# INNOVATIONS IN IN-HOUSE DEVELOPMENT SYSTEMS AT TUANKU BAINUN LIBRARY, UNIVERSITI PENDIDIKAN SULTAN IDRIS

Khairul Asyrani Sulaiman and Siti Sumaizan Ramli
Tuanku Bainun Library, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak
Email asyrani@upsi.edu.my and sumaizan@upsi.edu.my

**ABSTRACT**

*With the advance in information and communication technology (ICT), Tuanku Bainun Library of Universiti Pendidikan Sultan Idris (UPSI) has been enhancing the delivery systems in library services. This has led to the development of a number of in-house systems to improve user satisfaction and add value to library services and facilities. This paper discusses the innovation of four in-house systems namely Pustaka VRS (Vendor Rating System), SiberPROP, iPustaka and OffPAC. These systems have been developed since 2009 and are well received by library users. Further improvements and commercial potential aspects of these products are being studied.*

**KEYWORDS :** *Tuanku Bainun Library; Universiti Pendidikan Sultan Idris; UPSI; In-house system development; Information technology; Library innovation; Pustaka VRS; SiberPROP; iPustaka; OffPAC; Library services*

***ABSTRAK***

Dalam arus perkembangan teknologi maklumat dan komunikasi, Perpustakaan Tuanku Bainun, Universiti Pendidikan Sultan Idris (UPSI) telah meningkatkan sistem penyampaian bagi perkhidmatan perpustakaan. Ini telah membawa kepada pembangunan beberapa sistem dalaman yang bertujuan untuk memberi penambahbaikan kepuasan pengguna dan nilai tambah kepada perkhidmatan dan kemudahan perpustakaan. Kertas kerja ini membincangkan inovasi empat sistem dalaman iaitu Pustaka VRS (Vendor Rating System), SiberPROP, iPustaka and OffPAC. Sistem dalaman ini telah dibangunkan sejak 2009 dan mendapat penerimaan yang baik daripada pengguna perpustakaan. Aspek penambahbaikan dan potensi pengkomersialan bagi produk ini sedang dikaji.

**KATAKUNCI:** *Perpustakaan Tuanku Bainun; Universiti Pendidikan Sultan Idris; UPSI; In-house system development; Inovasi perpustakaan; Pustaka VRS; SiberPROP; iPustaka; OffPAC; Perkhidmatan perpustakaan; Teknologi maklumat*

## Introduction

Academic libraries play important roles in supporting the university's teaching, learning, research and publication activities. Transformation in academic libraries involves new delivery systems in services, enhanced facilities and in-house systems development for library staff and users. The proliferation of information technologies has made a significant impact on libraries in the way they deliver their services and content as well as the format of that very content as most libraries move towards digital collections or at the very least hybrid print and digital collections (Sidorko, 2007).

Since the development of the Internet during the past four decades, libraries have transformed their roles to satisfy user requirements. Manual processes of library services are being converted to online systems to accelerate and further improve the effectiveness and delivery systems of library processes. The in-house systems developed by academic libraries specifically the Tuanku Bainun Library is aimed at providing enhanced and value-added services to users. This will also improve the efficiency to library users as well as to the community as a whole. Moreover, with a crack in-house development staff, firms also may be able to make tweaks and upgrades to homegrown software more quickly and with pinpoint precision (Dysart, 2012).

The Tuanku Bainun Library or *Perpustakaan Tuanku Bainun* (PTB) of Universiti Pendidikan Sultan Idris (UPSI) has developed in-house systems to help librarians and users in accomplishing a number of key library related tasks. In 2009, PTB's own iSYS system won two main innovation competitions that recognized the ability of PTB in-house software development unit. iSYS is an indexing system which indexes newspapers, articles in journals and magazines into a reliable storage for easy retrieval. Up until early 2015, iSYS has handled more than a thousand records with about one hundred concurrent active users per day. iSYS implementation marked a new era of in-house system development at the library.

Since then, PTB in-house system development accelerated and has published several key library applications namely Pustaka Vendor Rating System (VRS),

Reading List System (RL.sys) and SiberPROP, iPUSTAKA and OffPAC. A brief description of each system is shown in Table 1 :

| System | Year Implemented | Purpose |
|---|---|---|
| Pustaka Vendor Rating System (VRS) | 2009 | Vendor rating and evaluation system which is used to evaluate vendors' performance and make comparison among vendors for future library acquisitions. |
| Reading List System (RL.sys) | 2010 | RL.sys development is to fulfill the requirement of the library's Collection Development and Management Division in order to keep track of the current status and availability of the university's reading lists for all programs. |
| SiberPROP | 2013 | SiberPROP is used to ease the management of registration, administration and monitoring of user education classes. |
| iPUSTAKA | 2014 | Android app that serves as the library bulletin board. Users are able to communicate with library staff and get the latest library news and information via their mobile phone. |
| OffPAC | 2015 | Offline version of Public Access Catalogue that is made accessible through users' mobile phones. OffPAC can be used to locate library materials even without the Internet connection. |

**Table 1:** In-house systems developed by PTB since 2009

However in this article, we will describe the four applications developed by Tuanku Bainun Library namely SiberPROP, Pustaka VRS, iPUSTAKA and OffPAC.

