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A Conceptual Model for Home Budget based on Soft System Methodology and MVC pattern

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Abstract

In this paper we present a preliminary study of how 10 families in the Depok, Indonesia earn, save, spend and understand money and family finances. The lack of awareness on the importance keeping record of income and expenses and the need to create a spending plan is a problem faced by every family, it is necessary to identify unstructured problems in family financial management in a holistic perspective. This study aimed to propose a conceptual model of family financial management Home Budget system with Soft Systems Methodology (SSM) approach and Model-View-Controller (MVC) software design pattern to complete the lack of techniques in SSM.

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1. Introduction

Lifestyle, environment, and skills to manage money become an influential factor for someone to organize and supervise their personal funds. Financial management problem is not just a problem for individuals, but also in the family life [1], [2]. The increasing needs of life, and changing patterns of consumer spending are unavoidable, then it is proper financial management must be observed by prioritizing or major needs in advance than other temporary needs in the short term [1], [3], [4].

Family financial planning is a continuous process in managing finances in order to achieve goals in life. Life goals include buying a home, set aside for education, and saving for retirement [3]. Good financial planning and maintaining financial stability would help in preventing the financial crisis [5]. The best way to escape from the financial crisis is to do the planning and financial records regularly, is to create a budget and spending plan to tackle the debt and have the ability to save [6][7]. The key to success in financial planning is to diligently keep financial records and consistently towards the implementation of the plans that have been made [1], [2], [4].

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Four steps to make family financial planning as follows [8]:

- 1) Make a budget, a family can view their financial status, and to see where spending should be reduced [4].
- 2) Develop a plan to reduce debt, can be done by planning to periodically reduce the total debt as a percentage within a few years, or with a plan to pay off the debt in a few years [1].
- 3) Plan savings, planning for savings is important, especially when there is an emergency matter, and also for other purposes such as holidays. The trick is to set aside two months of income for 3-6 months or by setting aside a percentage of income to save each month [2].
- 4). Create a spending plan, after performing the above three steps, necessary adjustments to spending plans that the family's financial condition remains on track [9].

To resolve that problem, then we proposed a concept model of the Soft Systems Methodology[10] and MVC technique [11] to help them tracking their financial situation.

2. Soft System Methodology

Soft Systems Methodology (SSM) was introduced by Peter Checkland in 1981 at the University of Lancaster UK. SSM is an action research methods and use models to facilitate the manufacture of consensus where there is a difference in purpose, needs, desires and values by different stakeholders. As a methodology based on the system in order to address the problems in the real world, SSM help analysts and stakeholders in understanding a different perspective.

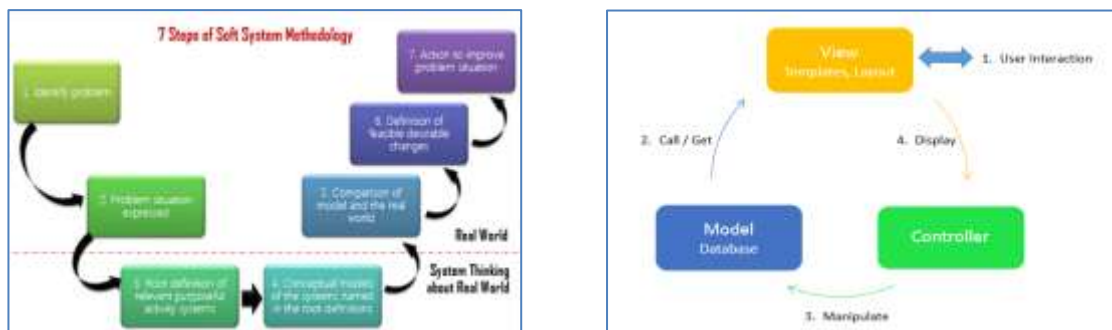


Fig. 1. a). Seven Steps of System Methodology [11] ; b). Components of the MVC [10]

SSM models traditionally have seven different stages [7], [9], the model consists of two types of activities: activity in the real world (stage 1,2,5,6 and 7) as well as the activity of systems thinking (stages 3 and 4), complete stages are as follows: a). Stage one - elaborate on problem situations; b). Stage two - declared the situation a problem; c). Stage three - establish root systems relevant definitions; d). Stage four - build conceptual models; e). Phase five and six - compared with the world; (f).Phase seven – desirable action.

