# THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

# Soft System Methodology Implementation in Extraction of Knowledge about School Tuition Payment Problem

# Cesario Barreto

Faculty, Department of Information, Satya Wacana Christian University, Jl. Diponegoro, Salatiga, Indonesia Eko Sediyono

Faculty, Department of Information, Satya Wacana Christian University, Jl. Diponegoro, Salatiga, Indonesia Kristoko Dwi Hartomo

Faculty, Department of Information, Satya Wacana Christian University, Jl. Diponegoro, Salatiga, Indonesia

#### Abstract:

Education development is a part of national establishment efforts which occurs in Timor Leste. Education sector establishment evolves rapidly, shown by many students registered in public or private school. Along with globalization era's improvement, technology information science and telecommunication development today, the private school needs a SSM implementation model to extract knowledge about School Tuition Payment problem to increase education quality in Timor Leste. Therefore, this research is done by making SSM implementation model vision to handle the problem appearing in private school, to support education sector, so that it can give contribution in education development in Timor Leste. This research action using Soft System Methodology (SSM) to find the best way to handle daily life situation and to give knowledge to school in how to determine the best decision for School Tuition Payment system service.

Keywords: SSM application, Extraction, Knowledge, School Tuition Payment.

# 1. Introduction

Education development is part of national establishment which is done in Timor Leste. Education sector establishment evolves rapidly, shown by lots of students registered in public and private schools. Along with globalization era's improvement, technology information science and telecommunication development today, private school needs a SSM implementation model to extract knowledge about School Tuition Payment problem to increase education quality in Timor Leste.

Based on interview result with headmaster, administration, homeroom teacher, parents and students, the problem which are often faced are the expensive School Tuition Payment, the underprivileged family who cannot afford to pay tuition, there are no aids neither from the government nor from non-government organization, the deadline payment and student's achievement influence. Those things cause many obstacles in learning and teaching process at school, thus the education system in Timor Leste is still underdeveloped. Comparing with other countries in South East Asia, therefore it needs Management Knowledge System (10) and a policy from school or the government of RDTL to give dispensation to student who cannot afford to pay their school tuition to solve the problem faced by school and student. Thus, this research is done by making SSM implementation description to solve the problem existing in private school to support education sector, so that it gives contribution on establishment process and education development in Timor Leste.

SSM implementation in extraction of knowledge (7) is important in learning problem at school, because the knowledge had by school has to be able to give progress to school itself. In order to school be able to survive, everyone in school surroundings divides or shares knowledge. Thus, it needs SSM implementation to extract knowledge about School Tuition Payment.

This research is research action using Soft System Methodology (SSM) to find the best way to increase service (4) to face daily life situation. SSM is a description using people's thought to give perception in reality. This method implementation is based on comprehension and participants' vision about what kind of solution which is capable to be done suitable with something desired. SSM method chosen because all participants are involved from the beginning, that is to define desired action in problem situation suitable with each unit interest and every side who are involved to discuss the problem together to find the best solution.

# 2. Literature Review

In the journal entitled Knowledge Capture based on Soft System Methodology (SSM) to The University Section discussing about Soft System Methodology chosen as an approach to give a whole description about the situation in BPHL so that the process of capturing knowledge can be done more maximal. The purposes of this research are to result implementation model and to be one of reference to develop Knowledge Capture for promotion section which can be used by promotion section in other universities especially private university, to increase promotion strategy which can introduce university well to the society as its target [1]. Moreover, another research entitled The Quality Improvement of Public Library Service through Soft System Approach discussing the process of quality improvement of library service, relating to the problem with service management and librarian evaluation toward library service on public library in Kediri city. The purposes of this research are to identify, to describe and to analyze the process of quality improvement of public library service in Kediri city through soft system approach.

Another research which is also related with Linking Research and Teaching: An Applied Soft Systems Methodology Case Study discussing redevelopment of research module and professional skill to give support to the international post-graduate students through the use of formative feedback. The purpose of this research is to increase the skill of academic research and self-confidence [6].

It can be seen from the previous researches that the difference of this research is the use of SSM as model in extraction of knowledge about the good problem of the school tuition payment in order to those knowledge can be known by all of the school part such as school owner, headmaster, teachers, staff, students' parents. Besides, this research is as the method which combines the model of SSM implementation and knowledge management explicitly and tacitly [2].

#### 3. Method

The method used in this research is Soft System Methodology (SSM)., there are seven (7) stages In SSM [3] which is shown in Figure 1.

