

Preliminary Database Application for Thai Production Saving Groups

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Abstract—The research aims to study, develop and compliance test of a suitable database system for the Thai Production Saving Groups. The institution plays an important role to strengthen micro-economy of the local communities in Thailand. Due to the institution is different from other financial institutions, available database systems do not fit to their work. This causes its routine work are still managed manually without any technological support system. This research starting from a basic technique focusing on a proper design of Graphic User Interface and the use of SDLC methodology to develop the prototype system. Then, after the system was fully functionally developed, it was tested by real users. The preliminary results of the database application includes the efficiency and compliancy of the developed database application. The statistical analysis shows the significant results, which indicated some benefits to operate the tasks; the first version of the system well supports routine work. In addition, as the prototype of database application developed from the real task, it provides invaluable benefits to small financial institutions especially in developing countries.

Index Terms— Management information technology, database application, production saving groups

I. INTRODUCTION

There are several types of savings banks in the world, and they provide for a strong national economy. Aside from these, there are also credit unions or Production Saving Groups. Credit unions are co-operative financial institutions, which provide powerful investment to the local economy and this institution has successfully established them throughout the world [1]. Credit unions are similar to Production Saving Groups but are different in terms of scale and policy. The main policy of credit unions and Production Saving Groups is driving their basic philosophy and objectives, which have a universal appeal to a diverse range of people who see benefit in achieving greater self-sufficiency in the running of their financial affairs [2].

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Although, credit unions and Production Saving Groups may be viewed as unique for each financial institution such as general saving bank, which provide powerfully money function more than credit unions and Production Saving Groups. Clearly, an objective definition of credit unions and Production Saving Groups is a 'purchasing' co-operative from the standpoint of its borrowing members, and a 'marketing' co-operative to its saving members [3].

In Thailand, the banking institution has several types of banks, such the government bank, commercial bank, credit-union and production saving groups, the methods of operation are different depending on their policies. For example, the bank of agriculture helps agriculturists to run their business by providing them soft loans. They also use IT, such as computer-databases, ATM, and internet banking. A similar institution is the credit union, which also uses IT to operate some functions like any bank. Then there is the Production Saving Groups institution, which falls under micro-economics and is located outside the urban spread.

Production saving groups are operated and supported by the community development department, ministry of interior, since 1974 and it has been encouraged in every Thai local community. The framework for operating is based on: (i) integrity (ii) sacrifice (iii) responsibility (iix) empathy (iiix) trust among members. The Production Saving Groups 4 have a budget to operate to fund members in the community. They offer services, such as soft loans (low interest), relief and welfare service, budget for operating business, and others. The production saving groups operates from deposited money (or promise to deposit) and uses forms to record each transaction which it uses together with the savings and load book (a small book) to record transactions. There are no automated devices in use. Some of production saving groups also use a software package but some functions cannot operate the tasks at hand. Just a few banks have adapted to IT for organizational purposes. Hardware or software has been around for the last decade or longer and software packages have been used to manage accounting in banks around the world and also provide powerful technology directed to this area. In history, banking or institutions involving money have accepted new technology to support tasks like enhanced productivity, support telecommunication, help with identification for investment and stored metadata [4][5][6][7].

IT has a meaningful effect on saving the time of the customers and the employees of the bank because it includes the teller system, customer database and more [8].

Focusing on large economic systems, Subhasish Dasgupta et.al confirmed that IT increases economic outputs through input consumption and accumulation [9].

Information technology is increasing the speed and reliability of financial operations and of initiatives to strengthen the bank institutional. Thus, we cannot ignore that the evolution of technology was a necessity of the current time especially we have to driven business on real world. Corresponding to Saeid et. al. who said, “Businesses need to adopt and embrace new technologies to provide excellent business operation and services to their clients” [10]. Returning to small institutions in the money system, namely Production Saving Groups which operate by old technology (manual), the question is: how to decrease risk and 5 manage well? There is a need to construct a suitable system that can help production saving groups.

