that appears on the research for the development of southern Thailand in accordance with the policies, problems, and needs of the community.

LITERATURE REVIEW

Developing knowledge management system based on problems, needs, and strategies of southern Thailand, according to the research for development knowledge organization approach, was studied along with categories and classifications approach and knowledge structure relationship list as main topics and subtopics, therefore, it is easy to access and covers all the points of knowledge of the south. The data has been hierarchically stratified and categorized by index. As a result, the system shows relationships, knowledge structure elements, and further applications for a recommender system or search system ([Tripathy & Acharjya, 2014](#); [Kewsuwun et al., 2019b](#)). Related the concept, theories, and approaches presented as follows:

Classifications and Categories Approach

Each classification and categories approach is based on different theories, concepts, and methods; therefore, it creates many knowledge systems that contain various attributes. The library and information science discipline has been claimed as the most systematic data management field ([Frické, 2012](#)), especially, the theories on classification and category. There are 2 main aspects regarding classification system theory; firstly, knowledge management system which collects and synthesizes content, then develops approaches and theories of related concepts, approaches, and theories to categorize classes and relationships of existing knowledge; secondly, knowledge management system which shows concepts, structures, and classifications of knowledge as guidelines, knowledge management system tools, and the existing and other related knowledge assessment tools ([Tripathy & Acharjya, 2014](#)).

Pragmatism was first applied in knowledge management system procedure as inventing tools for retrieval. Later, empiricism had been employed as a knowledge classification, knowledge structure management, and knowledge component management.

To manage each knowledge system, a designing structure must fit sets of data and conditions of each discipline. The designed system which illustrates relationship structures of any discipline data meaningfully is called classification structure ([Schwartz & Te'eni, 2011](#); [Liebowitz & Robert, 1999](#); [Lars Marius, 2004](#)) since the structure is to classify data

according to specific attributes as a phenomenon or related entity. This could be employed to classify the related structures of the data as follows:

1. Scientific Classification and Taxonomies are the basic structure on classification and categories concerning physical attributes of objects or living creatures which are based on taxonomy to show relationships among organisms.

The Structure of Taxonomy is to explain organism structures by classifying or grouping shared attributes as in a tree structure. It shows various relationships in class and sub-class relations or coordinated relations as a parent, child, and sibling ([Lars Marius, 2004](#)).

2. Folk Classification is to create structure focusing on phenomena. This structure illustrates roles, responsibilities or overviews of things according to social perspectives and conditions; as a result, this classification is unstructured and varied. Therefore, its objective depends on the users ([Hotho, Jäschke, Schmitz & Stumme, 2006](#)).

The 2 structures emphasize an entity only, so they are named entity classification or phenomenon classification.

3. Aspect Classification is to emphasize knowledge classification rather than entity classification. This is to concern thoughts, reasons, and languages, then to scope the knowledge according to each discipline or title. It could be classified as history, mathematics, logic, and literature.

The aspect classification is divided into 2 types as a general structure that employs original classification and specific structure that synthesizes or updates data to fit each discipline.

The relationships of knowledge structure share semantic structure attributes which indicate relationships among data and help users to access knowledge, retrieval and search system. This could be divided as follows ([Vu, Mertens, Gaisbachgrabner, Fuchs & Hemmje, 2018](#); [Bean & Green, 2001](#)):

1. Active Relation is to show semantic relationships between concepts explaining how one concept affects another.
2. Hierarchical Relation is to show all relationships deductively in the form of a tree structure and to classify in superordinate to subordinate relations or in coordinated relations which is parent-child or sibling.
3. Categorized Relation is to show relationships in terms of category, for instance, categorizing data according to disciplines, further, to manage the system. The data needs to be categorized by the content's types or alphabets.
4. Generic or Taxonomy Relation is to show relationships by categorizing types and genetics, for example, plants, animals, minerals, substances, chemicals, stones, and soil horizon. This relation is accurate in defining terms or inventing vocabulary due to clear classifications and categories.