**SiberPROP – All in one solution for user training**

SiberPROP is the online registration, management and analysis system for user education or information literacy programs. The Tuanku Bainun Library organizes user education classes in order to educate new students and academic staff on how to use the library collection, services and facilities to the optimum level. In 2012,

statistics showed that only 26% of the total number of new students attended user education classes. This declining trend happened because of a number of causes that will be discussed later. Table 2 below shows the statistics of students who had attended the classes in relation to the total number of new students:

| Year | Total Number of New Students | Total registered for classes (with %) | Total number of attendee (with %) |
|---|---|---|---|
| 2010 | 2,382 | N/A | 1,043 (44%) |
| 2011 | 2,203 | N/A | 933 (43%) |
| 2012 | 1,662 | 918 (55%) | 432 (26%) |

**Table 2:** Statistics of students attending user education classes from 2010-2012 (Source: Team OASIS KIK presentation, 2013)

Due to the drop in attendance of the classes, a task force has been established in late 2013 by means to overcome the issue and thus created a creative and innovative (KIK) group project comprising library staff.

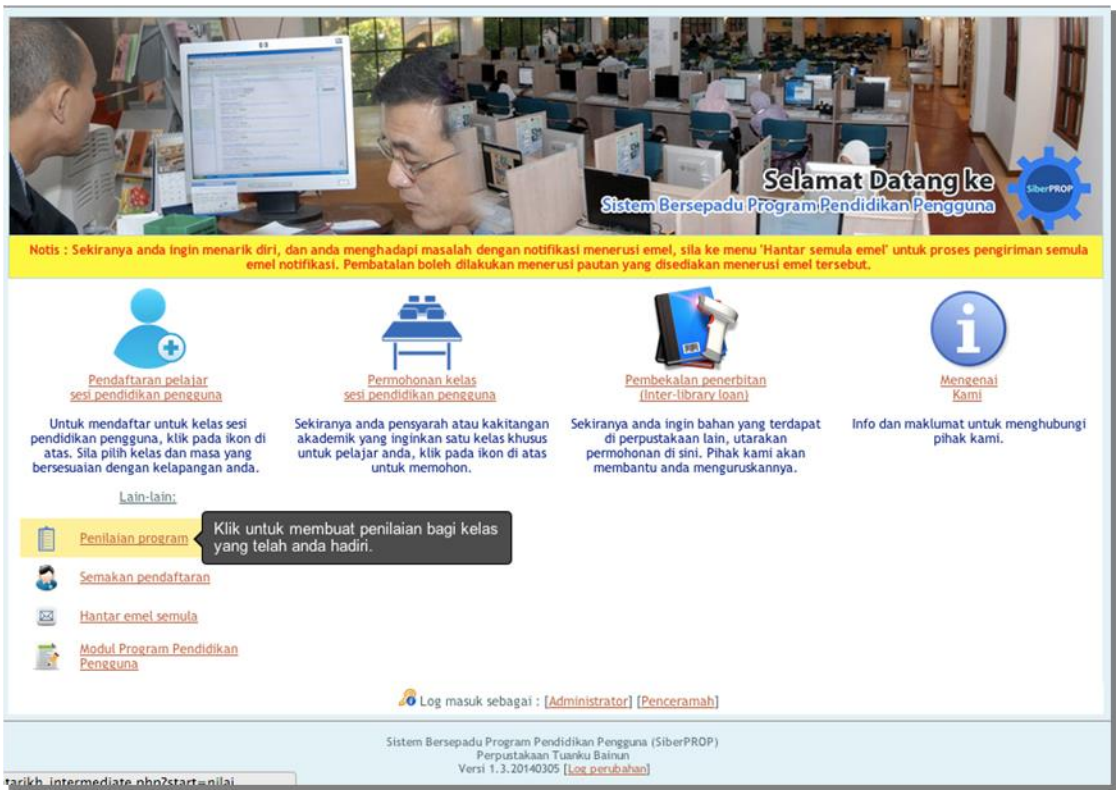
Their research and findings have identified the following causes of declining in registration and attendance of user education classes:

i. Registration was done manually
ii. There was no reminder on the schedule for students
iii. Lack of cooperation with the faculties to ensure new students are compulsory to attend the classes
iv. Course framework was not provided during registration

With all the factors explained and well documented, the team decided to build a complete all-in-one web based system to handle user education classes. The system should meet the following 'must have' criteria:

