
Dynamics of songkhla lake basin research in the south of Thailand

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Abstract The study aimed to investigate the dynamics of SLB research in the south of Thailand that can be used to integrate planning, decision making, and developing of the local area. It was believed that the knowledge development and research extension would increase the integrated management capability of Songkhla Lake Basin (SLB) for sustainable development. Focus group discussion was used as a tool to find out the dynamics of SLB research. The result of this study indicated that the future study of this particular area would be proactive that could match the aptitude of individual researcher to serve the requirement appropriately. The requirement was categorized into 4 sectors; a government sector, a community sector, an academic or expert sector, and a private organization sector. The outcomes of this study are useful information for the research management in SLB.

Keywords: dynamics, information system, research management, Songkhla Lake Basin (SLB).

Introduction

Songkhla Lake Basin (SLB) is located in the south of Thailand, lying in 3 provinces of Phattalung, Songkhla, and Nakorn Si Thammarat. SLB covers an approximate of 7,687 sq/km. of land area and an approximate of 1,042 sq/km. of the lake area for the total of approximately 8,729 sq.km. Songkhla Lake has a unique characteristic of 3-water ecosystem. The complex ecosystem has made the lake rich in biodiversity, natural resources, and environment. However, all rich resources in SLB have been deteriorated by various economic activities without reasonable effort to properly conserve and rehabilitate those resources. This area is unsustainable. Many problems have impacts to the quality of life and lifestyles of people in the community (Ratanachai and Sutiwipakorn, 2006). In 2005, the SLB master plan was initiated to specify the framework of the recovery and sustainable development of SLB as shown in Table 1.

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Table 1. The SLB Master Plan (SLBMP)

| | |
|------------|---|
| Strategy 1 | Rehabilitation of SLB natural resource and biodiversity, consisting of 5 measures Restoration of, and thereafter nourishing, forest in upstream part of the Basin; Restoration of, and thereafter nourishing, mangrove forest and peat swamp forest along coastline of the Lake, and around islands within the Lake; Provision of public land for inhabitants who may be displaced following the above measures; Dredging the Lake where appropriate, e.g., where siltation is severe, or where it is anticipated that dredging can restore abundance of aquatic fauna; and Restoration of rare and vulnerable aquatic fauna. |
| Strategy 2 | Sustainable use of SLB natural resources, consisting of 6 measures Management of soil resource and land use in SLB, in line with their natural potentials; Management of surface water and groundwater, in an integrated manner, both for consumption and other economic activities; Controlling the amount of freshwater pumped from the Lake during dry seasons; Management of water resource with emphasis on public participation; Improvement of drainage system and mass transportation system; and Sustainable management of fishery and aquaculture activities. |
| Strategy 3 | Pollution prevention and control, consisting of 6 measures Reduction of discharged nutrients, from domestic waste, industrial waste, swine farms and aquaculture activities, into the Lake; Installation of appropriate waste treatment systems for municipalities; Campaign for environmental awareness in pollution problems; Establishment of efficient and effective management scheme for solid wastes, with careful consideration on economic, social and political feasibility; Controlling land use and pollution source; and Improvement of environmental quality for communities along selected waterways, allowing sufficient participation from stakeholders. |
| Strategy 4 | Restoration and conservation of arts and culture, historical and archeological sites, tourism sites and local wisdom, consisting of 4 measures Restoration and conservation of arts and culture, tradition and local wisdom; Restoration and conservation and utilization of historical and archeological sites, and tourism sites; Development of network for learning and exchanging information about arts and culture, historical and archeological sites and local wisdom; and Promotion of sustainable tourism, in line with potentials of the sites, with careful consideration on communities' benefits. |
| Strategy 5 | Enhancement of efficiency in SLB administration and management, with emphasis on public participation, consisting of 5 measures Improvement of mechanism for administration and management of SLB natural resource and environment, so as to drive execution of the Master Plan; Enhancement of public participation; Establishment of mechanism for improving work culture; Establishment of mechanism where SLB database can be continually improved and update, while maintaining its integrity; and Establishment of a surveillance process where SLB development can be continuously and effectively monitored and evaluated. |

The development plan related to the area before the SLB development plan was the national economic and social development plan 1-10) Ministry Operation Center, Ministry of Education, 2009) starting from 1961 to present

(Fig 1). Furthermore, the National Research Council of Thailand (NRCT) was also involved. However, the overall of policy planning was parallel with the national plan.

