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INFORMATION PERSONALIZATION FOR E- GOVERNMENT SERVICE IN MALAYSIA

Silviana Prima, Roliana bt Ibrahim

6.1 INTRODUCTION

Organizational spending on IS/IT is continuously expanding. Government is one of the organizations that get the impact of the advancement of Information and Communication Technology (ICT) for the public administration. Many developing and developed countries including Malaysia, are implementing e-government. The implementation of e-government started since the initiation of Multimedia Super Corridor (MSC) in 1996 by the Malaysian government [2]. Government has a good potential to enhance services to its citizens by utilizing the internet and the evident now is obvious than ever before. E-government technology is created to make government more efficient, responsive, and transparent and legitimate [3]. Information of services holds the critical role in increasing citizen awareness, but now government is facing the information delivery problem to citizen especially if the existing information of service is overwhelming. When the existing information in the website is overwhelming and it indicates that users are facing the information overload. Personalization aims to deliver the information based on the citizen's needs and interests, improves the communication, and results to citizen satisfaction and repetitive visit.

Unfortunately, lack attention to further study regarding personalization approach in the government sector can inhibit the evolution of ICT in the government sector, while it is rapidly growing in the private sector for further study. The more advanced of Information personalization models and approaches have been further researched in the private sector for years, but recently it has only researched in the public sector as the concept for personalization. To analyze the most appropriate personalization model, researchers review some personalization models from another researcher and study the usage of personalization in public and private sector. Researchers also come out with proposed framework of personalized e-government service requirements that have been adapted [4] which it outlines the components and models to personalize the services.

6.2 RESEARCH OBJECTIVES AND METHODS

Following thorough review of literatures, a few research questions were developed and become the basis for the formulation of research objectives of this study. The two research questions are; (1) How the services given by Government meet the customer needs? (2) What is the most personalization approaches needed to personalize the services?

Based on the research questions above, the objectives of this research have been identified. Researchers go into detail about the whole objectives for this study area.

6.2.1 Objective

To achieve the success of personalization e-government service, the objectives of this study are :

- (a) Identify the requirements needed to personalize the services.
- (b) To propose the best personalization models based on the services provided in Malaysia government.

- (c) To propose updated features for E-Government portal with personalization strategies as the gate between government and citizens.

6.2.2 Methodology

To test the research framework that consists of components and personalization models, some research papers review were conducted. For personalization model, researchers studied paper [5] that highlights four personalization models ordered from simplest to the most advanced one. Besides that, the usage of personalization in the public and private sector has been investigated to analyze the best features to personalize the services. For the requirements needed to personalize the services, researchers adapted from the framework [4] that highlights some components inside Per-Gov framework and their interactions. In the end of this paper, researchers come out with personalized e-government service requirements framework that was adapted from those papers and literature review abovementioned.

6.3 LITERATURE SURVEY

There are many deep studies already conducted by previous researchers regarding world wide web personalization. In developing the proposed framework of personalized e-government service requirement, researcher adapted from some papers and literature reviews. One of the researchers that studied regarding personalization model [5] stated that there are four models of personalization; they are memorization, customization, guidance or recommender and task performance support. Those four models are ordered from the simplest to the most advanced of personalization model. The most appropriate example of the usage of personalization in the private and public sector is myyahoo.com and ecitizen.com of Singapore. In myyahoo.com as a private sector, it covers 3 models of

personalization which are customization, memorization and recommendation. And in ecitizen.com as a public sector, it covers two models of personalization, they are customization and recommendation, and one of the feature used in Ecitizen.com is service alert to improve the awareness of e-government service to its citizen [6]. To meet the implementation of personalization service, some requirements need to identify. Researchers adapted a framework of Per-Gov [4] that outlines four components needed to personalize the services in e-government sector. Those 4 components are User Interface, User Data Collector, Data Source Repository and Intelligent Recommendation Engine [4].

6.4 CONCEPTUAL FRAMEWORK OF PERSONALIZED E-GOVERNMENT SERVICE REQUIREMENT

To meet the most relevant service to citizen, some requirements need to identify for implementation personalized e-government service in Malaysia. Researchers propose a conceptual framework called personalized e-government service requirements that outline 4 components and personalization models for e-government service in Malaysia as in Figure 6.1. As the case study, researcher chose MPJBT as the government agency that provides some services to citizens. Table below shows the list of services provided in MPJBT.