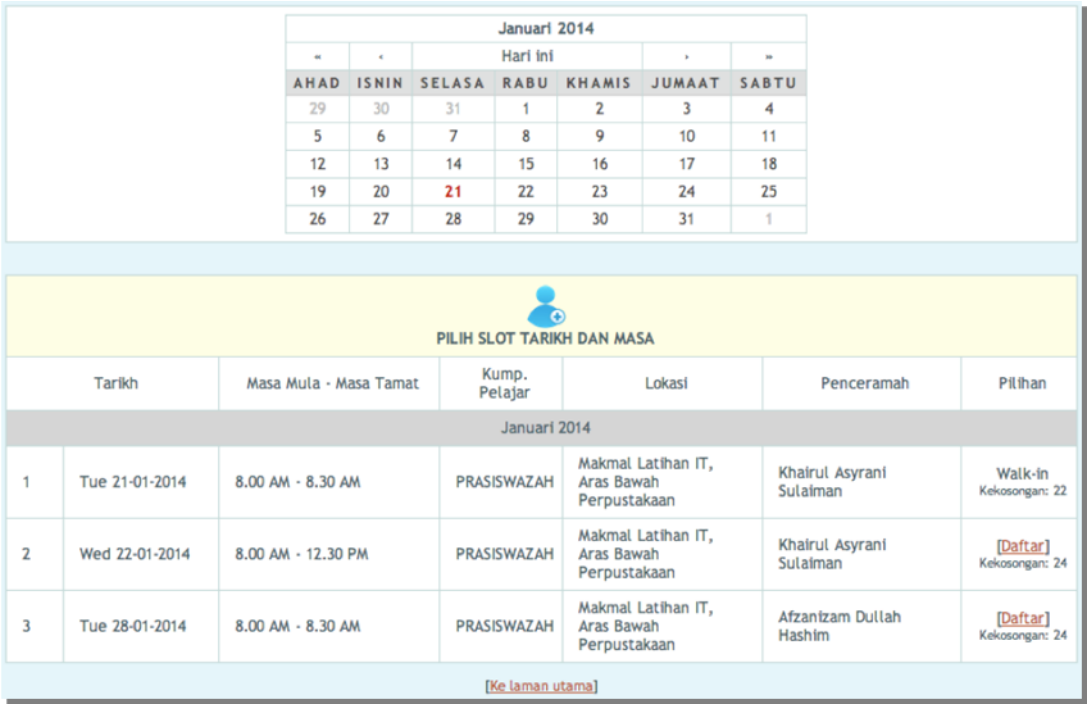
i. User-friendly interface for students to register for classes and be reminded of their registration schedules.
ii. Integration of administration aspects of the system for administrators to manage, monitor and facilitate classes.
iii. The system must be able to generate predefined report with graphs and figures and later exportable to Adobe PDF format.
iv. After-class evaluation module which requires users to evaluate their facilitators (librarians) and the overall performance of the class.

When all the requirements are finalized and approved, the team assigned the library's Information Technology Officer to develop a full in-house working system within two months. The development began in early September 2013 and completed by the third week of October 2013. The system has been named as **SiberPROP** (*Sistem Bersepadu Program Pendidikan Pengguna)* or the **Integrated System for User Education Program.**




**Screenshot 1:** Main interface of SiberPROP version 1.3 on a computer screen that also includes built-in Inter Library Loan module

Students register for user education classes by clicking on the registration icon and they will have an option to select the class at their convenience. The user education class list has indications to show whether the class is full or still open. Students are also allowed to walk-in to join any classes available in the schedule.



Januari 2014

« ‹ Hari ini › »

| AHAD | ISNIN | SELASA | RABU | KHAMIS | JUMAAT | SABTU |
|---|---|---|---|---|---|---|
| 29 | 30 | 31 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | 1 |

PILIH SLOT TARIKH DAN MASA

| | Tarikh | Masa Mula - Masa Tamat | Kump. Pelajar | Lokasi | Penceramah | Pilihan |
|---|---|---|---|---|---|---|
| Januari 2014 | | | | | | |
| 1 | Tue 21-01-2014 | 8.00 AM - 8.30 AM | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Khairul Asyrani Sulaiman | Walk-in Kekosongan: 22 |
| 2 | Wed 22-01-2014 | 8.00 AM - 12.30 PM | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Khairul Asyrani Sulaiman | [Daftar] Kekosongan: 24 |
| 3 | Tue 28-01-2014 | 8.00 AM - 8.30 AM | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Afzanizam Dullah Hashim | [Daftar] Kekosongan: 24 |

[Ke laman utama]

**Screenshot 2:** Student registration module

As for student's particulars, email address was a mandatory field. This was because all notifications would be redirected to their emails. The following were notifications that students would be receiving:

i. Registration details with a link to allow them to cancel their own registration and a reminder notice
ii. Notification of any cancelled user education class

For administrators, upon successful login, they would view several more additional administrative modules as follow:

i. Create and modify user education class
ii. Generate useful reports and statistics (exportable to PDF format)
iii. Manage facilitator for a class
iv. Manage students registration data
v. Create new system user as administrator or facilitator