The implementation and application of IT is a significant driving force behind many socioeconomic changes [11]. Database technology and the internet are powerful tools that develop information into a related data pattern [12]. For example, database tools have been managed into several task, websites is one type that directly influences bank’s effectiveness or institutional in money system [13]. Database systems improve accuracy in routine work. Corresponding to James A. G., internet improves the quality of banking, because it provides consistency and security for the information noted how internet-banking provide benefits to a banking operation [14].

IT in banking operations means task efficiency, and uses systems such as, E-payment for Business-to-Business (B-B) transactions system, and cash-management services. As we have seen, IT can improve several tasks in banking organizations. In the case of small institutions like production saving groups, the researcher wants to use information technology (IT) for real tasks.

We focus on how to use IT to support accounting and what tools are most suitable. The aim of this study is to develop the database used in Thai production saving groups. (Systems Development Life Cycle) SDLC methodology has been used to develop suitable systems, interviews and investigates the tools the system needs. Starting to researcher collects data, investigates and records data for Community Development Department, Ministry of Interior, Thailand, for planning to development then following to SDLC methodology.

II. MATERIAL AND METHODS

Sometime, advanced techniques or high-level methodology in computer science may not be able to provide any suitable system especially to real-world problems. Our design starts with very simple methodology. The prototype of database application was developed by using the accepted SDLC methodology, a term used in planning, analysis, design, implementation and maintenance. These make the methodology concepts powerful to construct our proposed

system, a useful system suitable for Thai Production Saving Groups institution.

SDLC methodology

The SDLC methodology is not new. The methodology within the SDLC process describes basic steps of system development usually includes a sequence of activities to develop a suitable system for developers or designer to follow. These steps are preliminary analysis, systems analysis, requirements definition, systems design, development, integration and testing, maintenance and evaluation [15].

Schneiderman's eight golden rules

Eight golden rules of interface design have been developed by Schneiderman which provides a useful suggestion to design a suitable user interface of the system [16]. The eight rules contains the guide points includes; (i) strive for consistency (ii) enable frequent users to use shortcuts (iii) offer informative feedback (iv) design dialog to yield closure (v) offer simple error handling (vi) permit easy reversal of actions (vii) support internal locus of control (viii) reduce short-term memory load. We adjusted and selected some points of the golden rules to development our system with a basic design.

Database concept

Database or database system is basically a collection of information organized, which provides easily access to the data when the data has been collected the information in two dimension table. Normally, the databases are organized by fields, records, and files, the data has been assigned into table, which have relation in each table [17].

Based on three reviews, SDLC, golden rules and the concept of database are used for preliminary development of the prototype database system for Thai production saving groups institution.

A. Interview routine operation (Planning)

Before designing a prototype system, a routine operation of Thai production saving groups, containing three categories follows in figure 1 below attachments.

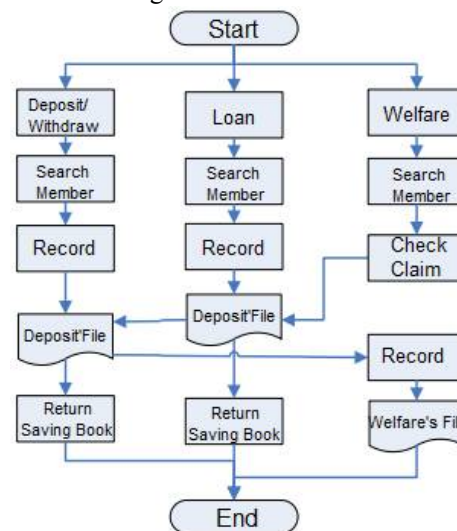


Fig. 1. Flow chart of routine operation of Thai production saving groups, operated manually

Deposit/withdraw process

This process starts when a member wants to deposit or withdraw from their account; they need to use a savings book to record the transaction.

The officer will search the file document (paper) then records both saving book and file document. The transaction figures are entered into the saving book and file document, which are updated then the savings book is returned to the member.

Loan process

This process starts when a member wants to loan money. It is necessary to check the information of the member's account (deposit or withdraw of file document) to check the balance corresponding to the rules (loan proportion is not more than 2 times the balance). When the loan has been approved, the officer will write the loan details into the loan book and file document. The loan book will be returned to the member, on the due date to pay back the loan, the member will take the loan book to the officer to minus the loan balance until the loan balance is zero; then the member can take a new loan.

