RAD Design and Data Management Systems of Natural Resources and Local Wisdom

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Abstract. This research proposed the Rapid Application Development (RAD) design and data management systems of natural resources and local wisdom from the real data. The objectives were to: 1) collect local resources such as biological of local plant, animal, and the wisdom in the community; 2) study, organize and create an information system collection; 3) create a web-based application to present information of the data. The research used Rapid Application Development to plan and combining process from existed data to the web-based application for managing natural resources and local wisdom for data management. Natural resources and local wisdom data management at Tambon Ramdang is a case study of the successful implementation from the RAD design. The conclusion showed the lesson learn from this research and extended future work in this area.

1. Introduction

Technology and society can help each other to increase economic growth. It is highly complex data and interrelated with a massive value with social responsibility. There are many processes drive technological advancement; however, this paper picks up two theories for drawing the model from both scientific and social sources. The new technology is the result of rational thought independent of social influences. If the technology fit closely with the social and organizational factors, it will be effective work from a clear socio-technical view point [1]. However, social constructivism suggested that technological advance is the result of social influences. This research believed that social constructivism comes first and second, rational-objective view [2]. There is a research proposed SDLC database design collecting medicinal plants from Saudi Arabia [3]. It is few studies related with other database design. Therefore, this research tried to design an appropriate model and implement in the real situation by involved social influences.

From local resource operations to conservation of plant and natural resources and the treatment of Thai culture and wisdom and biodiversity. For example, a research created a local digital resources by using GIS and data management of champedak and local wisdom of Champedak gardener, satun province [4]. This research surveyed local plants in Tumbon Ramdang. Identify the source code of the original plant species and rare, endangered species, keep records not to lose, easy to find, also used for monitoring to grow plants. Alternatively, to propagate the plant. Community personnel have learned from the study of physical resources. Participants observed the survey information and record of their flora, fauna, and cultural heritage in the area. It is part of Thailand to raise awareness and establish a sustainable academic knowledge based. That will lead to conservation and preserve sufficiency economy as well. Plant Genetic Resources Center, as well as other resources including many
organisations and universities involve this project by linking information between the units that participate in the royal initiative.

2. Research Method

2.1. Method

Rapid Application Development (RAD) was developed to address the weaknesses of structured design [5]. With the use of tools and techniques to help develop the system quickly under the real situation and high quality systems, fast development and delivery, and low costs [6]. The villages have the considerable amount of data, and the user can also try the prototype. Creating the prototype module also generates the system quickly and provide the key to validate data [7]. The RAD methodology has introduced various techniques and tools to support the development of systems that can be implemented at various stages in the Systems Development Life Cycle (SDLC) less than Structured Systems Analysis and Design Method (SSADM). Figure 1 shows the RAD process which include the data collection process, analysis and quick design, prototype cycle (the cycle of demonstrate, refine and develop), testing, and development.

![Figure 1. RAD process.](image)

The development methodology for RAD has been broken down into several different approaches, including phased development-based methodology, prototyping-based methodology, and throw-away prototyping-based methodology. This research explains in phased development-based methodology approach. A research also suggested that RAD prototyping become important when the new technology such as software or hardware development was discovered [8].

This research used RAD development instead of SDLC. The process of the RAD development cycle consists of five parts: (1) first, the data source was collected by the people, students, SAO administration, (2) second, design by technical computer system using existed spreadsheet which contained the data source, (3) third, develop web-based system by using PHP and MySQL, (4) testing program, by implement in the real situation and complete the system test before the training, then make changes to the rapid development tools, (5) deployment, is the process of implementation and maintenance. This research combined the SDLC process with a RAD development cycle, and it can be seen as follows (Figure 2).

![Figure 2. SDLC and RAD integration.](image)
Figure 2 shows the comparison RAD model and SDLC, a software development process. It is iterative development by using prototypes instead of a step-by-step design like the SDLC of waterfall framework. The first stage, data from natural resources, i.e. varieties of the plant, animals, local wisdom of gardeners, and village information in spreadsheet form were used to analysis and quick design. The real data from Ramdang area made the software to be written faster and easier to change requirements. The second stage, the rapid demonstrate, refine data, created a prototype from preliminary existed data, and build the prototype. This stage, the researchers integrate the interview and activities to collect the data from the real situation in Tambon Ramdang. The third stage, the researcher developed the web-based applications followed the designed model combined with local wisdom data. The final stage, this technique merge testing and implementation into the same stage, various structure techniques, especially data-driven information engineering, with the prototyping design to decrease time-consuming of software developing process.