KAWALAN TARIKH DAN MASA

| | Tarikh | Masa Mula - Masa Tamat | Penceramah | Kump. Pelajar PRA \| PASCA \| SEMUANYA | Status ON \| OFF \| BATAL | Kelas (Hadir/Daftar) | Statistik | Opsyen |
|---|---|---|---|---|---|---|---|---|
| Januari 2014 | | | | | | | | |
| 117 | 21-01-2014 [TEMPAH LOKASI] [PERMINTAAN] | 8.00 AM - 8.30 AM | Khairul Asyrani Sulaiman Set Batal | PRASISWAZAH | [ON] | SENARAI PELAJAR (1/2) | STAT (0) | [BATAL] [LAPORAN] |
| 115 | 22-01-2014 [TEMPAH LOKASI] [PERMINTAAN] | 8.00 AM - 12.30 PM | Khairul Asyrani Sulaiman | PRASISWAZAH | [ON] | SENARAI PELAJAR (0/0) | STAT (0) | [BATAL] [LAPORAN] |
| 116 | 28-01-2014 [TEMPAH LOKASI] [PERMINTAAN] | 8.00 AM - 8.30 AM | Afzanizam Dullah Hashim | PRASISWAZAH | [ON] | SENARAI PELAJAR (0/0) | STAT (0) | [BATAL] [LAPORAN] |

**Screenshot 3:** Class management interface for administrator

Since the implementation of SiberPROP has been a success, the library is studying its commercial potential. The successful implementation might generate output for the library management to identify SiberPROP as a complete all-in-one system for handling course registration, course scheduling and course evaluation.

**Pustaka VRS – Vendor Performance Rating System**

Pustaka Vendor Rating System (VRS) is developed by Tuanku Bainun Library to evaluate the performances of various vendor services. This is done in order to fulfil the requirement of Clause 7.4.1 - Purchasing Process in MS ISO 9001:2008.

The problems and issues that Tuanku Bainun Library faced prior Pustaka VRS was generally on the evaluation for a company being done using printed forms. For each evaluation, validation from Head of Acquisition Division or Chief Librarian is required before any evaluation could be finalized which is very time consuming. Calculations are done manually on a printed evaluation form and at times could lead to mistakes. After all the processes have been completed, the forms are then stored in a ring folder which affected the process of searching and filtering the files.

At each year-end, analysis has to be done manually and several computer programs have to be used in order to generate the final management report. Retrieving past vendor performances was not an easy task. Ring folders have to be taken out from the file storage and filtered out one-by-one. If a staff is required to make reports on any specific acquisitions, it would take many hours to search and filter the storage files. Therefore Pustaka VRS has been planned and developed to overcome those issues.

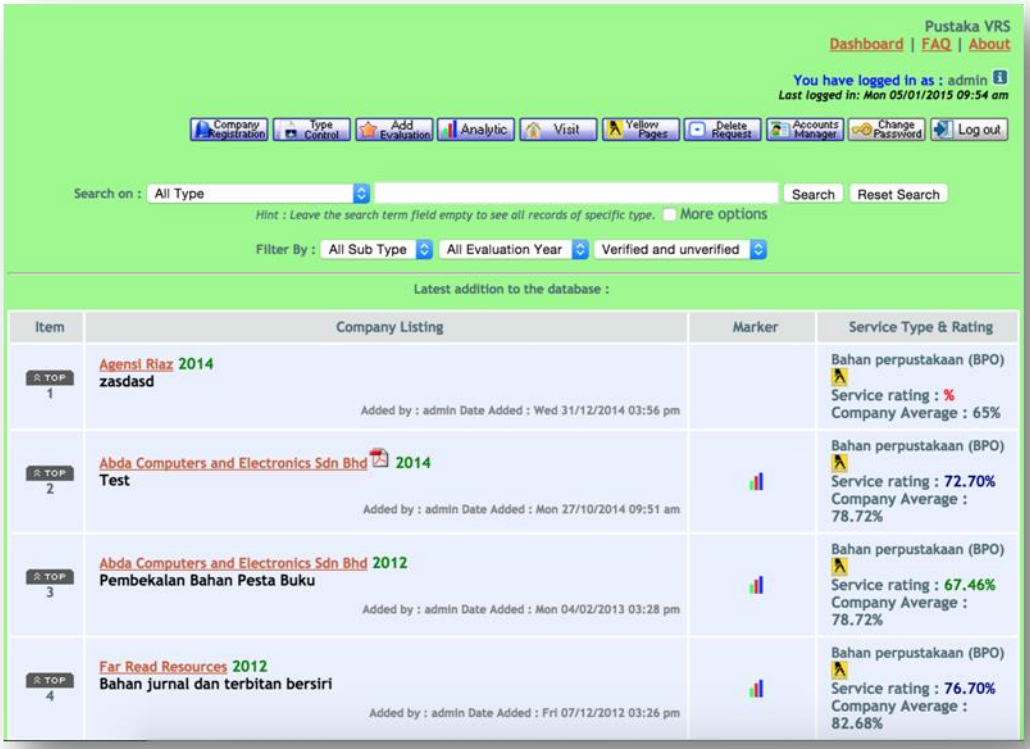
The features of Pustaka VRS include the following:

i. Central archiving, which means all evaluation data, will be stored into a centralized database for easy retrieval.
ii. Fast filtering can be done for a better comparison between vendors.
iii. Evaluation for a company is easily accessible and generated into widely used Adobe PDF format.
iv. For each question answered in an evaluation form within Pustaka VRS, a detailed analysis can be easily produced, calculated and previewed via a single user interface.
v. Retrospective evaluation data for each company is structurally organized and can be easily accessed for any purposes.
vi. User account is encrypted for each login and each data and interfaces are protected using a session management system.