Table 6.1 MPJBT's lists of services

Category of Services	Name of Service
Rental	Equipment Rental
	Field Rental
	Hall Rental
Asset	Building Renovation
	Asset Information Search
	Remission Application
	Selling of Blue Print
	Asset Ownership Transfer
License Services	Billboard License
	Business License

	Bunting License
	Temporary License (Promotion, Expo, Ramadan Bazaar, Festive, Concert, Circus)
	Hawker License (Road Side Stall, Wheeled Stall, Motorized Wheeled Stall) Arcade/Stall
Asset Tax	Decrease of tax rate for Malay reserve areas
	Asset Tax
	Asset Tax Objection
	Asset Tax Rate
Public	Public Report
	Car Park Road
	Closure
Waste Management	Waste collection in the Johor Bahru Tengah Municipal Council Area
Complaint	Complaint for any services by citizen

In the conceptual framework, four components outlined here are User Interface, User Data Collector, Data Source Repository and Intelligent Recommendation Service [4]. For the personalization models highlighted are customization, recommendation, memorization [5] and personal inbox and service alert are the selected features adapted from Myyahoo.com and ecitizen.com.

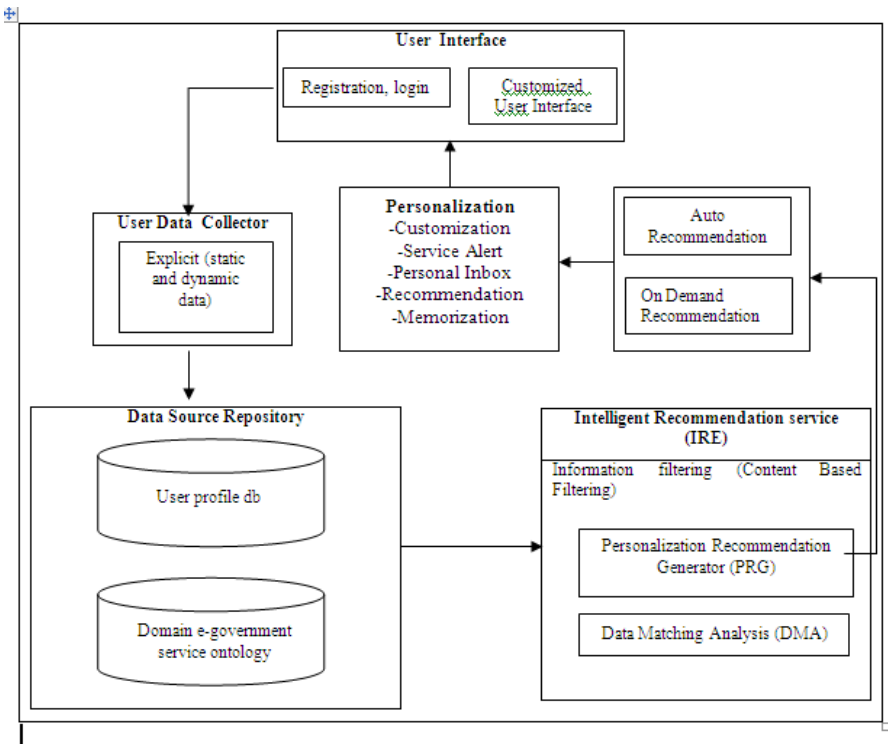


Figure 6.1 Personalized e-government service requirements

6.4.1 User Interface

For this User Interface (UI) component proposed by researcher, it facilitates the interaction between citizen and the system. The interactions are including registration, login, user feedback and corresponding recommendation. Basically there are 2 units for the user interface, they are registration or log in unit and customized user interface (CUI) unit. For the registration or log in unit, it is the interface for data collection of citizen and user authentication. For the CUI unit, it is the actual unit where the personalization implemented, the CUI unit is the interface where user can get the

personalized page based on citizen's demographic information, needs and interests of e-government services and past services collected during the registration unit. For the detail of user's data and service domain ontology such as user demographic information and the needs of services data, researcher will go into detail in the Data Source Repository (DSR) component. Through the user interface component that comprise of registration or log in unit and CUI unit, user can perform the following actions:

- (a) UI1: Subscribe personalization service by doing registration, user needs to provide his/her demographic information and interest of services in the specific domain.
- (b) UI2: Login to the system by providing the password and Malaysian Pass. Malaysian Pass is allowed only for the certain people such as Malaysian Citizen, Permanent resident, selected work permit holders and selected visa holder. To get the Malaysia Pass, user needs to make a request to the MPJBT.
- (c) UI3: Request to a particular services provided by clicking on the service item.
- (d) UI4: View the personal inbox
- (e) UI5: View the service alert
- (f) UI6: View the most relevant recommendation of services information and government rule
- (g) UI7: View and update his/her personal demographic data or interest and preference.