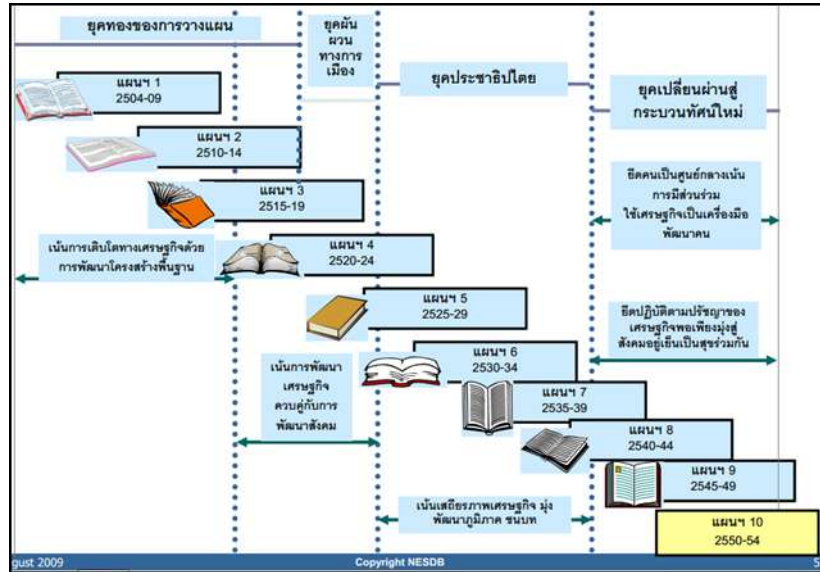


Fig. 1. The National Economic and Social Development Plan
Source: Ministry Operation Center (2009)

Research Dynamics

Dynamics refer to something of a process or system characterized by constant change, activity, or process. Therefore, the study on research dynamics was the study of research data from the past to present to find out the results that can reveal the past research and to support the research points and the future research direction which is relevant to Thailand Productivity Institute (2003) mentioning that the achievement of organizations was derived from the good selection and effective management of information technology. It was shown that the data were related to the direction and target of the organizations. Assessment and analysis revealed the actual management that would be able to improve and indicate the right target or right management direction as the basin management for sustainability. Also, research data are useful information and kinds of research for this area were conducted. If there were an effective research management system that could analyze the data relevant to the direction and the target, there would be a lot of useful information that was able to support the management in planning, decision making, and developing.

Songkhla Lake Basin Research Management Center (Faculty of Environmental Management and Research and Development Office, 2009) found the following issues; 1) a lot of data were being used in research management and planning but information in SLB had to be created continually with the right direction, and 2) main research issues of SLB should be created by issues or problems and questions relevant to the area. In addition, the results can be used to solve, conserve, and rehabilitate the SLB natural resources and environment. The study found redundancy and inconsistency of information that had been synthesized by specific objectives, not related to requirements of all user sectors. SLB researches did not support for integrated planning, decision making, and developing of the local area in the past. This study aimed to investigate the dynamics of SLB research in the south of Thailand. The investigation was divided into 3 parts; surveying and classifying data or research papers in the area, studying requirement of all sectors, and dynamics of SLB research according to based research findings of Hoffer *et al.* (2002), Diebold (1985), Partnership for rehabilitation of Songkhla Lake Basin (2010), Prince of Songkla University and Health Systems Research Institute (2004), Roodenrijs (2009), Search Software Quality (2000) and Songkhla Lake Basin research management center (2010).