Welfare process

Welfare is a service to support members of Thai production saving groups, which help members in health care costs or in emergency cases. Welfare services will pay money to the member corresponding to the rules, which depend on the balance and the member's age. The process starts when a member shows a medical-receipt from a hospital or clinic to the officer, and then the information will be retrieved from the loan file and deposit file to check the welfare level. The levels are separated follows:

- Deposit 0-49,999 welfare level 1, pay 300 baht
- Deposit 50,000-99,999 welfare level 2, pay 600 baht
- Deposit 100,000-149,999 welfare level 3, pay 900 baht
- Deposit 150,000-199,999 welfare level 4, pay 1,200 baht
- Deposit 200,000- 249,999 welfare level 5, pay 1,500 baht
- Deposit 250,000 hereafter welfare level 6, pay 1,800 baht

*Note that, currency 1 USD = 35 Thai baht and member age much more than seven years



Fig. 2. On the left: a file document (deposit) and saving bank book, which are used together with file categories (see picture on the right), which are separated by group numbers 001-999. The file document contains member information such as name, deposit, loan and welfare information

B. Analysis of the systems

A use case diagram is a tool to represent a user's interaction with the system. The diagram shows the relationship between the user and the different use cases in

which the user is involved [18]. The diagram is graphical and shows the details of the process in the system. The officer is a representative of the user, which directly interacts with the system. Figure 3 shows the use case diagram for Thai production saving groups.

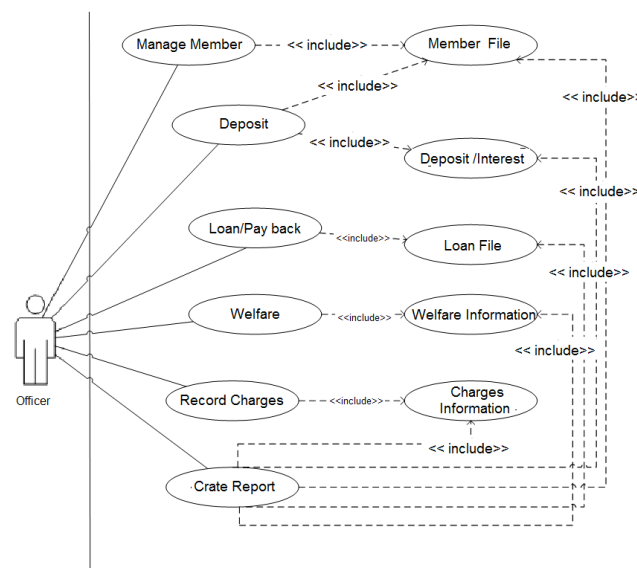


Fig. 3. On A use case diagram for Thai production saving groups

C. Design graphic user interface

In this step, designing the graphic user interface is an important step that would affect the user, especially the real user who uses the system (from interviews). In this step, the designs graphic user interface (GUI) needs to be carefully developed because this system is also used by an officer who has never used any system or has no computer skill. Thus, the system needs a common and clear interface. To make the GUI useful to the user, Table 1 shows detailed opinions from pilot 30 officer-users that affect the system of Thai production saving groups. In designing the SDLC we also use a questionnaire to elicit the opinions of the user. The developer has created four GUI patterns (Figure 5) for this purpose and is shown in table 1.

TABLE I
 THE RESULTS OF QUESTIONNAIRE, WHICH INDICATED APPROPRIATE GUI FOR THE SYSTEM

Point to considered	A	B	C	D
1.Suitable GUI to use with routine work	26.25%	16.42%	18.56%	38.77%
2.Screen size directly effects work	28.65%	21.95%	24.15%	25.25%
3.Front size	16.09%	19.79%	28.50%	36.62%
4.GUI easy to understand	29.25%	11.37%	28.26%	31.12%
5.Which color is clearly screen	Blue	Brown	White	White

Table 1 shows opinions from pilot users who used the system, and they are shown in percentages (1-4) apart from question 5, which shows the choice of which color is appropriate to the new system. The first question involves suitable GUI for routine work, such as the deposit process, withdrawal process, loan process and the welfare process. The results show that GUI pattern D has a high percentage, at 38.77%, because users ignored the banner, which is unnecessary and they wanted the GUI to provide a larger scale.