6.4.2 User Data Collector

User's data collected during the registration is a part of the explicit input [7]. In the personalization system, the process of collecting user's data is generated by User Data Collector (UDC) [4]. User Data Collector (UDC) component is the component that responsible for data collection of citizen's demographic information, interests or needs of services and past services usage. Basically there are 2 ways of data collections, they are explicit and implicit data input [8]. But for this study, researcher only chose explicit data input that consist of

static and dynamic data. For the UDC component, it will perform 2 tasks, they are:

- (a) Collect user related data: This is the task to collect citizen's demographic information, interest and preferences of services within services domain and the history of service implemented by citizen. This data is collected explicitly in UI1 action.
- (b) Update citizen's profile: This is the task to regularly update the citizen demographic information and interests of service, hence this data is captured and recorded in the Data Source Repository (DSR) component.

6.4.3 Data Source Repository

The process of storing the data into database is generated by Data Source Repository (DSR). Data Source Repository (DSR) component is to collect all the data needed to implement the personalization service [9]. DSR consist of domain ontology of specific e-government service and user profile database. For example if a citizen conducts the tax payment, MPJBT will store the form of tax payment as the service record. Citizens needs to fill a tax payment form and provides the personal information and the data of services. In the personalization website, the data of service and user's personal data is stored in the database. Researcher will go into detail of each of these DSR and the specific data needed for personalization information of services

6.4.3.1 Domain Ontology of Specific E-Government Service

For the domain ontology of specific e-government services, it describes the main concepts of available services and the relationships that link the concepts with the associated services rules. There are some concepts identified for this project, and the concepts are defined as follow:

Table 6.2 Concepts in e-government service

Concept	Description
Service	A means offered to conduct transaction to citizen. Services available in MPJBT are : <ul style="list-style-type: none"> • Rental (Equipment, field, hall rental) • Asset (Building Renovation, Selling blue print etc) • License Services (Billboard licenses, bazaar, festival etc) • Asset Tax (Asset tax of property etc) • Public (Public report etc) • Waste Management (Waste collection) • Price Watch • Complaint
Organization	A department in MPJBT that responsible in offering the service. Divisions in MPJBT are : <ul style="list-style-type: none"> • Management service department • Finance department • Property department • Engineering Department • Building department • Development planning department • Landscape department • Municipal & licensing service department
Service consumer	Citizen that is potential user to any services
Legislation	Any document that regulates the operation of service
Form	Instrument to conduct a service

Basically, each concept has its own properties, for example the concept of “service” has the properties of service name, service number, service description etc. The relationship has a responsible to link each concept, for example the relationship “regulates” links the concept of “service” and “legislation”. It means that, when citizen conducts the concept service “asset tax”, so citizen will get a

recommendation about the rules of asset tax service. And for the relationship “hasform”, it links the concept of “service” and “form”. It means that, when citizen conducts service “asset tax”, so citizen will be required to fill the form of asset tax. Specific ontology describes how the concepts interact each other for services available in MPJBT.

6.4.3.2 User Profile Database

User profiling in personalization helps the communication between citizen and government effectively and efficiently. User profiling is responsible in recognizing the user every time citizen logs on to the system [10]. User profiles are a collection of information used to describe a particular user [11]. User profile is defined as the structured data record that storing the citizen’s information. The data of the user is consists of two type of data which is static and dynamic of data [12]. Static data means the data that is never or rarely changed [13] and the dynamic data is the data of user that frequently updated.

By profiling we can know who the user is, what he likes or dislike, and the level of his knowledge hence user behavior can be predicted. And by user profiling, system can implement the recommendation of the most relevant information to the citizen. It also enables the Intelligent Recommendation Engine (IRE) component to match the most relevant service information to the citizen. For the more brief description of IRE, researcher will go into detail in the next phase.