Materials and methods

Studied Area

The studied area locates in the south of Thailand, lying in 3 provinces of Phattalung, Songkhla, and Nakorn Si Thammarat (Fig 2). Data and useful information can be found for continual creating of the relevant research issues in this area.

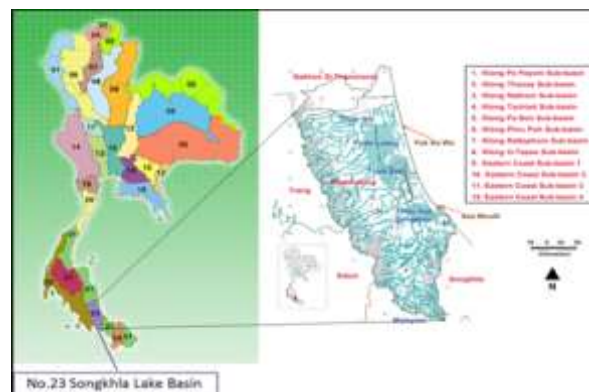


Fig. 2. Studied Area at Songkhla Lake Basin in the South of Thailand

Source: Department of Water Resources, 2006 and Institute for Social Sustainability, 2008

Focus Group Discussion

Focus group discussion with 8 groups of beneficiaries was taken along with the analysis of relevant documents. They were participants with various experiences and similar social backgrounds, such as researchers, lecturers, system administrators and staff. The objectives of focus group discussion were used to classify the research issues, to classify the research direction, and to design the requirement for the Research Management Information System in SLB that was a tool of data analysis (Fig 3).



Fig. 3. The Research Management Information System in SLB
Source: Tippayawong (2010)

Results and discussion

Current SLB Research Classification

According to the data, the total number of 1,284 research papers had been done in this area from 1970 to 2009 and was found in several organizations. The primary classification of research based on environment can be divided into 4 aspects; physical resources, biological resources, utilization of human values, and quality of life. Figure 4 shows that most research development focused on specific development. That is, the research for quality of life has the highest number of papers at 52.57%. This indicates the lack of balance in research for environment development. Besides, if analyzing into minor points, it was found that; (Fig 5).

For physical resources, the point of research for water has the highest number of papers at 72% while it was the least for air at 2%.

For biological resources, research on aquatic animals has the highest number of papers at 28% while research on benthos has only 4% of papers.

For utilization of human value, agriculture and livestock has the highest number of research at 63% but it was found least on the research on transportation at only 1%.

For quality of life, research on health showed the highest number of papers at 49% while research on politics and government, and security were found at 2% only.

From the study, it showed that there was a lack of balance in research development. This was due to the policy of research development and budget. Therefore, the specification on some aspects of research development could not solve the problem eventually and this affected the planning, decision making, and developing the SLB.