**Screenshot 4:** Pustaka VRS main login screen

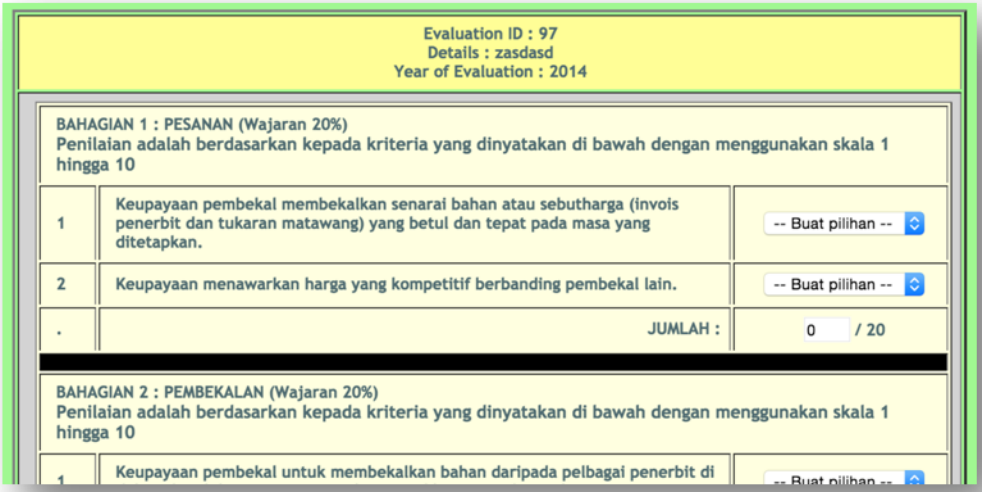
Pustaka VRS offers a standardized evaluation that is applied to all Malaysian academic libraries. The system has been released as Open Source software for libraries to further enhance and add more value to the system.

Up until now, apart from UPSI, the International Islamic University of Malaysia (IIUM) library has also deployed Pustaka VRS as their system to evaluate the performance of library vendors. Other institutions that have shown interest are Pustaka Negeri Sarawak, Universiti Malaysia Sarawak (UNIMAS), Universiti Kebangsaan Malaysia (UKM), Universiti Teknologi Mara (UiTM) and Universiti Utara Malaysia (UUM).