Moreover, font size is important, especially for older users. Second, screen size directly affects the efficiency of work, and the opinions are not different. A, B, C, and D have suitable area but A has 28.65 % (more than each pattern) because, users intimate that pattern from a website.

Third, font size is useful to GUI. Pattern D has a suitable screen with big front size, and 36.62 % of the users agreed. Fourth, what GUI pattern will make the user easily understand. Majority opinion shows pattern D is appropriate to put any information or button or picture and is highly visible. The last question is color for a clear screen. Majority opinion was in favor of white, because contrast and visibility of GUI are a big issue and the design process in SDLC methodology needs to consider this.

Thus, the majority of users in Thai production saving groups want GUI pattern D. The developer has mixed two patterns of GUI, the first one uses pattern D to be the menu in the main system, and then uses pattern A in the next page for routine work.

D. Implementation

According to previous steps for developing a prototype of preliminary database application, the developer approached construction of the system by php language, which is an appropriate and suitable tool with each functional process. The final system, after development, will be a stand-alone program, able to support routine tasks. 10 The principle of database has been used to construct the system, which is accepted as a database model for constructing the system. A relational database is a concept relating to the method which explains how to collect data items and organize them as a set of formally-described tables. The data can be accessed or reassembled in many different ways without having to reorganize the database tables [19].

After finishing the first stage of development (not complete in all functions), the system has been tested by real-users. Routine tasks have been tested by typing the deposit process into the system and testing the process to make a report of each transaction. The results show that the functional deposit is not working because the user wants to adjust font size and fix the total balance of the transaction. Thus, the first model will be improved according to the needs of the real-user.

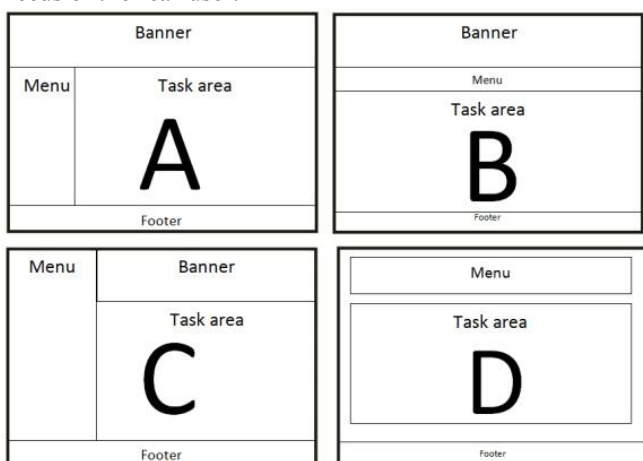


Fig. 4. Main menu of a prototype of preliminary database application for Thai production saving groups

The GUI in Fig. 5 operates a deposit task, includes the interest function (sub-process). The deposit process has been used together manually. To use the deposit system, the user needs to find the member by member ID then select year and month, types the value (money deposits per month) into the text-box and clicks calculates (green button), the data will record into the database. If the user wants to print this transaction, the print report function is in the main menu to print each transaction. Whereas, the GUI in Fig. 6 operates a deposit task, includes the interest function (sub-process). The deposit process has been used together manually. To use the deposit system, the user needs to find the member by member ID then select year and month, types the value (money deposits per month) into the text-box and clicks calculates (green button), the data will record into the database. If the user wants to print this transaction, the print report function is in the main menu to print each transaction