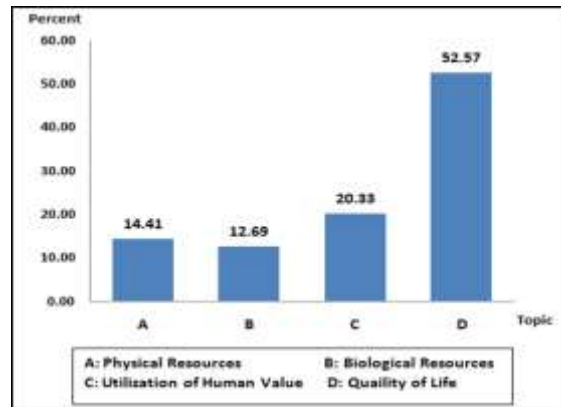
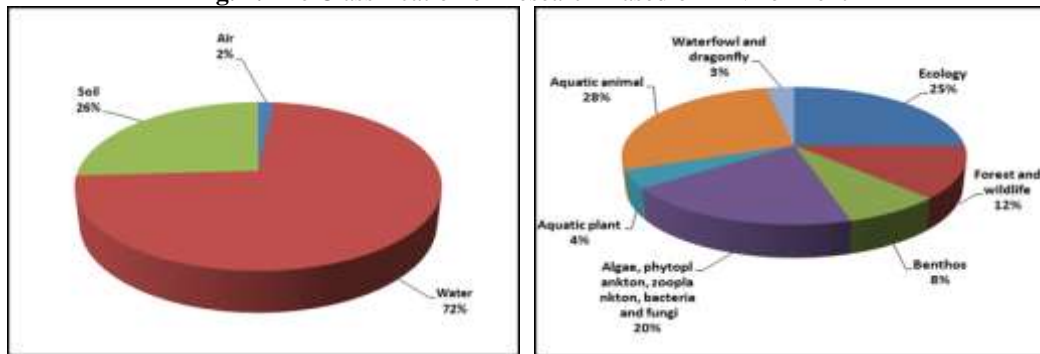
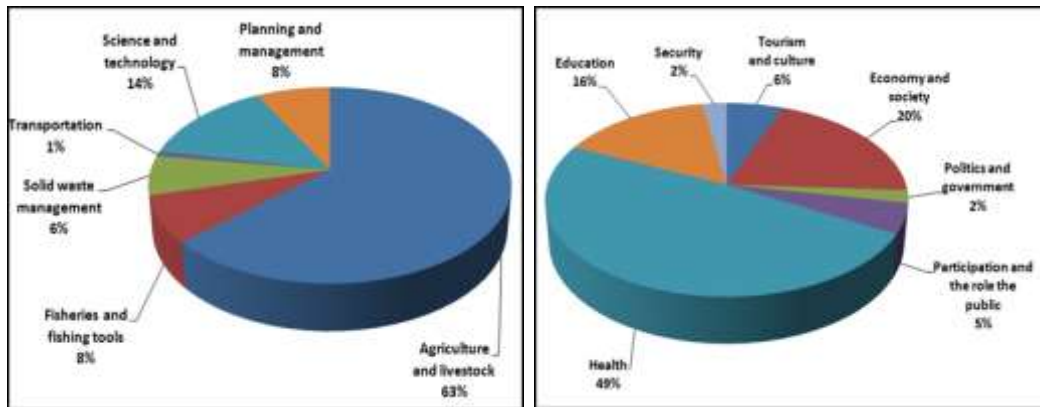


Fig. 4. The Classification of Research Based on Environment



A: Physical Resources

B: Biological Resources



C: Utilization of Human Value

D: Quality of Life

Fig. 5. The Classification of Research Based on Sub-topic of Environment

The classification of research based on SLBMP can be divided into 6 topics as follows: 1) rehabilitation of SLB natural resource and biodiversity, 2) sustainable use of SLB natural resources, 3) pollution prevention and control, 4) restoration and conservation of arts and culture, historical and archeological sites, tourism sites and local wisdom, 5) enhancement of efficiency in SLB administration and management, with emphasis on public participation, and 6) others (health, science technology, education, economy and community). Figure 6 showed that the overall research development was not relevant to the SLB master plan and in minor points of development concerning provision of public land and freshwater were found not being studied. From above, it is showed that most research topics were not related to the SLB master plan at the number of 573 or the percentage of 44.60. Besides, the provision of public land sub-topic and freshwater pumped sub-topic were not studied. This shows no balance in the research development according to the SLB master plan. If analyzing into aspects (Fig 7), the research found that researches on mangrove forest and peat swamp forest in rehabilitation of SLB natural resources and biodiversity were done most at 42%. The research on sustainable use of SLB natural resources was done at the number of 67%. Nevertheless, these researches were not significant for the SLB master plan. Researches on reduction of discharged nutrient in the pollution prevention and control were done at the number of 41%. Researches on arts and culture, tradition, and local wisdom in terms of the restoration and conservation of arts and culture, historical and archeological sites, tourism sites, and local wisdom were studied at the percentage of 54. Researches on SLB database in the enhancement of efficiency in SLB administration and management, with emphasis on public participation were done most with the papers of 35%.

The above findings indicated the lack of balance in research development and integration with organizations. These related to the report of the SLBMP revision and improvement (2011) mentioning that there was not enough integration of the plan among each organization. This affected the development in divisions. Besides, budgeting and the problem solutions for fishery tools, nature decadence, coastal erosion, water pollution and, water management were still unclear.

