

WEB-BASED STAKEHOLDER MANAGEMENT SYSTEM

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ABSTRACT

Stakeholder management has been studied and applied in an organization. However, most owner, executive or manager still operated their stakeholder as manual procedure. With the information system, it would facilitate all existing manual process to be better in terms of organization management. This paper demonstrated the implementation of web-based stakeholder management system. It provided policy owner with functions such as planning, identifying, analysing, recommending and reporting. Expert opinion on the application was inquired and they, in summary, were satisfied with the result.

KEYWORDS: Stakeholder System, Development, Web application, Implementation.

1. Introduction

Stakeholder management gains more important in many industries. Both government and private organization are well aware of stakeholder engagement. For policy maker or manager, stakeholder management is one of the key factors for the success. The stakeholder management process can be divided as plan a policy, identify stakeholder, analysis stakeholder, recommend strategy and action plan, collect a feedback and provide a conclusion. Mitchell et al [1] proposed the role of stakeholders by considering features such as power or potential for the organization, project Legitimacy, and the urgency of the event.

As in current information technology era, all operation migrates from manual process to a technology system. In this paper, we illustrated stakeholder management system development applying American Productivity and Quality Center (APQC) best practices

process [2]. A web-based application, additionally, was implemented as being widely operated in information technology market.

2. Previous Work

A stakeholder management process included planning, identification, analysis, strategic formation, activity work and stakeholder summary [3]. The planning process was to setup policy and stakeholder information. After gathering all stakeholder data, the stakeholder was classified based upon APQC in process classification framework Category 12.0, version 7.2.1—Manage external relationships, and was identified a key stakeholder. Stakeholder characteristics such as power level, interest level, knowledge level and position were processed according to the target policy. After analyzing the stakeholder information, the system generated strategy for performing action to the stakeholder. The stakeholder response to activity was kept and finally the system provides stakeholder summarizes report.

Schmeer [4] systematically provided the stakeholder management process and conducted in healthcare industry. Planning, selecting and defining a policy, identifying key stakeholder, adapting the tools, collecting and recording information, filling a stakeholder, analyzing, and using information. It aimed to help policy maker for collecting and analyzing key health reform stakeholder's information.

3. Research Objective

This paper objective was to implement web-based stakeholder management system and evaluate the system.

4. Research Methodology

For the stakeholder management system development, System Development Life Cycle (SDLC) was applied. There were 6 steps including requirement analysis, system design, implementation, testing, deployment, maintenance as shown in Figure 1.

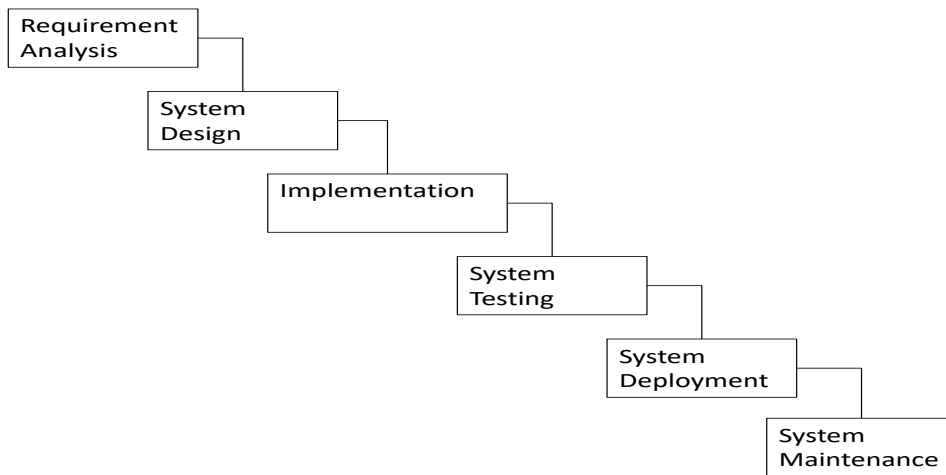


Figure 1 Waterfall SDLC Model

An expert opinion was used to evaluate functionalities of the stakeholder management system. When number of expert was 17 or more, the decreasing rate of average group error was minimal. The group error was the absolute value of the natural logarithm of the group median divided by the true answer [5]. Our research sample size was 17 experts. The purposive sampling was used and the experts were working at policy or management level from both private and public organization. The 5-level Likert scale questionnaires (5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree) were sent with formal introduction. The system was provided for evaluation as well. The interview were performed a month later either in person or by phone. The data collection was repeated unless it reached consensus. Median and Interquartile range (IQR) was statistically calculated, giving middle and data distribution information respectively. When IQR was no more than one, it reached the consensus--meaning more than half of all opinions were at specific point on the scale [6].