Knowledge Organization Approach

This approach focuses on the knowledge management system as systematic search and classification ([Schwartz, 2011](#)) which helps in collecting, building, creating and managing knowledge on problems, needs and strategies of the community in the southern to share and access it easily ([Iamkhajornvchai, 2013](#); [Maitaouthong, 2014](#)). The system employs updating function as differentiating new data based on qualifications ([Chan, 1985](#); [Hodge, 2000](#)), combining, and identifying differences of the existing knowledge. To create the knowledge management system must state the scope area of knowledge on problems, needs, and strategies of southern clearly ([Hjørland, 2017](#); [Choo, 1996](#)). Important components of a knowledge management system are (1.1) Knowledge structure refers to classify data into concepts and sub-concepts as a tree structure. (1.2) Special attributes of knowledge refer to perspectives and details of knowledge that needs to be classified as same as the knowledge structure. And (1.3) Relationship classification aspects refer to defining specific terms as users can select the information easily and quickly.

These 3 components are essential in creating an effective knowledge management system for users. Additionally, users can operate the system to show structural relationships between classes, search for keywords specifically and extensively. Further, managing the system depends on various aspects ([Taylor, 1999](#)). There are 7 approaches to the procedure of managing the system ([Panawong, 2015](#)) as follows:

1. The traditional approach is a knowledge management system that classifies abstract knowledge from various disciplines or the point-based on documents. This approach is for classification system development by searching for specific knowledge.
2. The facet analytical analysis approach explains important issues of each knowledge domain then employs cause and effect concepts to explain relationships by classification into knowledge domains.
3. Information Retrieval Traditional approach manages knowledge by relating similar attributes and correlating relationships.
4. The user-oriented approach refers to managing the system which concerns users' needs when operating.
5. The bibliometric approach focuses on reference management by applying interdisciplinary reference guidelines.

6. The domain analytical approach is mainly about a knowledge management system by using knowledge indicators and epistemology or knowledge theories to classify knowledge domains.
7. Other approaches are employed for very specific purpose research, for instance, the semantic approach has been brought to analyze language features and symbols or philology.

Each approach contains different procedures and objectives, yet they are under knowledge management: KM theories. The approaches provide opportunities for further research, perspectives, languages, and structures differently, therefore, results gained are different too. Attributes and structures are classified into 3 groups ([Tripathy & Acharjya, 2014](#); [Hodge, 2000](#)) as follows:

1. Term lists are to define terms and definitions and list terms used on specific domains and objectives. The structure is simple; it represents knowledge orderly and links unused lists to glossaries. The term lists refer to words with definitions, specific terms, and dictionaries. They contain broader word lists and definitions than glossaries including root words, spelling, morphology, other meanings, synonyms, and gazetteer with places and explanations.
2. Classifications and Categories are to set subjects and relationship lists which are classified by similar contents including subject headings; word sets which represent lists in subject headings and cover content in all disciplines. The sets are hierarchically stratified as categories, taxonomies, and groups which are classified according to correlated contents numerically or alphabetically.
3. Relationship Lists are a link between lists and the following concepts, (1) Thesauri is to show relationships of words in hierarchical levels and to represent relationships by symbols, (2) Semantic networks is to present concepts and word relationships as cause-effect or parent-child on network or web type and (3) Ontology is knowledge management system in a specific concept prototype and is a representative of complex relationships between objects and explanations of specific scope of knowledge which links data mining and management system. The relationship lists function is often used on online platforms since it links many Thai digital databases ([Staab & Studer, 2009](#); [Hotho, Jäschke, Schmitz & Stumme, 2006](#)).