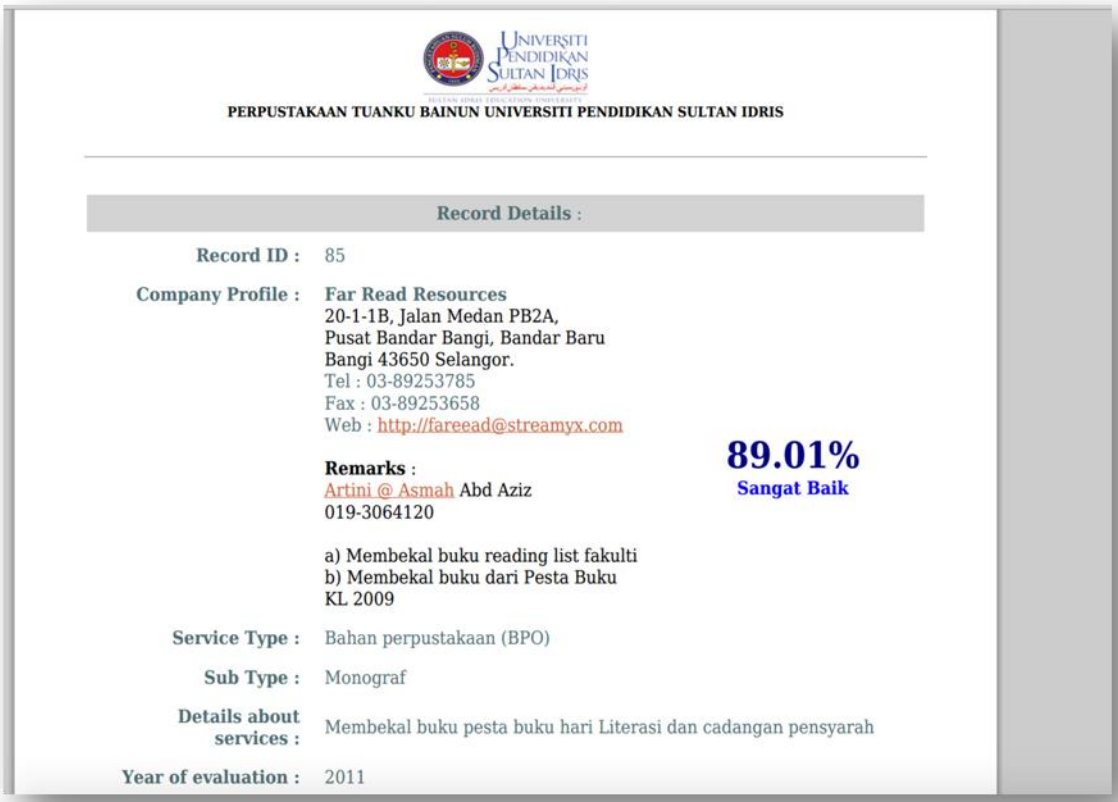

**Screenshot 5:** Administrative main screen with many filtering options

The main goal for Pustaka VRS is to provide an easy interface for data managers to search and filter any specific terms for vendor. Data managers can easily compare and evaluate past and present performances between vendors.




**Screenshot 6:** Evaluation form interface

All reports generated within Pustaka VRS can be easily converted to Adobe PDF format, without the need for separate importing to third party plug-in or software.



PERPUSTAKAAN TUANKU BAINUN UNIVERSITI PENDIDIKAN SULTAN IDRIS

Record Details :

| | |
|---|---|
| Record ID : | 85 |
| Company Profile : | Far Read Resources<br>20-1-1B, Jalan Medan PB2A,<br>Pusat Bandar Bangi, Bandar Baru<br>Bangi 43650 Selangor.<br>Tel : 03-89253785<br>Fax : 03-89253658<br>Web : http://fareead@streamyx.com |
| | **Remarks** :<br>Artini @ Asmah Abd Aziz<br>019-3064120<br><br>a) Membekal buku reading list fakulti<br>b) Membekal buku dari Pesta Buku<br>KL 2009 |
| Service Type : | Bahan perpustakaan (BPO) |
| Sub Type : | Monograf |
| Details about services : | Membekal buku pesta buku hari Literasi dan cadangan pensyarah |
| Year of evaluation : | 2011 |

**89.01%**
**Sangat Baik**

**Screenshot 7:** Evaluation details per vendor in PDF format

Pustaka VRS has proven to be a success in this paperless world. All aspects of evaluation is well taken care of in the form of a centralized database where users can access anytime, anywhere as long as they have valid credentials to access the system.

With a strong community support, Pustaka VRS could be the one and only vendor rating platform that can be easily accessible by any organization especially academic libraries in Malaysia.

**iPUSTAKA - A 'Swiss Army Knife' In A Modern Library**

The usage of mobile phones especially smartphones have been increasing lately in every aspect of our life. From note taking to online shopping, everything can be done

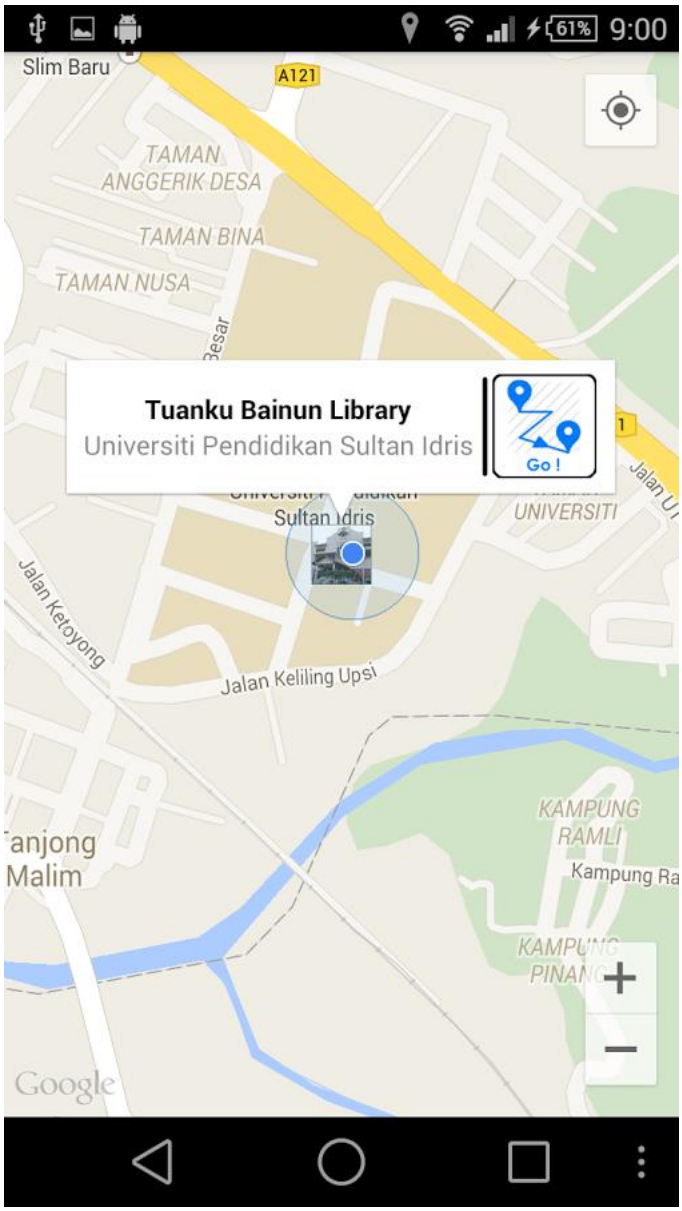
via a single tap on a small screen nowadays. With this in mind, the library has developed Android apps in order to capture and target smartphone users.