5. Stakeholder Management System Implementation

The implementation of the stakeholder management system was based on stakeholder management process [3]. The system was developed as web applications. The process included planning, knowing stakeholder information, analysis, strategic recommendation, monitoring and reporting. The client-server model was applied to separate client side--stakeholder or user and the server side locating the web server, web application and

database as shown in Figure 2. A stakeholder or user could access to the system with his/her browser via network.

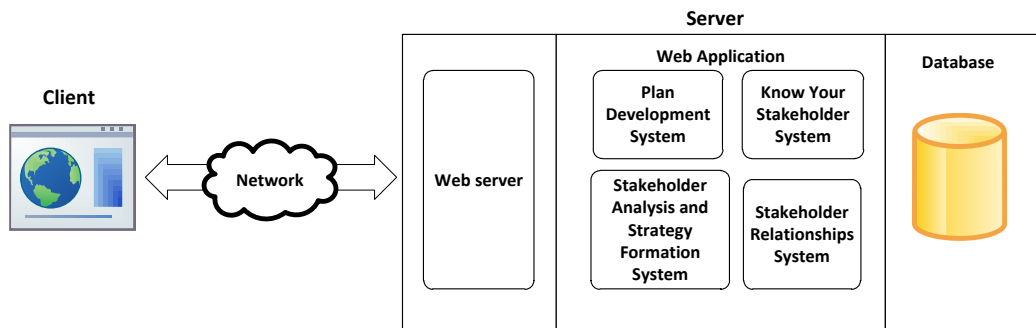


Figure 2 Stakeholder Management System Architecture

As Waterfall SDLC model, we developed the stakeholder management system into 6 steps including requirement analysis, system design, implementation, testing, deployment, and maintenance as detail below.

5.1 Requirement Analysis

The first step was to collect and analyze all relevant information from user to develop the system as per the requirement. As per the review, the stakeholder management system was newly created for the management purpose. This would help the stakeholder management was more comprehensive and effective. A current manual process would be changed to an automatic process with the system.

The analysis of the stakeholder management process was shown in data flow diagram as Figure 3.

- Plan Development System

Policy owner started planning a policy to be launch to stakeholders. The policy objective was set and was determined who will be relevant to it.

- Know Your Stakeholder System

After defining the stakeholder, his or her information was gathered either a direct method such as interview or an indirect method from secondary source such as website, library, or social media. Stakeholder name, title, organization, address, telephone, email,

characteristic—power, interest, knowledge and position (position, neutral, opposition) of the stakeholder toward a policy were collected in system. Additionally, stakeholder was categorized in different classes, adapted from APQC, into investor, government, board of directors, legal, public relations or target.