Nowadays knowledge management system functions are various depending on the purposes of the user, yet the main functions are information listing and keyword search. They are to categorizing classes and managing materials information according to knowledge classes especially managing information into digital formats ([Iamkhajornvchai, 2013](#)). It includes specific knowledge in each discipline for quick and easy access. There are 2 approaches to manage the knowledge system ([Chan & Salaba, 1985](#); [Rowley, 1992](#)): (1) Enumerative Schemes are traditional categorizing methods used in the library and they cover all information management methods. And (2) Analytical synthetic schemes are modern categorizing methods focused on synthesizing concepts and contents rather than distributing hierarchical structures.

RESEARCH SCOPE ON RESEARCH FOR DEVELOPMENT

The knowledge of the study has been scoped to 4 references based on the research for the development of southern Thailand as follows:

1. 7 strategies from the ninth national research policy and strategy (2017-2021) formulated by the national research council of Thailand are as follows:

Research Strategy 1: Advance the national research system to be stronger, more harmonious, and more sustainable, including enhancing a practical research ecosystem.

Research Strategy 2: Accelerate research and development activities to fulfill goals and acknowledge urgent issues regarding national research strategies, national development plans, and missions of departments as the government provides funds on research and development continuously.

Research Strategy 3: Enhance and support research and development in private sectors

Research Strategy 4: Enhance actual uses on the research process, research work, a body of knowledge, innovations, and technology resulted from research by every sector's cooperation

Research Strategy 5: Develop and strengthen national infrastructure in terms of research and development.

Research Strategy 6: Boost the number of research and development personnel and develop their capabilities to enhance the nation's competitive level.

Research Strategy 7: Develop collaborations of national and international research networks.

2. 10 strategies from the plan of national economic and social development (2017-2021) and the 20-year national strategy framework (2017-2036) formulated by the office of national economic and social development board are as follows:

Strategy 1: Strengthening and Realizing the Potential of Human Capital.

Strategy 2: Creating a Just Society and Reducing Inequality.

Strategy 3: Strengthening the Economy, and underpinning Sustainable Competitiveness.

Strategy 4: Environmentally Friendly Growth for Sustainable Development.

Strategy 5: Reinforcing National Security for the Country's Progress towards Prosperity and Sustainability.

Strategy 6: Public Administration, Corruption Prevention, and Good Governance in Thai Society.

Strategy 7: Advancing Infrastructure and Logistics.

Strategy 8: Development of Science, Technology, Research, and Innovation.

Strategy 9: Regional, Urban, and Economic Zone Development.

Strategy 10: International Cooperation for Development

3. 11 strategies and Synthesis on problems and needs of people in southern province group by the office of strategy management administration of southern (2018-2021) cover southern border, the Thai gulf coast and the Andaman coast are as follows:

Strategy 1: Accelerate and improve natural and cultural tourism

Strategy 2: Accelerate trade and investment along with support transportation, logistic, and disaster prevention system.

Strategy 3: Enhance the effectiveness of production and value-added process of rubber and integrated marketing.

Strategy 4: Accurate production, process, and management on economic crops (palm oil, rubber, fruits)

Strategy 5: Increase produces on inshore fisheries, aquafarming, and economic livestock farming.

Strategy 6: Advance international attractions on quality and formats.

Strategy 7: Advance basic infrastructures, transportation, and logistic.

Strategy 8: Advance to the green city and quality society.

Strategy 9: Advance tourism standard sustainably.

Strategy 10: Improve system and value-added process on produces of agriculture, fisheries, and livestock effectively.

Strategy 11: Accelerate and strengthen the potential of human capital for sustainable development.

4. Related research on the southern university research database system, the Thai national research repository and Thai library integrated system in the past 10 years from 2008-2017, then synthesized the data according to 3 aspects of research knowledge structure: research documents, research basic information, and other related research information. Those research were carefully selected in terms of correctness, completeness, and conciseness, as a result, there were 3,873 titles from 78 organizations.

Referring scope is used to study the problems, needs and set the research strategies for the development of southern Thailand and to classify research contents as frameworks on developing knowledge structures for the development of southern Thailand.