SSM has two main stages that is reality with five steps. The steps of this reality stage are the study of problem recognizing, problem expressing or problem mapping (rich picture) comparing the conceptual model with reality, make the desired concept and proper to be done and also take an action to repair the problem of school tuition payment. System thinking with two (2) steps that are constructing the definition of problem which is explained from the problem structuration on



*Figure 1: Soft Systems Methodology stages (Adapted from Checkland, 1999)* 

	Explanatior	of Figure	1	is	in	the	table	below	•
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1. Insert the problem situation	In this first step, identify and describe briefly about the situation in the organization.
2. Rich Picture	The second stage, collecting data and information which then poured in the form of rich picture
3. Formulate Root Definitions	In the third chapter formulate Root Definition (RD) to explain the process to achieve the goal. Usually
	RD begins with "The system for" The analysis on RD is done using CATWOE mnemonic, which
	consist of:
	1. Customers: The beneficial parties from this transformation.
	2. Actors: The parties who facilitate the transformation to the customers.
	3. Transformation: The achievable transmission, usually identify first condition and final condition of the
	transmission.
	4. Weltanshauung (world view): General view about the reason why the transmission should be achieved.
	5. Owner: Parties who can stop the transmission.
	6. Environmental constraints: Factors that influence transformation but not control the system.
4. Developing Conceptual	Conceptual model is graphic representation of Root Definition perspective. The first step in drawing a
Model	model is identifying all of verb in Root Definition; verb which is can help represent some of activities.
	For each verb, more or less one noun or pronoun related to (subject or object vocabulary) which point the
	doer and the receiver.
5. Comparing Model with	The fifth steps that have to be done is comparing conceptual model with the situation which was
Reality	described in step two.
6. The desirable transformation	The sixth steps are doing the transformation
7. Take Action to Improve the	Take an action to solve the problem.
Problem Situation	

Table 1: Steps of Soft System Methodology

#### 3.1. Framework of Problem Solving

The model planning of applying SSM in knowledge extraction about tuition fee that has to be paid, the point is to approach SSM. However, there are some processes which are added for solving the problem in the research. The following will be explained in the framework of problem solving in the diagram on Figure 2.



Figure 2: The Framework of problem Solving

The stage of problem solving is divided into two (2) major groups that are analysis process of case study and the implementation model of SSM in the extraction if knowledge about School Tuition Payment problem that will be the last model of this research. In the framework of Figure 2, some processes are placed in a thick bold box, which means that process adopted from the step of Soft System Methodology approach. The description of the problem solving framework on Figure 2 along with case study analysis will be explained about the description of private school situation, express the school situation in rich-picture, identify knowledge goal, identify knowledge needs of private school, then do the process formulation to reach the goal through root definition, holons, and framework for the implementation of SSM in the knowledge extraction about the problem of the school Tuition Payment, after that do the formulation of modeling extraction step of knowledge in the problem of School Tuition Payment worked on as a result of research in analysis.

#### 3.2. The Short Description and the Expression of Private School Situation

In the first process, the research was done at private school by interview method with the principal and all of staffs at school who handled the system of school Tuition Payment, and obtained information about task, the purpose of the school, stakeholder and their roles, and the school work program. The second process of this stage, expressed school situation in the form of rich-picture that is done in Figure 3, by describing all the present actors in the current state of private school, also describes some knowledge possessed, and knowledge needs of each connected and unfulfilled actor.



Figure 3: Rich Picture Situation in the School

In Figure 3 explains the situation in private schools in the form of rich-picture, which is explained about the actors involved in the activities of the tuition system payment. The actors are from inside the school, school owners, head master, administrators, and homerooms and outsiders are students, parents, government, NGO and those who connect students and schools are homeroom teachers. Rich-picture provides a mapping of the relevance of the actors involved in the tuition system, what each actor knows and the circumstances that describe the needs of each unfilled actor.

# 4. Analysis and Discussions

At this stage, the analysis is done to provide an appropriate framework to build a conceptual model. Conceptual model (11) consists of several factors that are understood to achieve the goal (root definition). Subsequently modeled the implementation of the proposed to achieve knowledge goal based on conceptual model obtained, then compared with holons in order to achieve knowledge management in school.

# 4.1. CATWOE Analysis

As seen from the identification of problem situations and defining the system of problems described earlier, the CATWOE analysis for each holon is described in Table 2.