6.4.4 Intelligent Recommendation Engine

Intelligent Recommendation Engine (IRE) component is a part of information filtering. For this study, researcher chose content based filtering as the technique of information filtering. IRE is responsible for implementing the most relevant information service based on the

interest of service, service history usage and citizen's demographical information. IRE consists of two units, which are Data Matching Analyzer (DMA) and Personalized Recommendation Generator (PRG).

6.4.4.1 Data Matching Analyzer

Data Matching Analyzer (DMA) unit is responsible to find the similarity degree between the user's request and the available e-government services. The matching similarity is measured using service to service similarity that describes the matching degree between the request service and the available service. This similarity computed based on the semantic ontology matching. For example in the service of drive license, the relationship "regulates" links the concept of "service" and "legislation", the system will calculate the degree of similarity of service in concept "service" and the concept of "legislation". So when citizen conducts service of drive license, the system will give recommendation about the rule of drive license service. The name of service and the rule of service should be matched.

6.4.4.2 Personalized Recommendation Generator

Personalized Recommendation Generator (PRG) unit is the unit to predict the most relevant services among the available services. In PRG unit, there two types of recommendations, they are on demand and auto personalized recommendations. In on demand recommendation, citizens need to click on the service items hence the system will give the information of related service. In auto personalized recommendation, PRG will implement automatically by an event such as new service added, updated user profile etc. For example if citizen conducts a tax payment service in MPJBT, so the system automatically will give recommendation about the

information related with the tax payment service, or if a citizen updates his/her service interest in his/her profile, so the system will give recommendation about the related information of his/her new interest of service.

6.5 PERSONALIZATION

6.5.1 Memorization

Memorization model stores citizen's data such as demographic information and services conducted where it is implemented in the web server side. In the MPJBT personalized service, memorization implemented by storing citizen's name, user id, Malaysian pass and services conducted. For the detail information of how memorization of services implemented in MPJBT, researcher presents it as follow.

Table 6.3 Data used to memorize MPJBT services

Service id	Category of Service	Name of service	Date of service	Name of user	User id	Malaysian Pass
001	Property Tax	Low cost house tax payment	23/2/10	Silviana	1045	AH635647
002	License Service	Ramadan Bazar License payment	7/7/10	Satia	3782	SJ748397
004	Rental	Taman teratai community hall	4/8/10	Tomy	8757	JH273838
008	Public Services	Car summon payment	17/4/10	Ahmad	7384	JS273829

6.5.2 Customization

Customization model allows citizen to change the structure of his/her personal page. Citizen can navigate it by selecting the services item

available, the system will give the information of related selected service to citizen. This type of model is adapted from myyahoo.com. Here, citizen can select the information of services based on their preferences and needs. By clicking to the services items, citizen can get the updated information of related services selected by citizen. For the available services can be selected by citizen, researcher presents it as follow.

Table 6.4 Customization Service

Service	Description	Information of servi
Price watch	User can get updated information regarding rate price of item in traditional and modern market in Johor area	<ul style="list-style-type: none"> • Rate price of hypermarket in Johor Bahru area • Rate price of pasar raya in Johor Bahru area • Rate price of pasar buah besar in Johor Bahru area
Job vacancy	User can get updated information about the job vacancy available in Johor Bahru	<ul style="list-style-type: none"> • Information of updated job vacancy in Johor Bahru area
Waste management	User can get updated information about the schedule of waste collection in Johor Bahru area.	<ul style="list-style-type: none"> • Schedule of waste collection area of Johor Bahru
Rental	User can get the updated information about the hall rental, equipment rental and field rental.	<ul style="list-style-type: none"> • Registration procedure of equipment and field rental based on user's location area • Rate price of rental based on function.
License service	User can get the updated information about the procedure of license service such as Billboard License, Business License, temporary license etc	<ul style="list-style-type: none"> • Registration procedure of license service such as Ramadan bazaar, concert expo and promotion event • Rate price of license service

In price watch service, citizens get the information of rate price of hypermarket, “pasar raya” and “pasar buah besar” based on the location area of citizen collected during the explicit input in registration. In waste management, citizen also gets the information of waste collection schedule based on the user's location area collected explicitly during registration. In rental and license service, citizen gets the information based on either past history or the

citizen’s location area.

6.5.3 Recommendation

Recommendation model automatically recommends the information that relevant to the citizen’s needs of services and it is implemented on the web server side. It relies on the data of citizen’s demographic information and past of service history. For MPJBT’s service recommendation, researcher presents it as follow.

