SMS-BASED CONTENT ALERT: A DIGITAL LIBRARY WEB-BASED SYSTEM USING SMS TECHNOLOGY

Mushahadah, Maghribi¹, Mohd Nizam, Osman², Nurul Fatin, Zainal²

> ¹Politeknik Tuanku Syed Sirajuddin, Malaysia <u>mushahadah@gmail.com</u> ²Universiti Teknologi Mara, Perlis Branch, Malaysia <u>mohdnizam@perlis.uitm.edu.my</u> <u>nurulFatin@gmail.com</u>

ABSTRACT

The motivation behind this research is the growing popularity of web-based systems and the need to explore the Short Message Service (SMS) technology that libraries could benefits to enhance their services to the users. This paper presents a notification-based content alert and web-based system using SMS technology. It was specifically developed for the alert notification to the patrons about the renewal date and the availability of the reserved books. The main purpose of developing SMS-based content alert in the library system is to reduce the cost and time consumed, which is beneficial to the librarian and patrons. Therefore, the system was designed automatically to send an alert SMS text message to the patrons about the due date of returning the book, and the availability of the book reserved. Besides, the web-based system with SMS notification was integrated with the Online Public Access Catalog (OPAC) system to enhance the capability of library services. This system was developed based on System Development Life Cycle (SDLC) using the waterfall model as a methodology. A user acceptance testing was conducted with 21 respondents who are the librarians to determine the effectiveness of the system by evaluating the questionnaires that were divided into five categories respectively. Results of the system evaluation showed that most of the participants were satisfied with all categories provided. Hence, the system using web-based and SMS technology is the convenient, economic and reliable method of notification for the library.

Keywords: Web-based system, SMS, OPAC, SDLC, user acceptance testing

1. Introduction

Many organizations used web-based system that can be integrated with SMS technology because most people often used mobile phone that gives convenience to the users who are familiar with SMS technology. The technology has been implemented into the wide-range different sectors, such as education (Ismail & Husen, 2013; Verma & Gupta, 2013), digital library (Bakar, Rahmad, Baharuddin, & Amin, 2011; Jetty, Bajpai, & Anbu K, 2013), health organization (Gurol-Urganci, de Jongh, Vodopivec-Jamsek, Atun, & Car, 2013; Wang & Andoh-Baidoo, 2017), government (RoshanTharangga et al., 2013) and private sectors (Ghoreishi & Shajari, 2010).

Many revolutionary changes are taking place especially in the workflow process and type of resources that are stored in the library. Library system has changed from manual to online system corresponding with new era of ICT. The changed from the traditional library system to the digital system is predictable. Therefore, a digital library, which referred to the collection of information to people be able to access over the Internet, or some type of remote electronic connection became an essential medium to the patrons. Many libraries in educational organization provided on-line services such as Online Public Access Catalogue (OPAC). 61.9% of students used OPAC to access library materials because it is an easy way to access the material compared where patrons needed to go to the shelf to find the material they want to borrow (Yusuf & James-Iwu, 2010).

Meanwhile, the used of the web-based system become a popular trend due to the services can be accessed remotely by using web browser and can be accessible from anywhere in the world. Besides, a mobile phone is an essential medium to communicate, interact or device to gain knowledge (Asmara & Aziz, 2011). Nowadays, SMS technology can be implemented with the web-based system in the more convenient way. SMS text message is also possible to be send from computer to recipients by using GSM modem and SMS gateway as a transmitting device.

With the growing popularity of mobile phones and SMS, the technology should be seriously considered as the majority of the students that have high usage of mobile technologies. The challenge will be to determine the nature of services that the library should deliver via SMS and to come up with solutions to their various challenge mobile phone technologies currently present to ensure satisfactory services to its customer. Furthermore, many libraries are still using traditional methods by notifying the patrons using e-mail or letter of notification about the returning of the book and the availability of the book reservation. Hence, it considered time-consuming and the worst case, the information is not delivered to the patrons at the right time. Most of the library has no automation system to notify the borrower to return the book and take the reservation of the book when it's available. Therefore, the service at the library is enhanced through the used of the web-based system that is integrated with SMS notification. According to (So, 2009) libraries can serve and approach students by sending and receiving SMS for the library information.

2. Methodology

The digital library web-based system integrated with SMS technology has a very user-friendly interface. By using this system, the librarians can manage the patron information and SMS notification to the patron within a few clicks only. The new data can be added or an existed data can be edited or deleted too by the librarians. Thus, there is no delay in the availability of any information, whether

needed, can be captured very quickly and easily. This system becomes very helpful for librarians and patrons.