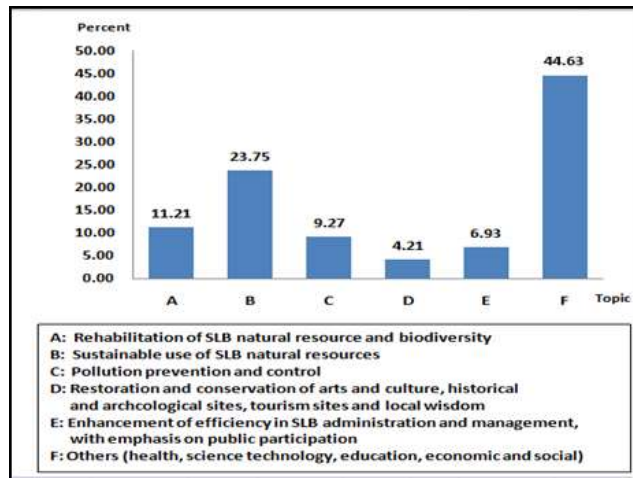
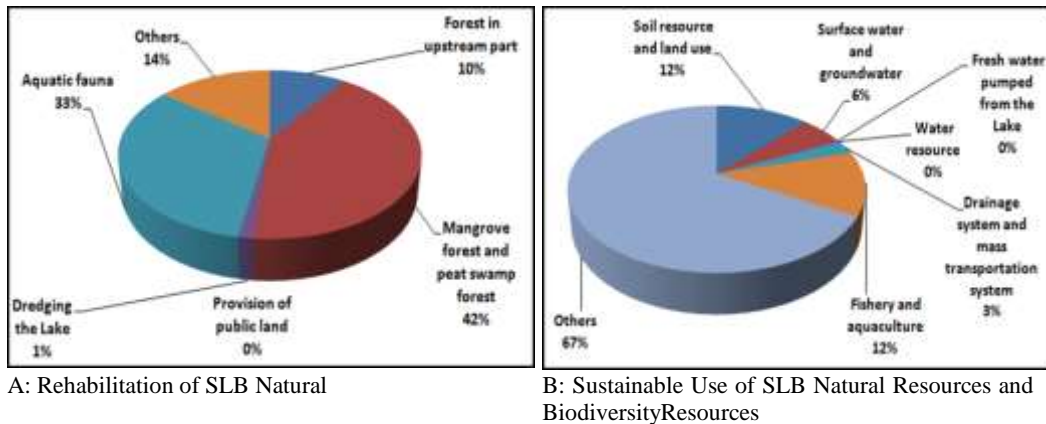
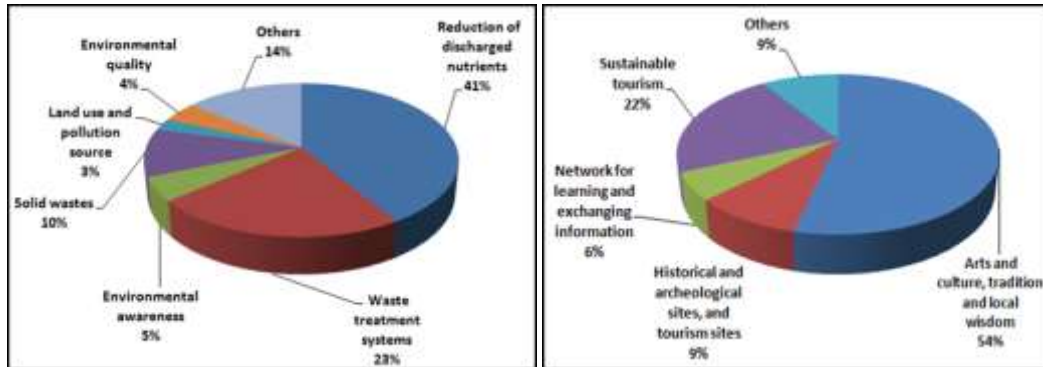