METHODOLOGY

It has brought mixed-method research to manage knowledge structure as using content synthesis to generate research contents and relationships, also using a classification approach to classify data concerning the meaning and then to synthesize research key points systematically (Boonprasaert, 1999).

Procedure for Data Collection and Analysis.

This study is a synthesis of the research on problems, needs, and strategies in southern development for setting the knowledge scope and making a relational knowledge of research. The research procedure is as follows:

1. Creating knowledge structure on research for the development of southern Thailand in accordance with (1) 7 strategies from the ninth national research policy and strategy (2017-2021) formulated by the Thailand national research council. (2) 10 strategies from the twelfth plan of national economic and social development (2017-2021) and the 20-year national strategy framework (2017-2036) formulated by the office of national economic and social development board and (3) 11 strategies and synthesis on problems and needs of people in southern province group by the office of strategy management administration (2018-2021).
2. Retrieving research related to southern development from the southern university research database system, the Thai national research repository and Thai library integrated system as there were 3,873 titles in the past 10 years from 2008- 2017. Those research were carefully selected in terms of correctness, completeness, and conciseness then classified and categorized as mentioned in (1).

After classifying and categorizing, the data was divided into 3 categories as research document data, research basic data, and other related research data. The research knowledge structures are divided into 2 domains:

Research aspect domain refers to knowledge related to the research for the development of southern Thailand that comprises 17 classes and each class comprises 113 concepts and each concept comprises 215 sub-concepts

The research work domain refers to knowledge related to scopes of the research for the development of southern Thailand and consists of 3 classes and each class consists of 26 concepts and each concept consists of 112 sub-concepts.

To group the data attributes, it uses basic search information data in the national research repository of Thailand database and the southern university research database system, literature reviews on database development, and other online research access from many organizations ([Mueanrit, 2013](#)).

3. Creating knowledge organization uses a knowledge organization approach along with classifications and categories approach to set main topics and distribute data relationships into tree structures. Relationships have been done by generating similar contents as subject headings; word sets which represent lists and cover content in all the point of southern. The sets are hierarchically stratified in categories, taxonomies, and groups which are classified according to correlated contents numerically or alphabetically. The data is distributed in subheadings by meanings, written formats, time, or locations to gain knowledge elements for the southern development ([Hjørland, 2017](#)).
4. Having the findings confirmed by 7 experts cover experts of policies and plan, information and knowledge management and research. Then the researchers revised as a finalized knowledge structure on the research for the development of southern Thailand concerning correctness, appropriateness, conciseness, and clearness. This could be used to investigate, confirm, and link the existing research knowledge in southern Thailand. We could use this knowledge system as an additional source for developing the ontology for a recommender system or knowledge-based system of research on problems, needs, and strategies for the development of southern Thailand.

According to the procedure for data collection and analysis, it could be concluded as in Figure 1.