Table 6.5 Recommendation of MPJBT’s services

of Service	Name of service	Recommendation of service informa
Tax	Low cost house tax payment	Procedure of low cost house tax payment Due date of tax payment The tax rate for low cost house Regulation of tax payment by section 127, 163.
	Taman Teratai community hall rental	Procedure of hall rental registration Types of function allowed for hall rental : Teratai. Rate price of hall rental in Taman Teratai
ervice	Ramadan bazaar license payment	Procedure of registration for Ramadan bazaar Rate price of Ramadan bazaar license.
	Expo license service	Procedure of registration for expo license. Rate price of expo license. Regulation of expo license service
rvices	Car Summon payment	Procedure of car summon payment Rate price of car summon.

6.5.4 Personal inbox and Service Alert

These features are presented in CUI unit of UI component. Each citizen will get the information of services based on the data collector, past service history and customization. Each feature will give the different content of information. For the detail content of

each feature, it will be presented as follows.

Table 6.6 Personal Inbox Feature

Description	Category of service	Name of services	Information in personal inbox
This feature covers the information of feedback from any service inquiry from citizen.	Complaint	Complaint regarding waste management	<ul style="list-style-type: none"> • Feedback of complaint regarding waste management service. • Your enquiry regarding schedule of waste management in Skudai area.
	Price Watch	Price watch in Johor Bahru area	<ul style="list-style-type: none"> • Your enquiry regarding price rate in Skudai area
	Property Tax	Low cost tax payment	Your bill of low cost tax payment.
	Rental	Hall Rental	Your bill of Taman teratai community hall rental payment
	Job Vacancy		Information of updated job vacancy in Johor Bahru
	Registration and password change		<ul style="list-style-type: none"> • Confirmation of password changed • Confirmation of registration.

Table 6.7 Service Alert Feature

Description	Category of service	Name of services	Information in personal inbox
This feature covers the reminder to citizen before the due date of services come, the purpose of this feature is	Property tax	Business property tax	<ul style="list-style-type: none"> • Due date of business property tax payment • Late penalty of business property tax payment • Regulation about outstanding tax notice.
	Public services	Car summon	<ul style="list-style-type: none"> • Reminder regarding payment of car summon

<p>to increase citizen's awareness regarding services conducted.</p>	<p>License service</p>	<p>Business license service</p>	<ul style="list-style-type: none"> • Fine for the late car summon payment. • Due date renewal your road side stall license. • Penalty of late business license renewal
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For the recommendation feature, system will give the recommendation based on the user demographic information and interest of service collected explicitly in registration form, new service conducted by citizen and the past services conducted by citizen. For example in explicit input, if the system stores the user's location of address is in Skudai, so the system will give a recommendation about the schedule of waste collection in Skudai area. Besides that, system will give recommendation about the services if the new service is conducted by citizen.

The data of new service will be added to the user and system recommends the information to the user based on the new service conducted by citizen. And for the past services history, system will store the service and give the recommendation of service because still there is a possibility of user still implements that service in future. For the recommendation service, it is presented in the Customized User Interface (CUI) and it is generated by Intelligent Recommendation Engine (IRE) component. This data is collected in User Data Collector (UDC) component and all the user and service data are stored in Data Source Repository (DSR) component. Those components jointly work together hence the personalization can be implemented in MPJBT government agency.

6.6 PROTOTYPE DESIGN

For the illustration of how an application may solve the requirements, researcher represents the user interface of service personalization page. The selected models of personalization that have been identified are customization, recommendation and memorization, and the selected features are personal inbox and service alerts.



Figure 6.2 Proposed Personalization Interface



Figure 6.3 Proposed Customization Interface

Figure 6.2 and 6.3 are the researcher's proposed personalization interface. There are some features in the personalization page such as last log in message, greeting message, personal inbox, service alert, recommendation information and customization of service.

6.7 CONCLUSION AND FUTURE WORK

Researcher sees there some good potential that can be developed through this project remembering the important benefits gained by developing this project. Researcher wishes to highlights several suggestions that may enhance the portal's usability in the future, because there are some areas that can be enhanced for further study. And the suggestions of further study are proposed as below.

- (a) Study the technology used for Personalization development either in private or public sector.
- (b) Enhance the personalization features.
- (c) Enhance personalization information delivery for various channels such as in mobile phone.
- (d) Develop the to-be system for personalization service.

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