Holon 1	The actors (school owners) make their own decisions in the preparation of the School <i>RAPB</i> does not involve the parents of the students in the determination of tuition fees.
Customer	Students, parents
Actor	School Owner, headmaster
Transformation	Customers who cannot share the problem to a customer can be dealt with issues encountered in payment.
Weltanshauung	There was a misunderstanding in the implementation of the payment.
Owner	School owners
Environment	Difficult to record the problems faced
Holon 2	The implementers propose improvements to the payment system
Customer	Headmaster, homeroom teacher
Actor	School Owner
Transformation	The policy of the school owner to improve the School Tuition Payment system
Weltanshauung	School owners should pay attention to suggestions from school principals, homeroom teachers and parents
Owner	School owners
Environment	There is no parental support for the proposed improvement of the School Tuition Payment system

Holon 3	The administration reports the progress of the payment of the tuition system
Customer	Student
Actor	Administration
Transformation	A system that can process school Tuition Payments
Weltanshauung	To know the payment data tuition the number of students who paid off and not paid off
Owner	School
Environment	Many students have not paid off
Holon 4	Governments, NGO and donors do not provide scholarships and facilities
Customer	Schools and students
Actor	Government and NGO
Transformation	Systems that manage scholarship assistance
Weltanshauung	Governments and NGOs should pay attention to underprivileged and outstanding students
Owner	Government
Environment	There is no financial support from the government and LSM
Holon 5	Students and parents suggest a payment crash
Customer	Students and parents
Actor	Students and parents
Transformation	There is a change in the payment system
Weltanshauung	Government, NGO, and schools to alleviate the burden of parents in the payment of tuition
Owner	School
Environment	There is no financial support from the government, LSM and schools
	Table 2. Problem Analysis in Private Schools

In Table 2, an analysis of five holons from the previous rich-picture was described. Each holon is analyzed by customers, actors, transformation, weltanshauung, owner and environment.

#### 4.2. Building a Conceptual Model

From the activity of the School Tuition Payment system described, there are several elements that can form the conceptual model as shown in Figure 4.



Figure 4: Conceptual Model Application of soft system methodology Knowledge Extraction of School Tuition Payment

Figure 4 is a conceptual model built on the details of the school's School Tuition Payment activities, which then makes root definition a common perspective to be achieved. To reach that perspective, elaborated factors (in the form of nouns) support the achievement of perspectives. In SSM, the conceptual model usually describes factors in the form of a verb or activity for each type of work, in the form of things that need to be achieved for the achievement of root definition. In this study, the conceptual model is formed in noun, because each worker in the school's School Tuition Payment can manage more than one factor, and each factor can be managed by more than one worker. This can produce an elusive conceptual model. Therefore, a conceptual model is created in the form of a noun with activities derived from the description stage of the school situation.

#### 4.3. Conceptual Model and Realities of School Tuition Payment



Figure 5: Conceptual Model and Realities of School Tuition Payment

Figure 5 explains that there are elements related to the school Tuition Payment process in conducting the process. These elements are involved in school activities that are divided into three categories, such as normative, operational, and strategic. This category based on the concept of knowledge goals by Probst. Thus, it can be paired equally between the source of knowledge and the results of knowledge. School activity produces a perspective that is expected. It is called a holon. It is referred from SSM relating to the need for the practice of knowledge extraction.

Beside the existence of holon, school activities also produce unstructured knowledge. Therefore, it takes the support of technology, such as data manager and report manager as a tool that helps the process of recording knowledge into the repository.

Data manager and report manager are created in the form of software according to the recent knowledge. SSM implementation model in extracting knowledge about School Tuition Payment problems, data manager and report manager is a function. There would be a change in the form of input and report device which are resulted according to the development of existing knowledge.

Repository of knowledge is important to support the storage of school knowledge in a structured form, so ontology is used in the knowledge repository. It has a function as a provided grammar related to the growing knowledge in school Tuition Payment system. The system needs a property in repository, so the property can structure the existing knowledge in the school.

Document knowledge as a result of knowledge can enrich the school and help the school to conduct activities. In the knowledge goals, the system sets an achievement of knowledge management arranged in three kinds of goals: normative, operational and strategic. Document knowledge can help school activities that have been adapted to the concept of knowledge goals.

# 4.3.1. School Activity

School activities are divided into three classes. They are normative, operational and strategic, adapted to the concept of knowledge goals. Normative activity at the school is an activity related to daily behavior that occurs at the school during the implementation of School Tuition Payment activities. Operational activity at the school is a practical activity and related to daily process. Strategic activity is an activity which relates to long-term plans or the process of programs determination. This activity is according to the available resources.