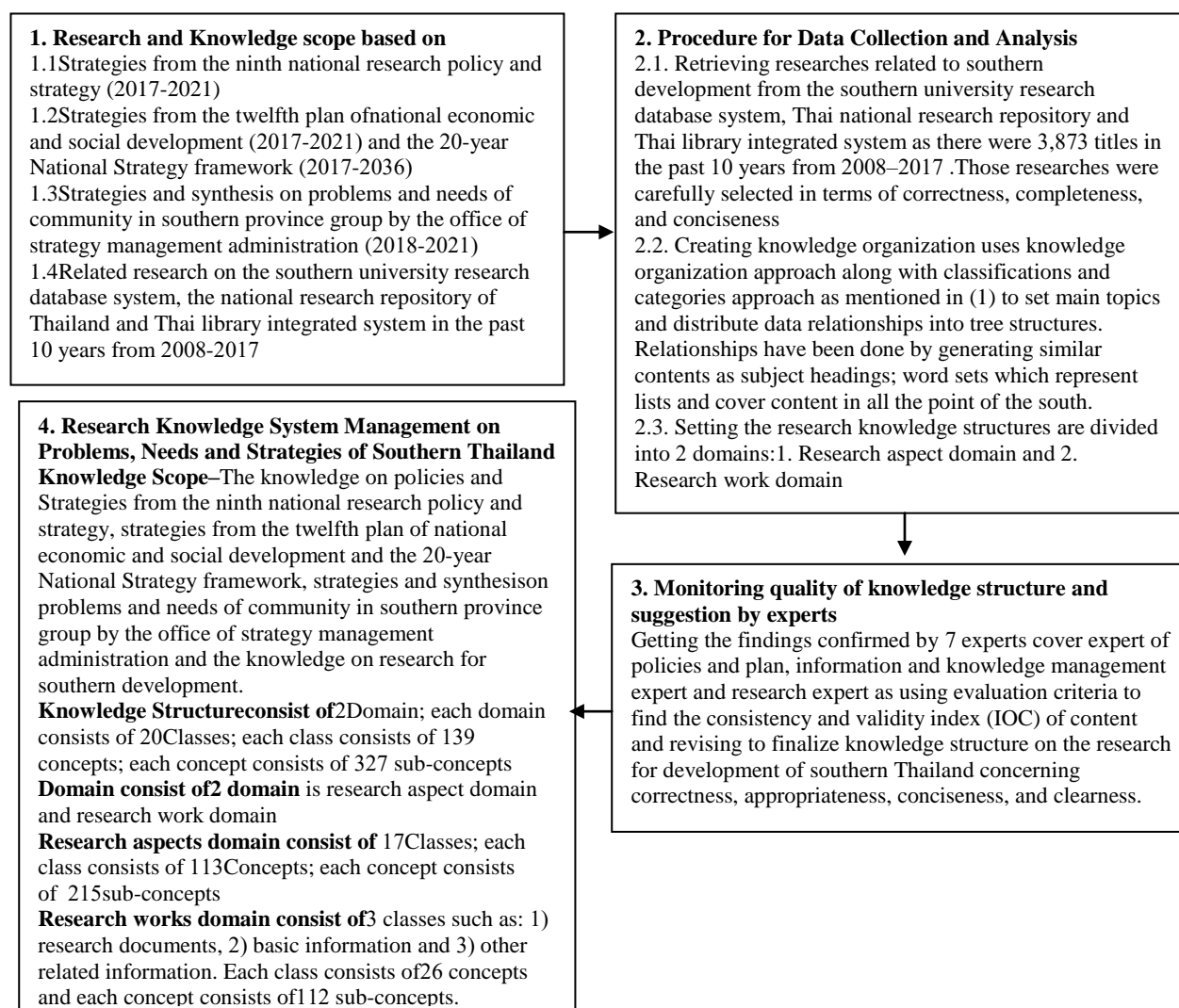


Figure 1: Diagram of procedure for data collection and analysis of research knowledge management system on problems, needs, and strategies of southern Thailand.

RESULT / DISCUSSION

After classifying and categorizing research for southern Thailand development, the knowledge structure had been revised according to experts' suggestions in an index, domain, and concept issues. The results are as follows:

1. Overview of research knowledge structure on problems, needs, and strategies of southern Thailand for development consists of

- 1.1 Research aspect domain refers to knowledge related to the research for the development of southern Thailand which consists of 2 knowledge sets (1) research knowledge on policy, strategy, and management of southern province group, and (2) research knowledge on problems and needs of southern province people.
- 1.2 Research work domain refers to knowledge related to the scopes of the research for the development of southern Thailand which consists of 3 classes such as 1) research documents, 2) basic information and 3) other related information.