iPUSTAKA is an Android based application that served mainly as the library bulletin board. Information to this mobile bulletin board is taken directly from external RSS/XML sourced from the Tuanku Bainun Library info blog. The content will always be up-to-date as long as the user is connected to the Internet. The Tuanku Bainun Library also begins experimenting and integrating with numerous other features as follow:

i. Integrated phonebook with built-in access to Android dialer. Users may browse the library staff directory and select to whom he or she wants to contact or speak with.
ii. Integrated resource locater where users may find locations, shelves and other points of interest in the library building very easily with guided direction.
iii. It comes with QR code scanner that utilizes user's smartphone camera. Scanned QR code may then be use to give users useful information depends on the location the users scanned those codes.
iv. There is also a mini photo gallery. Users may swipe left or right to navigate through the photos to gain information.

**Screenshot 8:** Main screen of iPUSTAKA version 1.0

iPUSTAKA also integrates with Google Maps API and play nicely with several other GPS navigation application. At any location in Malaysia, users will be automatically directed via turn-by-turn navigation to the Tuanku Bainun Library without opening or purchasing separate apps.

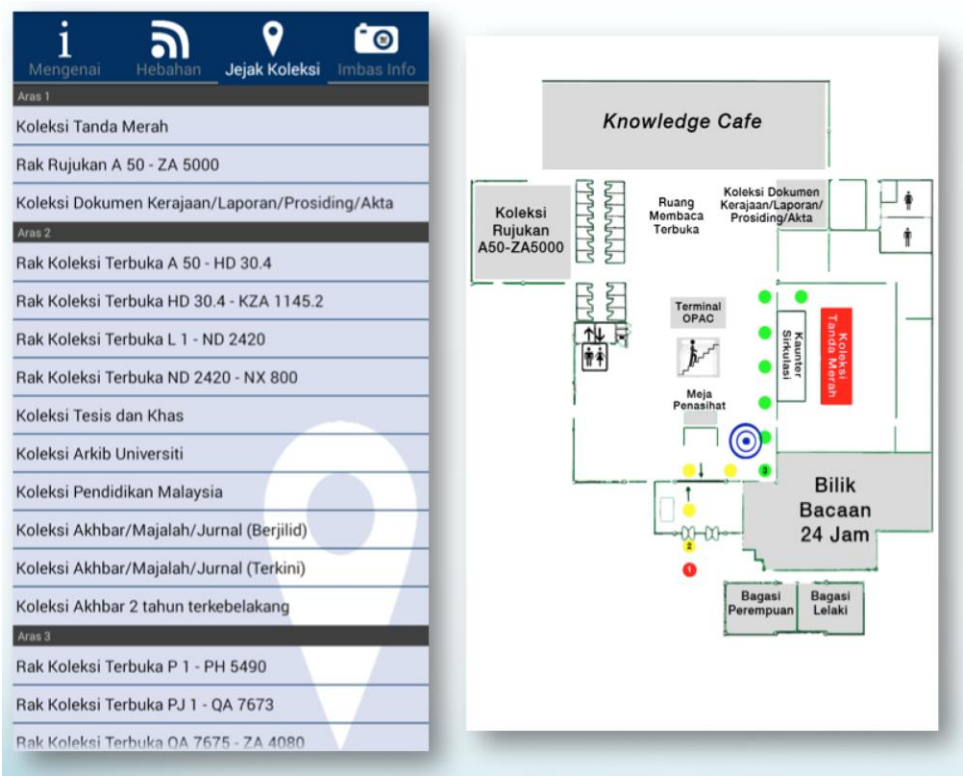



**Screenshot 9:** iPUSTAKA is integrated with Google Maps API

Then there is a news feed tab where contents are always current and up-to-date taken from the Tuanku Bainun Library blog that is powered by Google Blogger platform.