We made used of the barcode scanner for the input to retrieved data of book's information and student's information such as matric number, name and course. The barcode scanner scans related data of the students and books. Then, the data of the book's availability and renewal date for the books will be updated in the database. The data was extracted from the database and was used for the webbased and SMS system to generate renewal reminder and the availability of the books through SMS technology. Then, the system developed was integrated with the Online Public Access Catalog (OPAC) system to enhance the capability of library services. Figure 1 shows the library web-based system architecture for the proposed system.



Figure 1. The Library Web-Based System Architecture

The SDLC was used to develop the web-based system and SMS notification. SDLC is a framework that describes all activities and processes in a software development project. The process is associated with the waterfall model which consisted of six phases such as planning, analysis, design, implementation, testing and maintenance.

Planning. In this phase, all information, data and problems of the project were gathered by reading articles, journal and thesis from previous research. From the information gathered, all the requirements and opportunities were recognized.

Analysis. The activities included were the identification of the hardware and software requirement in the development system, scope of project, schedule of activities such as Gantt chart and the total budget.

Design. In this phase, the researcher designed the requirement needed in system development. Included were the system components, system architecture, contextual diagram, data flow diagram, entity relationship diagram, user interface design and system flowchart.

Implementing. Layouts of interfaces were created using HTML and PHP coding through Adobe Dreamweaver CS 3 and notepad++. PHP language is used to execute the system and MySQL runs as database and to save data within the

system. Additional tools for the system development were used such as a bar code reader to retrieve data of book's information and patron's information. Then, SMS Gateway script by iSMS was embedded in the web-based to make the system able to send the message to the patron's mobile phone.

Testing. Debugging and testing of the program for fixing bugs or errors of the design were done in this phase. Then, the system was evaluated to determine the system performance and to ensure all requirements accomplished. User acceptance testing was done by testing the system on users to ensure that users can perform the tasks respectively.

Maintenance. After testing phase, minor refinement was done to integrate corrections of bugs and the user's feedback which was focused mainly on fine-tuning of system, configuring, installing and usability issues.

In the development of SMS system notification, the researcher was used SMS gateways and mobile phone, which are connected to the web-based system. The SMS gateways served as the gateway to connect with the mobile phone users and the system for sending an alert message automatically to the patrons about due date and the availability of the reserved book. The mobile phone was used for receiving the text messages and alert messages from the system.

The system was tested and conducted at UiTM library. The target respondents of this study were UiTM librarian who had experienced in using the university's OPAC. In order to evaluate the effectiveness of the system, user acceptance testing was conducted. A quantitative approach was taken, and a survey questionnaire was the data collection instrument for this study. A total of twenty-one (21) survey questionnaires were distributed and received for the analysis. The questionnaire consisted of nineteen (19) questions and categorized into five (5) parts. The first part was comprised of the user interface design. The second part focused on the content. The third part of the questionnaire investigates the usefulness and ease of use, the fourth part, evaluate the SMS alert function and finally, part five investigate the navigation and usability. The data were analyzed using arithmetic mean technique based on the ranking score value.

3. Result and Discussion

To evaluate the user acceptance testing on the web-based and SMS notification, the study was tested to twenty-one (21) respondents of the librarian. The study has successfully done to evaluate the effectiveness of the system and categorized into five parts, which includes interface design, content, usefulness and ease of use, SMS alert system, and navigation and usability. The score value with scale 1 to 5 was given for every type of criteria identified. Every scale represents from strongly disagree(1), disagree(2), average(3), agree(4) and strongly agree(5).

TABLE 1. Analysis and mean on the effectiveness of the system											
NI -	Outtonia	Score (1-5)					Mean				
NO.	Criteria	1	2	3	4	5					
Part 1: User interface design											
1	Interface of this system is easy to understand			1	9	11	4.5				
2	Use appropriate of background color			2	13	6	4.2				
3	I like the interface of this system			8	11	2	3.71				
4	Error message in the system are helpful			1	14	8	4.71				
5	The text is clear and understandable				11	10	4.5				
				TOTAL MEAN			4.32				
Part 2: Content of the system											
6	The content provided is well-arranged and clear			1	9	11	4.5				
7	The information provided is easy to understand			1	8	12	4.52				