2. Research synthesis on the ninth national research policy and strategy (2017-2021), the twelfth plan of national economic and social development (2017-2021) and the 20-year national strategy framework (2017-2036), administration and strategy planning of southern province group development framework (2018-2021) is classified into 6 classes, 31 concepts, and 95 sub-concepts on research aspect domain:

- 2.1 Research and development knowledge scope consists of 2 concepts and 11 sub-concepts: developing the research system and promotion and development of the research industry in the private sectors.
- 2.2 Infrastructure development knowledge scope consists of 2 concepts and 8 sub-concepts: urban development and the development of economic space structure.
- 2.3 Social development knowledge scope consists of 9 concepts and 45 sub-concepts: promoting stability, social and economic capital development, public administration, human capital for science and technology development, fairness and inequality reduction, strengthening relationships of learning community groups, pension systems development, and development to the green city and quality society.
- 2.4 Economic empowerment knowledge scope consists of 10 concepts and 20 sub-concepts: promoting and developing tourism businesses, managing human and social capital, labor problems management, international cooperation, promote trade and investment, increase production efficiency by using innovation and technology, develop markets to increase economic value, develop products from waste materials, promote handicraft products and tourist attraction development.
- 2.5 Sustainable development knowledge scope consists of 6 concepts: promoting the learning of the community, conservation and sustainable use, intrusion prevention, sustainable management and development guidelines, knowledge transfer for sustainability, waste management and industrial impact on the environment and supporting the production of alternative energy.
- 2.6 Production development knowledge scope consists of 2 concepts and 11 sub-concepts on creating value-added and increasing production to agricultural and fishery products.

3. Research synthesis on the problems and needs of people in southern province groups in (1) the office of strategy management of southern border provinces: Satun, Pattani, Yala, and Narathiwat, (2) the office of strategy management of the Thai gulf coast provinces: Chumphon, Suratthani, Nakon Sri Thammarat, Songkhla and Pattalung, and (3) the office of strategy management of Andaman coast provinces: Ranong, Pang-Nga, Krabi, Phuket, and Tang is classified into 11 classes, 82 concepts, and 120 sub-concepts on research aspect domain:

- 3.1 Safety system and welfare development knowledge scope consists of 11 concepts: the adjustment of the peacekeepers, violent behavior in the southern border provinces, staff welfare in risk areas, quality of life of the victims, Receiving social security benefits in accordance with Islamic provisions, solutions to lawsuits and unrest, social attachment to drug-related offenses, social affiliations and associations that affect offenses, strengthen peace in the area, the emergency decree 2005 and multicultural space management.
- 3.2 Education development-knowledge scope consists of 7 concepts: promoting and developing teaching and learning media, increasing community learning resources, supporting technology for education, the development of competencies of teachers, administrators, educational person, education consistent with the local curriculum, the creation of co-operating networks, awareness of the influence of technology on political.
- 3.3 Career development knowledge scope consists of 7 concepts: integrating career development, development of excellence, community welfare management, knowledge management for community development, farmers

Participation in agricultural occupational promotion project, promote coastal fishery occupation, rehearsing and promoting agricultural careers.