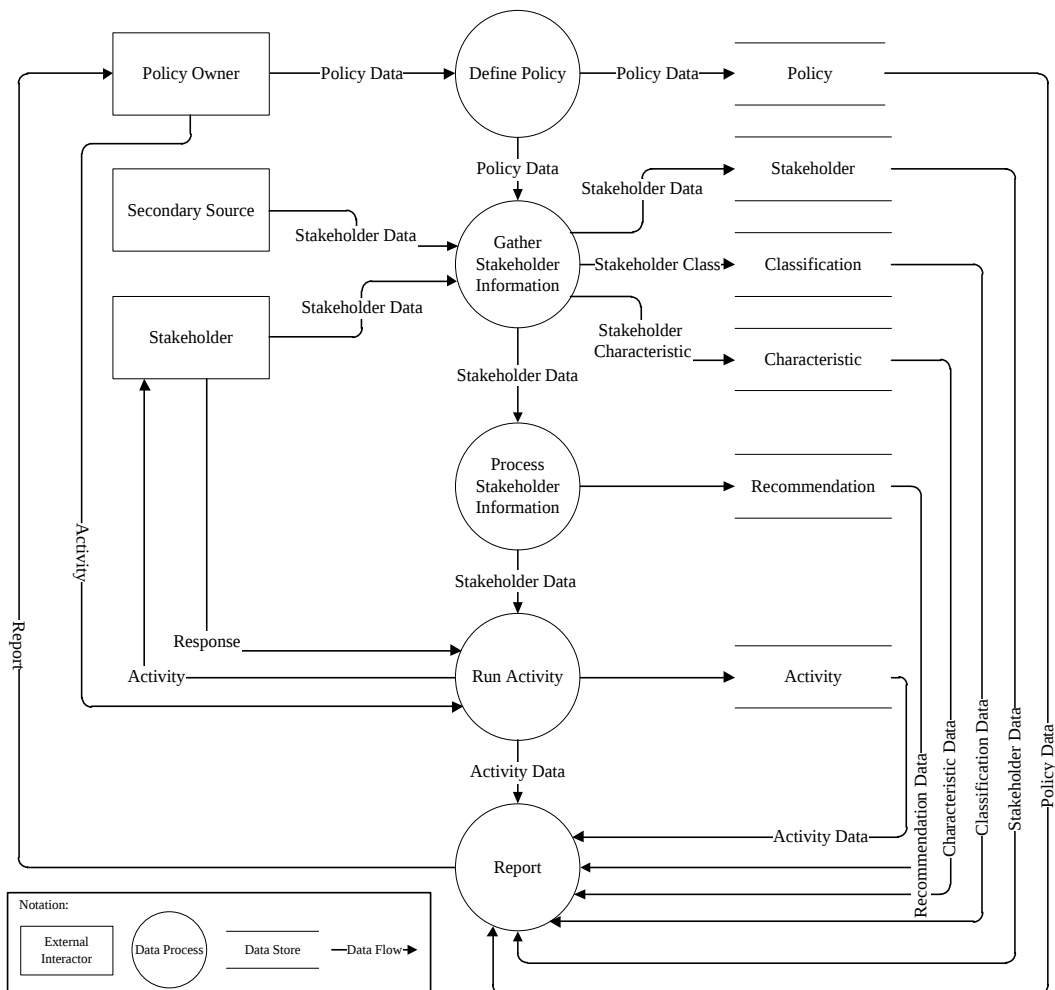


Figure 3 Data Flow Diagram

- Stakeholder Analysis and Strategy-formulation System

The system performs stakeholder analysis and provided answer who is the key stakeholder for this policy and the profile of stakeholder. It advised a strategy for stakeholder to perform in order to achieve the policy goal.

- Stakeholder Relationships System

The process was for policy owner to do action with the target stakeholder based on classification. Stakeholder responds to the activity and all data were collected in the system. This was to try to maintain and gain support of stakeholders for the policy plan.

- Report

Report utilized data from the above system. The report was management tool for policy owner. Sample reports were Stakeholder profile and stakeholder position toward the policy.

5.2 System Design

The requirement gathered in the first step was used as an input and software architecture, user interface, database, report are defined for source of development and coding. As from stakeholder management process analysis, the entity relationship diagram was visualized as Figure 4.

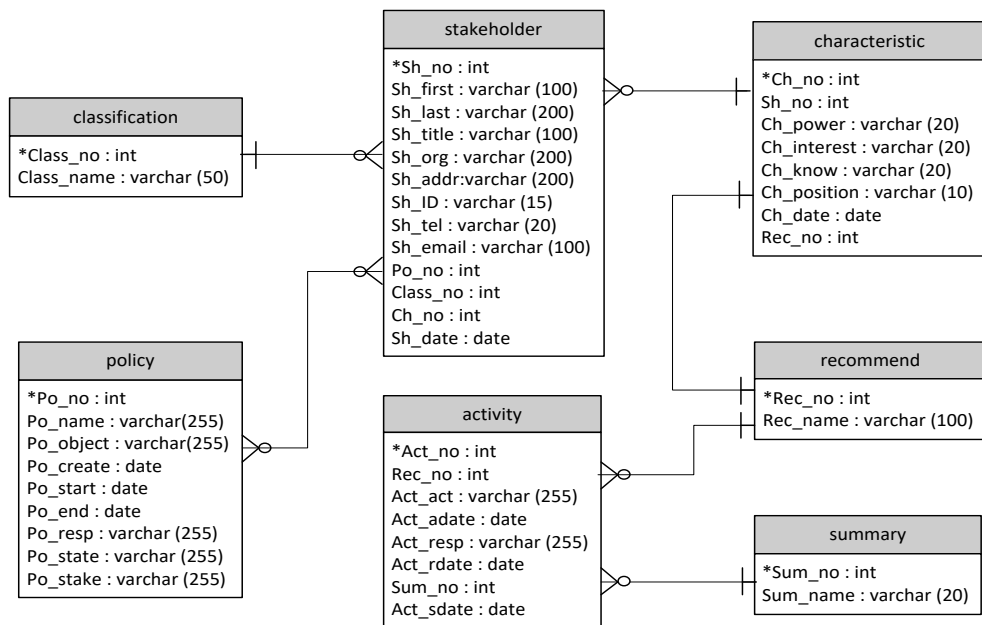


Figure 4 Data Flow Diagram

The database design has 7 tables comprising of stakeholder, policy, classification, characteristic, recommend, activity and summary. The table relations were provided as well as the field name, field type and field length.