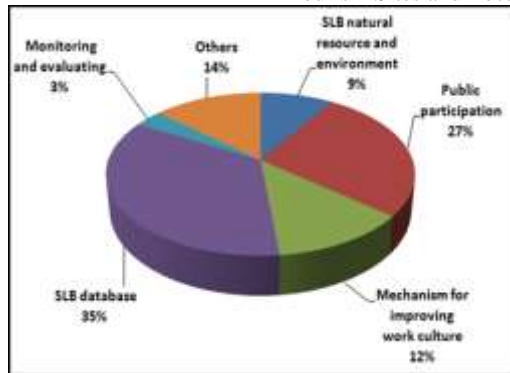
Fig. 6. The Classification of Research Based on Songkhla Lake Basin Master Plan (SLBMP)





C: Pollution Prevention and Control

D: Restoration and Conservation of Art and Culture, Historical and Archeological Sites, Tourism Sites and Local Wisdom



E: Enhancement of Efficiency in SLB Administration and Management, with Emphasis on Public Participation

Fig. 7. The Classification of Research Based on Sub-topic of Songkhla Lake Basin Master Plan (SLBMP)

Analysis of the Requirement for the Research Management Information System in SLB

According to the focus group discussion, the study found that the research requirements could be classified into 4 sectors; a government sector, a community sector, an academic or expert sector, and a private organization sector. Then research direction was classified into 4 dimensions; an environment, a community, Songkhla Lake Basin Master Plan (SLBMP), and a provincial strategic plan (Fig 8).

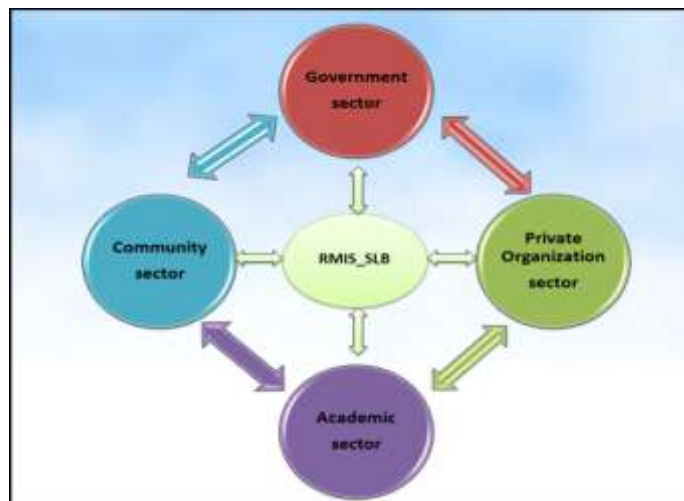


Fig. 8. The Sector Requirement for the Research Management Information System in SLB

Dynamics of SLB research

The aspects of development and research summarized from The National Economic and Social Development Plan (NESDP), Songkhla Lake Basin Master Plan (SLBMP) and National Research Council of Thailand (NRCT) were shown in Table 4-7.

Table 4. The Situation of Development and Research before 1982

| Period | Planning)Before 1982(|
|---------------------------|--|
| The Development Situation | laid emphasis on economic and social activity, and promoted the use of natural resources lack of planning, managing, and taking into account the environmental impact In 1981, the project started to develop the basin and the development plan began to focus on environmental issues. |
| Research Aspects | emphasis on the NRCT's 10branches, i.e., 1) physical science and mathematical, 2) medical science, 3) chemical science and pharmaceutical, 4) agricultural and biological, 5) engineering and industrial, 6) philosophy, 7) Law, 8) political science and public administration, 9) economic, and 10) sociological |
| Research Description | 48 papers focused on water quality, economy and society respectively provided few research, only 3.74% conformed to the academic section of NRCT |