#### 4.3.2. Data Manager

Data manager is a software provider that serves to capture the unstructured knowledge. It takes a process that structures knowledge into data forms. The process for capturing knowledge arising from school activities will be divided on elements and data storage property will be analyzed in the knowledge repository. The usage of the knowledge (explicit and tacit) can be obtained from the data processing. The processes on progress are for inventory elements, facilitators, Financial Calculation Planning Programs, evaluation, training, communication, budget, student schools, Financial Calculation Planning targets, and external cooperation (government, Social Organization and international donors)

#### 4.3.3. Knowledge Repository

The knowledge repository serves to store data derived from the results of structuring the knowledge. The design of repository knowledge describes two basic components of knowledge; an object consisting of structure and concept. Knowledge is unstructured and connected one and another. The storage by the database management facilities becomes stiff and requires complex table merge operations. Therefore, the system needs a mechanism that can be used to manage data (knowledge forming), so that knowledge can be traced or accessed quickly.

#### 4.3.4. Report Manager

Report manager serves to produce a knowledge document according to the needs of users. Practically, report manager is not all used, but considered according to the needs. It is also required data processing to produce the appropriate documents. Various kinds of data processing technology can be used and adapted to the needs. This processing serves to select the data that will be processed to produce a knowledge document.

#### 4.3.5. Knowledge Goals

Knowledge Document formed from previous process can be utilized by schools to support the achievement of knowledge goals in three levels; normative, operational and strategic. The achievement of each knowledge goal supports the other knowledge goals.

#### 4.4. Analysis of SSM Implementation Model for answering holons in CATWOE

Holons is an explanation of root definition that is shaped based on the real conditions that occur in schools. The SSM implementation model established is capable to answer the holons, with a description of each holons in table 3.

Holons	Explanation
Holons	The agents (School owner) make their own decision in composing school's RAPB without involving students' parents in
1	determining the expense of SCHOOL TUITION PAYMENT.
Holons	The executor suggests improvement for the system of school's SCHOOL TUITION PAYMENT payment as knowledge to
2	do improvement. Holon 2 can be answered when the executors save the knowledge in their experience follow the served
	structure in the knowledge repository properties. The suggestions from the executors can be saved in repository and can be
	accessed in form of knowledge document contained discussion report in forum, contains suggestions for improvement of
	the system of SCHOOL TUITION PAYMENT payment, students' parents give suggestions about the dispensation for
	SCHOOL TUITION PAYMENT payment, and also the respond from the school owner toward those suggestions.
Holons	Administration side reports the development of SCHOOL TUITION PAYMENT payment to the school owner and
3	headmaster. Holon 3 can be answered when the administration side accesses knowledge document which comes from
	repository with domain SCHOOL TUITION PAYMENT payment. In the inside of it, there are the report of the sum of
	students and the report of students' SCHOOL TUITION PAYMENT payment which is already paid and which is not paid
	yet.
Holons	Government, LSM and donator do not give scholarships and facilities. Holon 4 can be answered when the agent of activity
4	accesses knowledge document which comes from repository with domain government and LSM. In the inside of it, there is
	the report about scholarships given by government, LSM, and another donator.
Holons	Students and parents suggest the dispensation for SCHOOL TUITION PAYMENT payment. Holon 5 can be answered
5	when the executor of the activity accesses knowledge document which comes from repository with domain student. In the
	inside of it, there is the report about the suggestions related with the dispensation for SCHOOL TUITION PAYMENT
	payment from students and parents. This knowledge is gotten from students and parents whose children are studying in the
	school.

Table 3: SSM Application Model Analysis

#### 5. Conclusion

This research is action research using Soft System Methodology (SSM) method to find the best way in facing situation of daily life. The result of this research gives knowledge to the school for determining the best decision toward the payment system of SCHOOL TUITION PAYMENT, in order to every student's parent is burdened by the expense of SCHOOL TUITION PAYMENT.

SSM applying model in extracting knowledge about payment problem have been built using Soft System Methodology approach with the steps have been improved appropriate with case study. SSM applying model in extracting resulted problem contains elements which considered that it gives knowledge to the school and the process which need to do in creating knowledge about SCHOOL TUITION PAYMENT problem.

#### 6. Suggestion

Based on the result of the research and the explanation on the conclusion, the researcher proposes some suggestions for the school in increasing the system of SCHOOL TUITION PAYMENT service process. The school side should give dispensation and special attention for the student who cannot afford to paytuition, then the school side should always involve student's parent on designing annual estimation and on determining the rise of tuition payment expense, then the government should give scholarship for quite capable student and for excellent student in order to student be motivated by the scholarship from the government in minoring the burden of SCHOOL TUITION PAYMENT. And the last for the next researcher to do deeper research about the income of student's parent in order to be able to know the problem that is faced by student's parent.

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