- 3.4 Business development knowledge scope consists of 7 concepts: accessing financial resources of the establishment, business profit planning analysis, needs help from the government, managing working capital for business operations and management of commercial sales networks of entrepreneurs.
- 3.5 Tourism development knowledge scope consists of 17 concepts and 5 sub-concepts: developing tourism management systems and mechanisms, developing prevention standards and security plans, creating understanding and awareness as a good host, developing various tourism styles, developing tourist attraction standards and improving the infrastructure, linking tourism routes between provinces, promotion and service provider skills development, developing information systems for tourism networks, managing community tourism networks, assessing tourism recreation activities, studying the impact of tourism industry and the development of tourism businesses to support the expansion.
- 3.6 Natural and environmental resources development knowledge scope consists of 5 concepts and 28 sub-concepts: conservation of environmental and natural resources, local conflict management practices, fishery resource development, environment-friendly management, and water resources management.
- 3.7 Public health development knowledge scope consists of 3 concepts and 35 sub-concepts: medical social development, medical and public health development and the development of Thai traditional medicine.
- 3.8 Family unit development knowledge scope consists of 3 concepts: strengthening the family, enhancing careers in the household and creating knowledge and understanding family institutions.
- 3.9 Agricultural area and innovation system development knowledge scope consists of 13 concepts and 52 sub-concepts: developing and promoting garden management knowledge, developing and defining plantations, developing innovations and research in agriculture, developing rubber and value-added markets, developing transportation systems, developing and improving oil palm policies, product development Agriculture, developing farmers' groups, developing strategies for catching fish, developing shrimp disease research innovation, developing aquaculture water, agriculture and renewable fund and development of distribution center and central markets.
- 3.10 Transportation development knowledge scope consists of 5 concepts: Electrical system development, improve signs and warning signs, develop routes to link southern provinces, increase the overpasses and develop warning systems.
- 3.11 Solutions on immigrant worker knowledge scope consist of 4 concepts: Strategic management on the border checkpoint, social organization legal measures, and cooperation of entrepreneurs and capitalists.
- 4. Research synthesis on the southern university research database system, the Thai national research repository, and the Thai library integrated system** are classified into 3 classes, 26 concepts and 112 sub-concepts on research work domain:
 - 4.1 Research document refers to the research documents, articles, and proceedings on southern development and consists of 2 concepts and 7 sub-concepts.
 - 4.2 Basic research information refers to Academic positions, qualification, researchers' status, tools of research, population and research target groups, statistics, researchers' contact information, and research areas and consists of 8 concepts and 35 sub-concepts.
 - 4.3 Related information refers to affiliation of researchers, research type, research type divided by subject science and provincial group strategy, researcher region/province, research area divided by province group, southern regional development strategy office, research funding source, distribution model, source of research, research copyright and data source, data collection method and consists of 16 concepts and 70 sub-concepts.

CONCLUSION

The results of research knowledge management system on problems, needs, and strategies of southern Thailand are used to investigate, confirm, and link the existing research knowledge in southern of Thailand, further, they are sources for further studies on research, innovations, national competitions, innovations ([Choo, 1996](#)) and can be developed as a recommender system database of research for development of southern Thailand. Knowledge structure consists of 2 domains, 20 classes, 139 concepts, 327 sub-concepts. We could discuss this as follows:

1. 2 domains consist of the research aspect domain and the research work domain.
2. The research aspect domain refers to knowledge related to the research for the development of southern Thailand which consists of 17 classes; each class consists of 113 concepts, and each concept consists of 215 sub-concepts.

3. The research work domain refers to knowledge related to the scopes of the research for the development of southern Thailand which consists of 3 classes such as 1) research documents, 2) basic information and 3) other related information. Each class consists of 26 concepts and each concept consists of 112 sub-concepts.

Additionally, the research findings could be applied in terms of the policy area and national strategies, for example, the body of research knowledge on tourism and agricultural development which is crucial for the national economy and resource. The government could take the knowledge into account the research or tourism policies, agricultural production as start-ups: Smart Tourism and Smart Agro Technology that supports production capacity and business value of products and services, responds to needs and expectations of customers enhances competition capacity in national level or applies as a part of solutions (Kewsuwun et al., 2019c). According to the knowledge management system, it could be concluded as in Figure 2.