Table 5. The Situation of Development and Research during 1982-1991

| Period | Research Development Beginning)1982-1991(|
|---------------------------|--|
| The Development Situation | improved natural resources utilization efficiency and environmental conservation program started to study the SLB Master Plan emphasis on the NRCT's 10branches Focus on the key factors for developing country, i.e., quality of life, natural resources and environment, science and technology, economic and social, politics ,and administration PSU has represented a SLB's committee in 1991 |
| Research Aspects | 123 papers |
| Research Description | focused on health, culture, tourism, and water quality gained a little more research, 9.58% conformed to the academic section but the research direction for area development was unclear Were activated by local institutes |

Table 6. The Situation of Development and Research during 1992-2001

| Period | Research Support)1992-2001(|
|---------------------------|---|
| The Development Situation | have extend using modern technology , law for conservative natural resources and budget the Enhancement and Conservation of the National Environmental Quality Act B.E.) 2535NEQA (1992 appointed a committee to review the SLB Master Plan for degradation and participated by the community sector focus on issues of national importance and urgency, i.e., social development, and economic performance |
| Research Aspects | 579 papers |
| Research Description | Focused on health, education, and water quality provided a large number of research, 45.09% not conformed to the area development aiming to manage natural resources and environment including urgent economic problems related to local researchers' ability and knowledge |

Table 7. The Situation of Development and Research during 2002-2011

| Period | Action*)2002-2011(|
|---------------------------|---|
| The Development Situation | have restructuring strategies for sustainable urban and rural development, and have emphasis on sufficiency economy used draft SLBMP and translated into action approved SLBMP in 2005 and used in 2007 focus on the potential of the country as follow: the sustainable development and self-reliance)agriculture) the increasing competence of competitiveness)science and technology and industry (Quality of life) health and social(|
| Research Aspects | 534 papers |
| Research Description | Focused on health, economy, society, human use, agriculture and livestock, and sciences and technology grew in numbers of research rapidly, at the percentage of 41.59 conformed to the research direction of NRCT but not to local development especially the master plan related to local researchers' ability and knowledge |

Note:* The research data was derived until 2009 and was shown the published only.

Dynamics of SLB research

Dynamics of research based on environment found that research topics concerning the quality of life topic and the utilization of human values tended to be more done while the physical resource topic biological resources topics might be less developed (Fig 9). Meanwhile, the finding of studying dynamics of SLB research showed higher numbers of irrelevant researches although the importance of the area's problem solution was mentioned in the area development framework during 2002-2011. Only the sustainable use of SLB natural resources topic was increased. However, it was also found that the points concerning the master plan were likely to be less done (Fig 10). From the result of this, it revealed researchers still give importance to human resources, economy, and society rather than natural resources and environment.