		TOTAL MEAN			4.51
Part 3	3: Usefulness and ease of use				
8	Using this system will make easier to do my job	1	7	13	4.6
9	Learning to operate the system would be easy for me	1	9	11	4.5
10	I would find the system useful in my job	то	7 14 TOTAL MEAN		
Part 4	I: SMS alert function				
11	The SMS alert system used in the system is relevant		7	14	4.7
12	I found that the SMS notification system is helpful		8	13	4.62
13	Integrating with SMS will make the system more effective		6	15	4.7
		TOTAL MEAN			4.67
Part 5	5: Navigation and usability				
14	It is easy to move from one page to another page		11	10	4.5
15	The instruction given is clear		10	11	4.5
16	The button provided is easy to click and understand		9	12	4.6
17	Overall, I am satisfied with how easy it is to use the system		10	11	4.5
18	It is easy to find information needed in the system		10	11	4.5
19	The system has all the functions and capabilities I expect it to have		11	9	4.4
			TOTAL MEAN		

The study has successfully done for each type of the criteria to evaluate the effectiveness of the system. Table 1 summarized the results for the identified criteria, mean for every question and total means for each category respectively. The overall results shown that respondents were satisfied with the web-based system that integrated with SMS alert function, and it can help them completed their task easier and faster. This can be proven when the total mean for the criteria was calculated as the highest which is 4.67 for the SMS alert function. Besides, most participants were satisfied with the system since each of the question categories grades were above 4.0.

4. Conclusion

This paper has presented some insight on user technology to construct and integrating the web-based system with SMS technology to enhance the service provided by the library. The system helped the librarian to notify the patrons through SMS system by sending a reliable message to alert the patrons about the status of due date and the availability of the reserved book. Thus, the system provides a convenience way of notification through the use of mobile phone, which is a common personal communication medium in most of the students.

To measure the effectiveness of the system, user acceptance testing was conducted to evaluate the performance of the system used questionnaire method. Based on the results and analysis, the overall system was measured to be acceptance by the users of the system. From the testing session, the system functions are well-functioned and most of the respondents satisfied with the system.

In conclusion, the integration of web-based and SMS technology in the library is the ultimate way to take the advantages of today technology, in order to enhance the productivity and efficiency of organization. In reality, SMS has been adopted by many users and has in fact, become extremely popular. Despite their limitations, mobile devices, especially mobile phones have become a natural part of the everyday lives of a huge number of people, especially the younger generation

growing up with computing and Internet technologies. Besides, the increasing range of services provided based on mobile applications will benefits to the users.

References

- Asmara, W. A. H. W., & Aziz, H. (2011). SMS flood alert system. In Cotrol and System Graduate Research Colloquium (ICSGR)(pp. 18-22).
- Bakar, A. A., Rahmad, F., Baharuddin, M. F., & Amin, Z. M. (2011). Mobile OPAC prototype based on koha open source integrated library system. In *Seminar Kebangsaan Perpustakaan Akademik 2011* (pp. 403–410).
- Ghoreishi, N., & Shajari, M. (2010). Web-based SMS passenger application: new approach to inform passengers via SMS in Airlines. In *International Conference on e-Education, e-Business, e-Management, and e-Learning 2010,* IEEE Computer Society, (pp. 469-473).
- Gurol-Urganci, I., de Jongh, T., Vodopivec-Jamsek, V., Atun, R., & Car, J. (2013). Mobile phone messaging reminders for attendance at healthcare appointments. *The Cochrane Database of Systematic Reviews*, (12), 1-51.
- Ismail, S., & Husen, M. N. (2013). Adoption of SMS and web based system to measure usability and effectiveness of text alert system as broadcast communication for managing and disseminating information. *International Journal of Computer and Communication Engineering*, 33–35.
- Jetty, S., Bajpai, M. K., & Anbu K, J. P. (2013). Cost-effective content alert system using SMS: a case study at Bundelkhand University Library, Jhansi. *New Library World*, *114*((1/2)), 20–31.
- RoshanTharangga, J., Samarakoon, S. M. S., Karunarathne, T. A., Liyanage, K. L. P., Gamage, M. P. A., & Perera, D. (2013). Smart attendance using real time face recognition. In *SAITM Research Symposium on Engineering Advancements 2013*, (pp. 41–44).
- So, S. (2009). The development of a SMS-based teaching and learning system. *Journal of Educational Technology Development and Exchange (JETDE)*, 2(1), 113–124.
- Verma, P., & Gupta, N. (2013). Fingerprint based student attendance system using GSM. *International Journal of Science and Research (IJSR)*, 2(10), 128-131.
- Wang, Y., & Andoh-Baidoo, F. (2017). Design of integral reminder for collaborative appointment management. In *Proceedings of the 50th Hawaii International Conference on System Sciences* (pp. 910–919).
- Yusuf, F. O., & James-Iwu, J. (2010). Use of academic library: A case study of Covenant University, Nigeria. *Chinese Librarianship: An International Electronic Journal*, 1–12.