3. MVC (Model View Controller)

Model-View-Controller (MVC) is a software architecture for implementing the interface. MVC introduced by Trygve Reenskaug in 1970 at Xerox PARC. According to him, the goal of MVC is to bridge the gap between human mental models and digital models on the computer [11], [12].

Components of the MVC [11], [12] as followed :

- a. Model, as a central component, serves to capture the behavior of the application in accordance with the problem domain, a model directly manages the data, logic and application rules.

- b. View, is a component that is responsible for generating the representation of the output to the user.
- c. Controller, is a component that receives input and convert it into a message to the model or view.

The benefit gained by adopting the MVC architecture is to easily manage the application when there is a change in one component [11].

4. Methodology

This research applies a combination of soft system methodology (SSM) and software design pattern Model-View-Controller (MVC) using ideas from Mingers Multimethodology [13] to guide software development. A known limitation of SSM is the lack of techniques required to initiate taking action. This limitation is overcome in our approach by the usage of MVC software design [12][13][14].

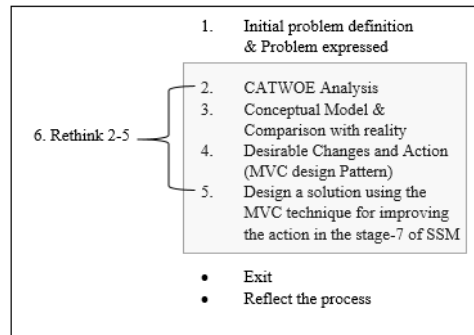


Fig. 2. Rich Picture Home Budget [11]

The steps in our framework for mixing SSM and MVC can be devised in detail as shown in Table 1. The SSM evaluation of the problem in our framework (see Figure 1) corresponds to the first three stages listed in Table 1. [14].

Table 1. The steps and related methods in the proposed framework for mixing SSM and MVC technique

1.	Express the problem situation as experienced, using rich pictures;
2.	Model the relevant conceptual systems using CATWOE analysis, root definitions, and conceptual models;
3.	Compare the models and real world to arrive at an action that is acceptable to all stakeholders and bring about improvement in the situation. It is defined as an agreed conceptual model of the human activities that will bring about improvement
4.	MVC software design pattern: <ul style="list-style-type: none"> - Expand the conceptual model into a conceptual data flow diagram (use case diagram), - Model the concepts required to represent the output using a logical view (domain class diagram), and - Create the controller that receives input and convert it into a message to the model or view (deployment diagram).

5. Applying SSM and design the solution using MVC technique

5.1. Stage 1 and 2 - Problem Identification & Problem Situation Expressed

Most of the financial problems that arise in a family background because of the lack of knowledge regarding good financial management [4], [15].

Problems or mistakes that often occur in home financial management as follows:

- 1. Problems to define the purpose or ideal finance vision [1], [4].
- 2. Problems in the management of cash flow [1], [6].

3. Risk management problems [3], [6].
4. Defects in investing [3][7].



Fig. 2. Rich Picture Home Budget [11]

5.2. Stage 3 - CATWOE Analysis

Results of identification CATWOE (Customer, Actor, Transformation, Weltanschauung / World View, Owner, Environment) are used as a tool to establish the meaning of value [11], [12], [16], as described in Table 1.

Table 2. CATWOE Analysis

Client	Husband / Wife (family member)
Actor	Husband / Wife (family member)
Transformation	The need to have a better family financial planning management
Worldview	Family trust that better financial management will be increase quality of life, financial health, then the happiness of family
Owner	Husband / Wife (family member)
Environment	Location (place where family live), Lifestyle, economic global

5.3. Stage 4 & 5 - Conceptual Model of Home Budget & Comparison with Reality

In stage 4 we demand to expand our preliminary result by collecting other data from all perspective in the financial management components. The conceptual model in this study is presented in Figure 3.a).