5.3 Implementation

The implementation step was to develop the stakeholder management system. For the Client side, Firefox web browser was installed on a MS Windows notebook. The Apache HTTP server, PHP, myPHPadmin, and MySQL software were installed on the computer (server-side). These software were all freeware and widely used in application development. AppServ was software providing all Apache HTTP web server, PHP, phpAdmin, and MySQL into single package. We selected AppServ version 2.5.9 for Windows including Apache HTTP web server version 2.2.4, PHP version 5.2.3, MySQL version 5.0.45, and phpMyAdmin Database Manager Version 2.10.2. The tools for develop HTML web site (client-side) was HTML editor and Adobe Dreamweaver CS 5.5.

5.3.1 Plan Development System (PDS)

As PDS main function was to create policy information. The system provided form to add Policy name, Policy number, Objective of the policy, Effective date of the policy, responsible person/people for the policy, policy description and stakeholder in plan. The PDS User Interface (UI) was shown in Figure 5.

Stakeholder Management System

Policy Information

Policy Number :

Policy Name :

Objective :

Effective Date From : To :

Responsible Team :

Statement :

Stakeholder :

Created Date :

Figure 5 PDS UI

5.3.2 Know Your Stakeholder System (KYS)

KYS was gathering, classifying and characterizing stakeholder information. After gathering stakeholder data, KYS provided field to store the data into the system. The gathered data was Name, Title, Organization, Address, ID, Contact Number, and Characteristic of stakeholder. The classification was mainly based upon the APQC PCF 12.0 Manage External Relationships and adding internal stakeholder to make the system more comprehensive. The stakeholder category was Investor, Government, Industry, Board/council, Legal, Public Relations and Target. To make it more practical, we separately classified government and industry. We changed to Board of Directors class to be Board/council to make it more general. KYS function will automatically classified stakeholder into each relevant category. The characteristic data was from the questionnaire results and the secondary data in case no response data from the questionnaire. The KYS UI was shown in Figure 6.

Figure 6 KYS UI

The KYS UI gathered and provided stakeholder information such as first name, last name, title, organization, address, ID, e-mail, telephone number and classification of stakeholder. The classification was assigned mainly based on the stakeholder organization. One stakeholder would be only in one category.

The other of KYS UI handled stakeholder characteristic as in Figure 7. The position, power, interest and knowledge level of a stakeholder were displayed and one mark for each characteristic per stakeholder. Date was stamped for the stakeholder characteristic of the particular policy.

The screenshot displays a web application titled "Stakeholder Management System". On the left is a vertical navigation menu with the following items: "Policy Development", "Know Your Stakeholder", "Stakeholder Analysis", "Stakeholder Relationships", and "Report". The main content area is titled "Stakeholder Characteristics" and contains the following fields and options:

- Stakeholder Number :
- Policy Number :
- First Name :
- Last Name :
- Title :
- Organization :
- Characteristics :
 - Power : ☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ None
 - Interest : ☐ Very Interest ☐ Interest ☐ Moderate ☐ Slightly Interest ☐ Not Interest
 - Knowledge : ☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ None
 - Position : ☐ Support ☐ Neutral ☐ Opposition
- Created Date :

At the bottom right of the form is a "Submit" button.

Figure 7 KYS Characteristic UI

5.3.3 Stakeholder Analysis and Strategy-formulation System (SAS)

The data from PDS and KYS systems were sources of SAS development. The SAS UI had 2 UI's, the analysis called SAS-analysis and the strategy formulation called SAS-Strategy. The analysis provided stakeholder profile while the strategy recommends possible activity for a stakeholder. The SAS-Analysis UI was shown in Figure 8.

The screenshot displays the 'Stakeholder Management System' interface. On the left is a sidebar with navigation links: 'Policy Development', 'Know Your Stakeholder', 'Stakeholder Analysis' (selected), 'Stakeholder Relationships', and 'Report'. The main area is titled 'Stakeholder Analysis' and contains a search form with the following fields: 'Policy Number' (with a dropdown menu), 'Stakeholder Position' (with a dropdown menu), 'Characteristic (power, interest, knowledge)' (with a dropdown menu), and 'Characteristic Level' (with a dropdown menu). Below these fields is a 'Submit' button. The search results are displayed in a table with the following columns: 'Characteristic', 'Level', 'First Name', 'Last Name', 'Title', 'Organization', and 'Class'. The table is currently empty. Below the table, there is a text label 'Total Number of Stakeholder with above criteria =' followed by a value of '0'. At the bottom right of the main area is an 'Export' button.