2.2. Data Collection

The government tried to collect natural resources systematically, and the objective of the systems is to collect data by using information systems for easy access and fast search. The vision of the chief executive of the Ramdang Subdistrict Administrative Organization (SAO) is to use modern information technology to store information and display the data. The local resources, both physical and biological, are collected. All nine worksheets used to collects manually from field surveys by community registra, biological registra or villager.

The existed data is complex and various forms. For collecting the original data Tambon Ramdang, SAO, provided the appointment of the Local committee for local resources. There are four resources: plant data, animal data, biological data, and cultural data and local wisdom data. The researchers had many meetings with personnel interview and community members in the village, such as community leaders, village heads, teachers and school administrators. They were involved in providing feedback and implementation. They also cooperated with Songkhla Rajabhat University to carry out their activities. Next step, the members of SAO selected the outstanding of biological resources, the cultural and intellectual resources of the area. There is an activity to complete resource level Kor.1. Then, they surveyed the preserved area of local resources, local animal, the biological resource at “Ta-Kae cemetery area” and identified the code of animal and plant species by providing the label.

This research used many programs for designing tables suitable for the variety of databases and most of them are useful for this cases, for example, MySQL Workbench. However, because we have existed spreadsheet files as a starter guideline. Each column of the spreadsheet was transformed into variables in MySQL table. Then, we defined the properties of each variable and defined the size of the primary key, secondary key of each table. After finished designing each table neatly, we established all relationships between tables. There are 31 tables and their relationships with Primary Key (PK) and Foreign Key (FK) in each table, showing in figure 3.

The researchers implemented the web-based system a few weeks later with PHP language and MySQL database. We created a system for local resources management as well as other functionality, and it eventually delivered at the end of a three-month period. A further three months was spent providing a software module in the SAO and offered a course administration. The third phase was spent in the maintenance program as well as making some further adjustments and training module. The project also had the fourth phase preparing for other developers in terms of re-engineering and upsizing the system onto an industrial-strength database platform.
3. Conclusion
This research proposed the Rapid Application Development (RAD) design and data management systems of natural resources and local wisdom from Tumbon Ramdang data. It showed that RAD could reduce the steps and time of design and implementation of the systems. The tables from the spreadsheet were handy for RAD design and MySQL developments and implementations. Moreover, it worked efficiently regarding the real situation, and accurate existed data and social participates. The benefits of this research are the SAO members can participate in the community personnel knowledge and understanding of plant necessary genetic information. They knew how to conserve genetics and collect the local resources database. Regarding system development, local resources were carefully stored in a database storage system which could be easily searched and it could be published to the people under their priority. Villagers or other participants can use information of local resources database such as sort, search, and save in digital form with high performance. For social impact, the local resource information will be useful for Ramdang students concerning learning with data storage. Understanding the recording of the local plant, animal information, local wisdom resources and create their opportunities to take advantage of the data stored.

Acknowledgments
The authors wish to thank the Chief Executive of the Ramdang Subdistrict Administrative Organization, Mr. Udom Takkara, for advising this study and provide the structure of the data sources.
In addition, the authors wish to thank the Computer Centre of Songkhla Rajabhat University that provide the information and experiences in testing and implementing.

References
[1] Tongkaw A 2013 Procedia Soc. Behav. Sci. 93 1467.
[2] Thamhain H J 2005 Management of technology : managing effectively in technology-intensive organizations (New Jersey: John Wiley & Sons Inc.).
[3] Hassan A et al 2017 Int. J. Adv. Comput. Sci. Appl. 8 5.
[4] Tongkaw A et al 2018 3rd Int. Symp. Expertise of Engineering Design Johor Bahru Malaysia.
[5] Beynon-Davies P et al 1999 Eur. J. Info. Syst. 8 3.
[6] Beynon-Davies P et al 2002 Inf. Sw. Tech. 44, 10.
[7] Pop D P et al 2014 Procedia Eng. 69 1172–1179.
[8] Kordon F et al 2003 Des. Autom. Embedded Syst. 8 4.