Ages		Finances shared with a partner		Activities	Done	Undone
60-69	1	Yes	7	Record income	✓	
50-59	2	No	3	Prioritization of expenditure		✓
40-49	2			Specify the budget expenditure		✓
30-39	3	Numbers of children		record expenses		✓
20-29	2			investment allocation		✓
	2			allocation of savings		✓
	1			allocation insurance		✓
	0		4	Monitor the financial health		✓

Fig. 3. a). Conceptual Model of Home Budget ; b). Comparison with reality

Next stage, model is compared with the real world situation as a validated process (the discussions resulted in the consensus among the concerned people as well as the changes that can be implemented to improve the situation) [8] [9]. There are following questions: a). Efficiency: How big is the perceived benefits compared to business users issued to be able to use this application?, b). Effectiveness: Is this system can help users to control and perform financial management?, and c). Efficacy: Is this system easy to use?

5.4 Stage 6 & 7 – Desirable Changes and Action

Based on the comparisons made in the former stages, the following changes can be considered: a). Creating a budget; b). Setting debt reduction goal; c). Setting saving goal; and d). Developing spending plan.

Design a solution using the MVC technique for improving the action in the stage-7 of SSM. First, expand the conceptual model into a conceptual data flow diagram (use case diagram) as described in Figure 4(a). Use case diagrams are used as the basic for analysis in the development of system models [10], [12], [17]. The second, build class diagram (see Fig. 4(b)) to described Logical View of the system such as, how the system of the Home Budget and how each class interacts with one another.

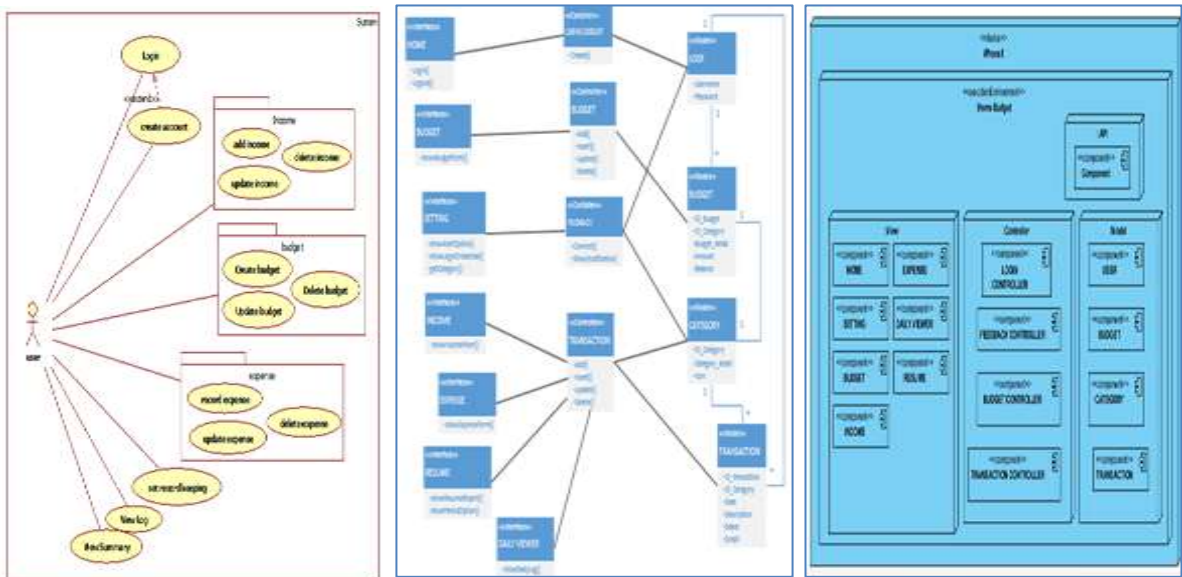


Fig. 4. (a) UML diagram;

(b) Class Diagram;

(c) Deployment Diagram.

The last, Home Budget system implemented connected modules using the deployment diagram (see Fig. 4.(c)).