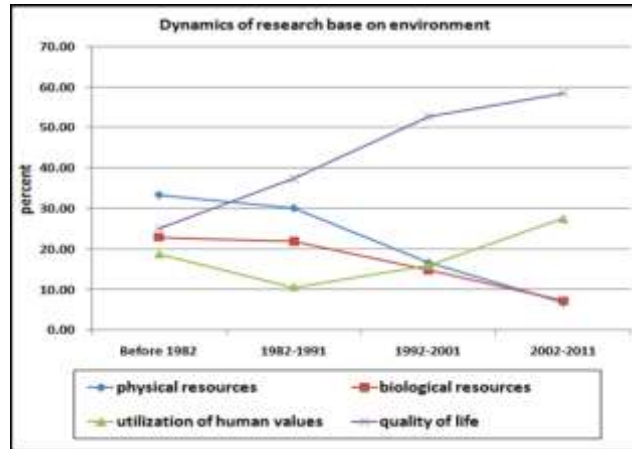


Fig. 9. Dynamics of SLB research base on environment

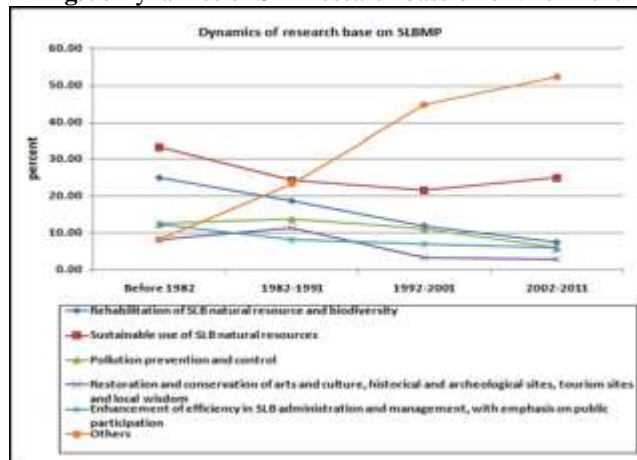


Fig. 10. Dynamics of SLB research based on SLBMP

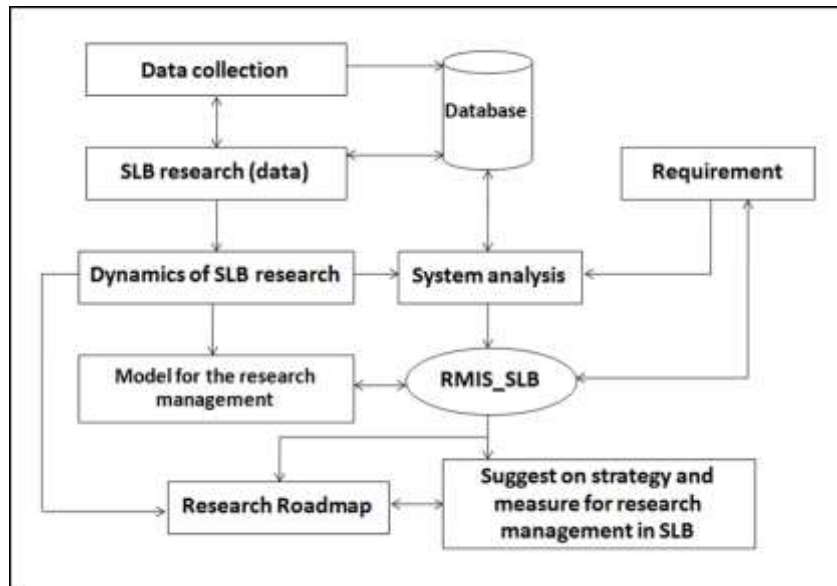


Fig. 11. Framework of the research management in SLB

From the research study at Songkhla Lake Basin from the past up to present, it is offered to divide the periods of research development or dynamics according to the concept of area development from the National Economic and Social Development Plan (NESDP), Songkhla Lake Basin Master Plan (SLBMP), and National Council of Thailand. It can be categorized into four periods as follows:

- 1) Planning (Before 1982)
- 2) Research Development Beginning (1982-1991)
- 3) Research Support (1992-2001)
- 4) Action (2002-2011)

Developed researches could be compiled to the number of 1,284 during 1970-2009 (Data gathered until 2009 and only authorized) with the method of grouping from the environment data and the master plan. The research found that the local institute provides the undergraduate program of public health and a large hospital for the academic study and the center of Southern Thailand. This enabled the research on health most. Also, when considering from research dynamics according to the plan of the area development, health was the most important. This did not conform to the master plan that aimed to manage natural resources and environment and the research on this topic tended to be done less. It revealed eventually that the master plan did not effect the research direction. Besides, it was shown that most researches, around 83.5%,

were from academic institutes which indicate most researches were done by academic researchers.

Conclusion

The study of research dynamics in Songkhla Lake Basin reflected the actual research development from the past until the present, and it could show the possible trend of research development in the future. Therefore, to develop the research to conform to the local plan and the needs of local organizations, it is needed to develop the information technology for Songkhla Lake Basin Research Management for the most useful information for this area. This aims for the future plan, decision, and development as follows (Fig 11):- (1) for other purposes such as the research for the requirements of local people, (2) for the research roadmap, (3) For create a model of research management of the Lake Basin with the data developed from RMIS_SLB for making a plan, decision, and development and (4) for suggestion about strategies and measure for research management in SLB.

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