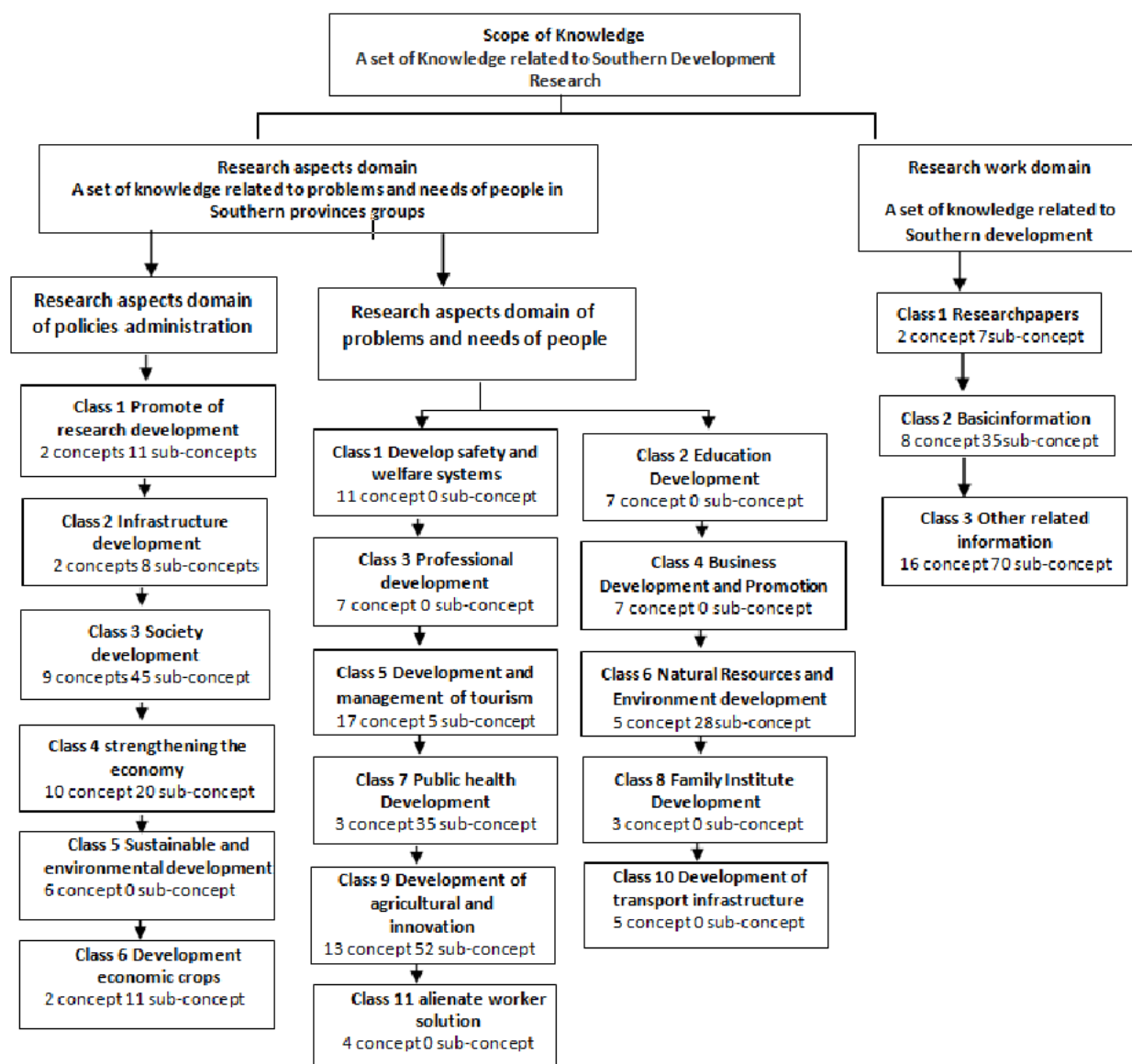


Figure 2: Overall of the result: Research knowledge management system on problems, needs, and strategies of southern Thailand.

LIMITATION AND STUDY FORWARD

The research limitations in the study concerns document review as follows: 1) on the problems and needs of the community, most problems and needs of the communities were surveyed by some agencies in the provincial level, it may result as they are not covered in all aspects and some parts are not being used in considerations or determined as strategies to solve problems 2) on research related to the south of Thailand, the researcher studied documents that distributed only at the national level due to access restrictions and the limit budget on accessing international documents, therefore, this study may not cover some issues.

The study forward, the researchers plan to improve the knowledge structure according to the research trend to align with various aspects of the south and Thailand. Therefore, researchers will gather the most updated, reliable, precise, and valid information to use in further research. Further development is value-added research on southern and covers development issues at the regional and national level to enhance long-term research and learning community.

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