6 Conclusion

The Soft Systems Methodology (SSM) targets process modelling and identifies unstructured problems in financial management as well as placing unclear problem solutions in a holistic perspective. This

approach provides the possibility of capturing the change that is necessary to prepare the suitable home budget system that will answer the family need. A known limitation of SSM is the lack of techniques required to initiate taking action. This limitation is overcome in our approach by the usage of MVC software design [12][13][14]. Applying this methodology to design the home budget system for families in Depok, Indonesia, shows the potential of SSM and MVC for design Home Budget system in the financial management problems.

References

- [1] C. L. Bird, A. Şener, and S. Coşkuner, "Visualizing financial success: planning is key," *Int. J. Consum. Stud.*, vol. 38, no. 6, pp. 684–691, 2014.
- [2] J. J. Kaye, M. Mccuiston, R. Gulotta, and D. a Shamma, "Money Talks : Tracking Personal Finances," *Proc. 32nd Annu. ACM Conf. Hum. factors Comput. Syst. - CHI '14*, pp. 521–530, 2014.
- [3] A. J. Murphy, "Financial Plan for Your Life and Career Goals," *Simulation*, vol. 29, pp. 128–130, 2002.
- [4] P. Babiarz and C. a. Robb, "Financial Literacy and Emergency Saving," *J. Fam. Econ. Issues*, pp. 1–11, 2013.
- [5] B. A. Hamid, "PSYCHOGRAPHIC FACTORS : DOES IT INFLUENCE PERSONAL BANKRUPTCY IN PSYCHOGRAPHIC FACTORS : DOES IT INFLUENCE," no. August, 2015.
- [6] E. W. Gadsby, J. Segar, P. Allen, K. Checkland, A. Coleman, I. McDermott, and S. Peckham, "Personal Budgets, Choice and Health," *Int. J. Public Priv. Healthc. Manag. Econ.*, vol. 3, no. 3, pp. 15–28, 2013.
- [7] P. Finance, M. Practices, T. Level, and S. Community, "Personal Finance Management Practices and the Financial Stability of," vol. 4, no. 1, pp. 14–21, 2014.
- [8] A. Gasiiorowska, "The relationship between objective and subjective wealth is moderated by financial control and mediated by money anxiety," *J. Econ. Psychol.*, vol. 43, pp. 64–74, 2014.
- [9] G. Fischer, A. Schoar, A. Economic, and J. Applied, "Keeping It Simple : Financial Literacy and Rules of Thumb The MIT Faculty has made this article openly available . Please share Citation Accessed Citable Link Detailed Terms Keeping it Simple : Financial Literacy and Rules of Thumb," 2015.
- [10] D. Pop and A. Altar, "Designing an MVC Model for Rapid Web Application Development," *Procedia Eng.*, vol. 69, pp. 1172–1179, 2014.
- [11] M. R. Mehregan, M. Hosseinzadeh, and A. Kazemi, "An application of Soft System Methodology," *Procedia - Soc. Behav. Sci.*, vol. 41, no. August 2015, pp. 426–433, 2012.
- [12] D. Avison and G. Fitzgerald, "Methodologies for Developing Information Systems : A Historical Perspective," *Past Futur. Inf. Syst.*, pp. 27–38, 2006.
- [13] J. Mingers and I. Munro, "The Use of Multimethodology in Practice - Results of a Survey of Practitioners," pp. 369–378, 2002.
- [14] K. Sewchurran and D. Petkov, "A systemic framework for business process modeling combining soft systems methodology and UML," *Inf. Resour. Manag. J.*, vol. 20, no. 3, p. 46, 2007.
- [15] M. Kebede and P. D. Candidate, "Financial Literacy and Management of Personal Finance : A Review of Recent Literatures," vol. 6, no. 13, pp. 92–107, 2015.
- [16] W. B. Liu, W. Meng, J. Mingers, N. Tang, and W. Wang, "Developing a performance management system using soft systems methodology: A Chinese case study," *Eur. J. Oper. Res.*, vol. 223, no. 2, pp. 529–540, 2012.