Figure 8 SAS Analysis UI

SAS-Analysis UI had 2 sections—the search requirement and the result. The UI provided a search based on Policy Number/Name, Stakeholder position, characteristic, the characteristic level. The result provided list of stakeholder name, title, organization and classification matched with the search requirement.

With cross-reference search, the analysis could answer questions such as Stakeholder who is support with different power level, interest level or knowledge level; and Stakeholder who is opposition with different power level, interest level or knowledge level. Additionally, the total number of stakeholder in the policy for each characteristic was provided by the system. The SAS-Strategy UI was shown in Figure 9.

First Name	Last Name	Title	Organization	Class	Strategy

Figure 9 SAS Strategy UI

SAS-Strategy UI had 2 sections—the search requirement and the result. The UI provided a search based on Policy Number/Name and Stakeholder Number/Name. The result provided recommendation strategy for an individual stakeholder or classification for the specific policy. It showed stakeholder First Name, Last Name, Title, Organization, Classification and strategy.

5.3.4 Stakeholder Relationships System (SRS)

A SRS form was created to record activity and response from a stakeholder. SRS UI was divided into 3 sections as shown in Figure 10. The first section on the upper top of the UI allowed user to select policy, classification and stakeholder based on his/her requirement. The middle section provided space for adding activity and response regarding to a stakeholder. The last section on the bottom of the UI was to add the final stakeholder position and could add final note with finalized date.

Figure 10 SRS UI

5.4 System Testing

Before operating the system in real environment, system test was performed to make it error-free as much as possible. We had set up a simulated computer as Stakeholder Management Web server with AppServ version 2.5.9 for Windows including Apache web server, MySQL, phpAdmin and install PHP program. The functional test was executed by a tester who was not involved in the system development. In case an error was found, related program module was recoded and retested until system was free from functional error.

5.5 System Deployment

This step was to bring the stakeholder management system to the user organization. The development codes and files were transferred from simulated computer to production

machine or server via Filezilla Client software, FTP program. For client side, only generic browser was installed by user and as the system was web-based, there was no installation package provided.

5.6 System Maintenance

A user could send the feedback or system problem to us. The system improvement would be developed based upon system function error or technology change as necessary.

6. Result and Discussion

A panel in this research included 17 experts as following 3 academic experts, 2 government officers, 2 retail experts, 2 military officers, and 1 expert for each of construction, healthcare, manufacturing, mining, software, technical service, transportation, and utility industry had been included. Nine experts ages were between 41-50 years old, 7 experts were between 51-60 years old and only one was more than 70 years old.

The questionnaires were given a panel for ranking opinion on each aspect of the stakeholder management system. As in Table 1, the experts ranked strongly agree on stakeholder management system will improve operation efficiency while the rest were ranked as agree. This indicated the expert group strongly is confident that the stakeholder management system will efficiently improve their organization operation because it utilized information system to manage all process and information instead manual process. The process data were recorded, tracked, and restorable in the system as well as the process was run automatically. Besides, the expert agreed that when deploy the system it would assist an organization to meet its objective in managing policy and stakeholder. It would provide extensive process covering all key functionalities for planning and implement the policy. The system, moreover, provided friendly UI of user to run the system easily. As web-based system, it would be brought to real organizational environment with less complication. Lastly the respondents agree to recommend others to use the system.

In summary, these results suggested the stakeholder management system was completely developed and met the expectation especially for improving operation efficiency. All experts were certainly satisfied with features and functionalities of the system development.

Table 1 The result from expert opinion

To what degree do you agree or disagree with the following stakeholder management system?	Median	IQR	Range
- The system meets your organizational objectives as your management intention for policy and stakeholder management.	4	4-4	3-5
- The system is fully comprehensive. It provides step by step and covers all essential stakeholder management processes.	4	4-4	4-5
- The system will improve operation efficiency in terms of shorten operation time and produce more work output.	5	4-5	4-5
- The system is convenient to use. User can operate easily and in short period of time.	4	4-5	4-5
- The system is practical in real life. The system can be brought and implemented to real organizational operation.	4	4-5	3-5
- You are willing to recommend this system to others.	4	4-4	3-5

Note: Value in table is Likert scale where 5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree; IQR=Interquartile Range (quartile 1 and quartile 3 value); Range=minimal and maximum value

7. Conclusion

The stakeholder management system has been developed to serve policy owner. Based on expert opinion feedback, an organization using the stakeholder management system, should be more satisfied than one without using the system in terms of comprehensive features, supporting operation efficiency and convenience to use in their organization.

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