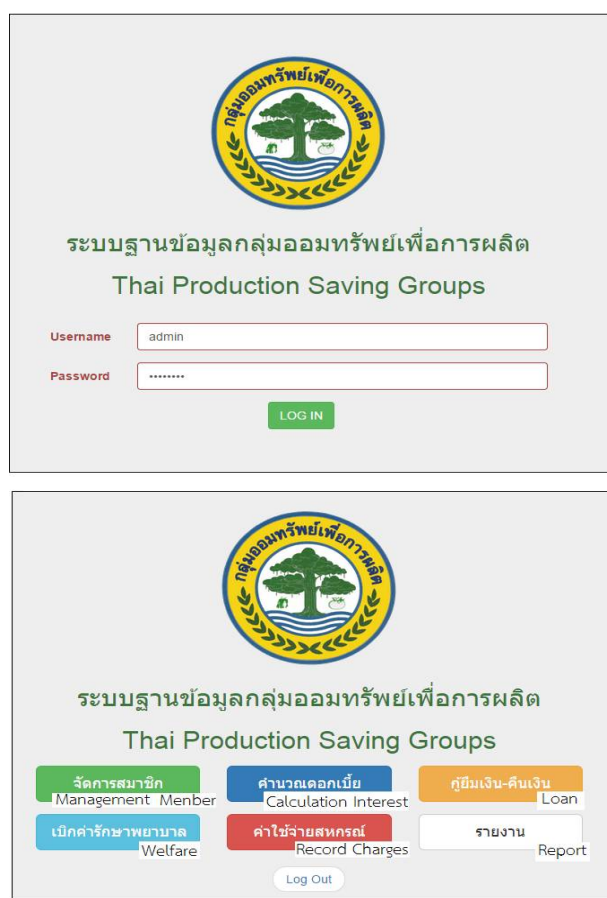


Fig. 5. Graphic user interface of main page of the system.

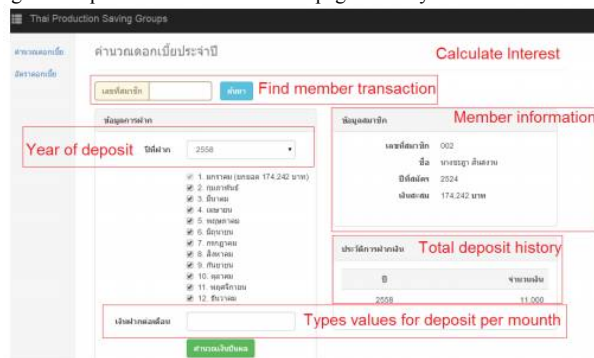


Fig. 6. Graphic user interface of deposit task

In the Fig. 7 shows the graphic user interface of the system, which supports the loan process. This function is as follows: (i) find the member ID (ii) types the value (money to loan), types guarantee member by finding the member ID, and then information will show to official-user to determine a loan offer. However, the system will block the loan process when the totals of deposits are lower than the loan offer. The system will compare the total money of the bondsman before approving the loan. The information such as the loan history of that member will display on the right hand side

Graphic user interface of the system in Fig. 8: This supports the welfare process. This process starts searching members then the system will display welfare information, such as name, year of member, welfare amount, and history of welfare. After the welfare information has been shown on the right hand side, the user needs to select the institution of treatment, for example hospital, clinic, the user then types the money value into text box and types name of user

The function of report in each process in Fig. 9 has been tested to support the needs of the user and routine tasks. The picture shows an example of the report in interest function (subset of deposit process). Moreover, the report function supports each process of the system without the main process, instant print member information, and summarized total of monthly allowance.

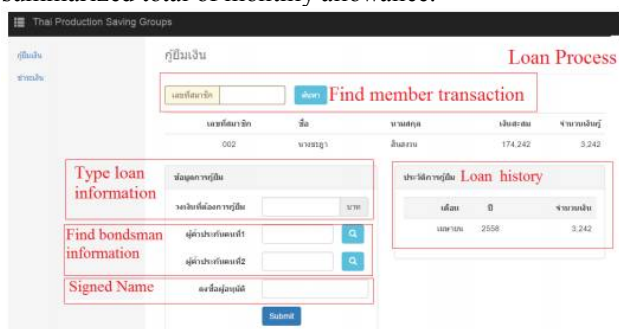


Fig. 7. Graphic user interface of loan process

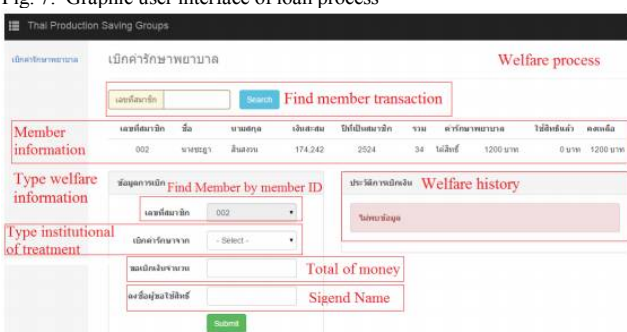


Fig. 8. Graphic user interface of welfare process

รายงานเงินฝากและดอกเบี้ย (99 เมษายน 2558) Report of deposit information and interest

เลขที่สมาชิก	ชื่อ	นามสกุล	ปีเกิด	ปีสะสม	ยอดเงิน
001	นาย เสาว	นายเสาว	2548		22,100
002	นาย เสาว	นายเสาว	2524		163,242
003	นาย เสาว	นายเสาว	2524		27,233
004	นาย เสาว	นายเสาว	2544		92,500
005	นาย เสาว	นายเสาว	2544		55,800
006	นาย เสาว	นายเสาว	2542		26,000
007	นาย เสาว	นายเสาว	2524		90,045
008	นาย เสาว	นายเสาว	2542		60,000
009	นาย เสาว	นายเสาว	2544		34,700
010	นาย เสาว	นายเสาว	2524		102,400
011	นาย เสาว	นายเสาว	2524		37,100
012	นาย เสาว	นายเสาว	2528		58,352
013	นาย เสาว	นายเสาว	2538		26,000
014	นาย เสาว	นายเสาว	2524		135,000
015	นาย เสาว	นายเสาว	2524		45,800
016	นาย เสาว	นายเสาว	2524		24,900
017	นาย เสาว	นายเสาว	2528		40,370

Fig. 9. Results of example of the report in interest function

The first generation of the system has been performance tested: The field test has been used to evaluate the real operation of tasks, by 20 end-users separated in two groups. By means of a questionnaire, the users could compare efficiency between the traditional operation (manual) and the new system. The first group (Group A) was composed of users totally unfamiliar with the database system whereas in the second group (Group B), most of the users had some level (although a small one) of related system experience. Both groups of users (experienced and non-experienced) were variables that the developer monitored, and measured by their performance. A t-test and simple descriptive statistics were used to measure and analyze the data, because they are the simplest and most suitable to measure variables between one dependent and one independent.

The t-test was used to measure the significance of statistical difference between pairs of variables, (it measures the correlation between performance and the independent variables). The statistical analysis was tested, the results are as follows: Statistics for performance in relation to use the system, table 2 shows the descriptive statistics and t-test analysis for their performance in relation to their expertise of user. We have set the hypotheses as follows:

(H1): the performance of the use of system in group A and Group B are different

(H2): the performance of the use of system in group A and Group B are not different.

Results in table 2 agreed with hypothesis when p-value is 0.22 and greater than $\alpha = 0.05$. Thus, the performance of the use of system in two groups of users is not different.

TABLE II
 STATISTICS FOR PERFORMANCE OF SYSTEM

Group	Mean	Variance	t	p-value
Performance Group A	8.75	0.20	2.01	0.22
Performance Group B	9.26	0.19		

III. CONCLUSION

Our system development employed the SDLC methodology, which provides suitable direction to develop the prototype database system to handle the real operational tasks of the Thai Production Saving Groups. As shown, it is compared to the general database systems (especially commercial software), which cannot handle the real operational task of the institution. This is because the requirement of the institution is unique, so its operations are not the same as other institutions. According to the golden rules design, the graphic user interface from user selection can directly provide useful operation in their routine work, because components such as buttons, text-boxes, text size, etc. are indicated into suitable areas on the graphic spaces.

From the statistical analysis above, the experimental results show the performance of users when operating the real tasks and also the usefulness of the system. Two groups of samples, A and B were collected to compare the users' experience which tested by sample t-test.

The result confirms that our system can provide support to users who both have and have not system experience.

As the result, the development of the prototype of database application can support the institution. The development of the useful system provides a tool to manage and construct social values, add value to the community and encourage the community economy to strengthen the economy of the nation. For our future work, we would consider about the database security and network connection, which are important points to do in the next version.

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