**Screenshot 10:** News feed tab that is powered by Google Blogger platform

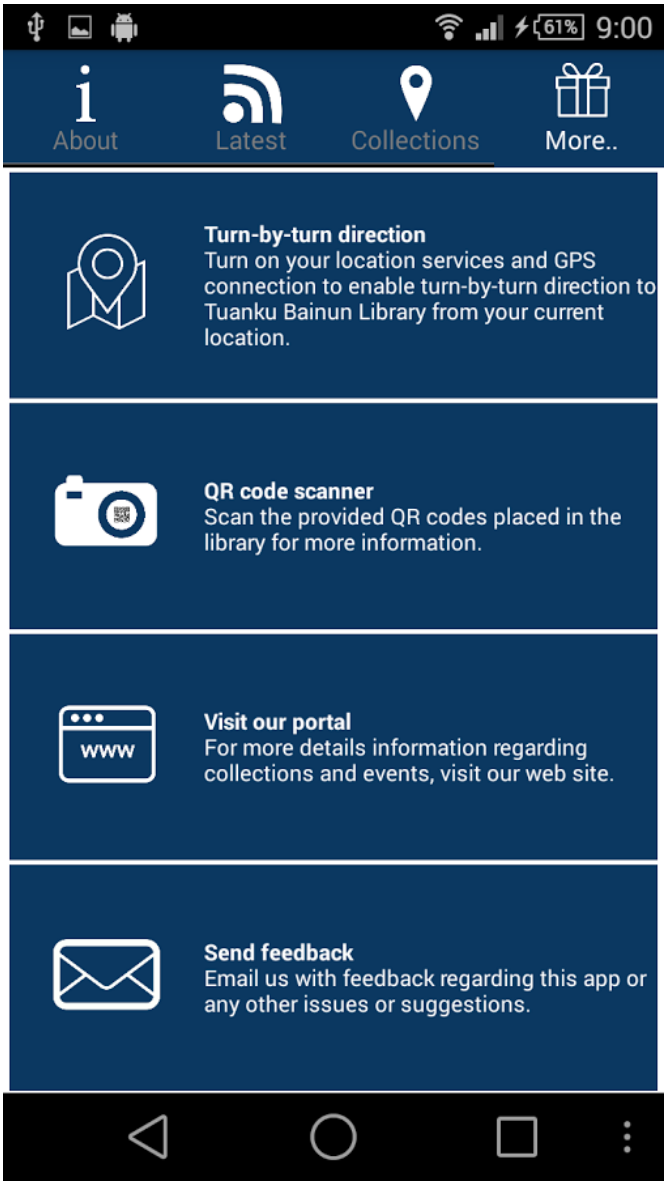
The development of iPUSTAKA continues with a feature dubbed collection tracker. With this feature, users will be shown steps and direction to their desired point of interest (POI) in the library building. As in version 1.0, this feature is available for users and received many good feedbacks. Version 2.0 of this apps was released in January 2015. The library's development team has simplified the interface for this particular function and shows POI in a color- coded form replacing the step-by-step guide.




**Screenshot 11:** Collection tracker as in version 1.0

**Screenshot 12:** Collection tracker as in version 2.0

iPUSTAKA also provides many useful functions with bigger impacts as shown in Screenshot 13.



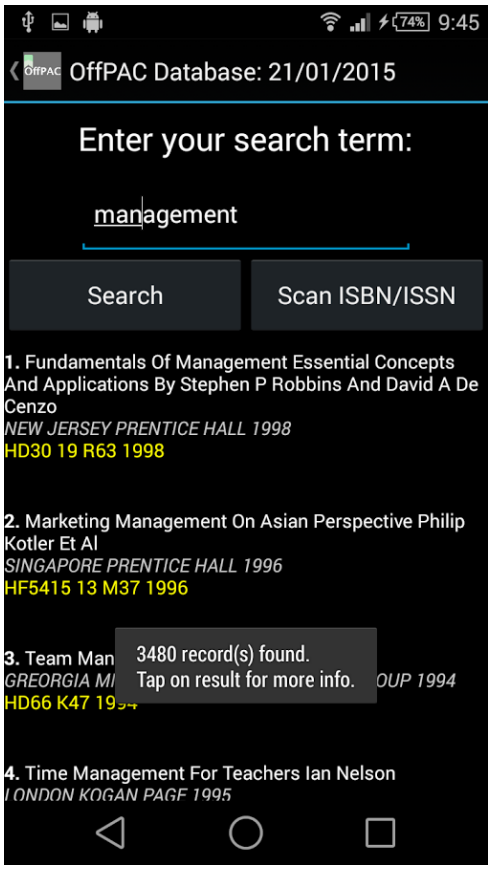

**Screenshot 13:** More useful functions inside iPUSTAKA

The four additional functions explained by the screenshot above provide a one-stop center for users to get more information about their library. iPUSTAKA since implemented has been receiving good impressions among academicians and library users. Their comments and positive feedbacks provide useful inputs for further improvements.

**OffPAC - Offline Public Access Catalogue**

OffPAC is an evolutional way to search and discover reading materials the library collection holds. The idea of developing OffPAC arose from a number of key issues :

i. Traditional OPAC (Online Public Access Catalogue) is in need of Internet connection to view and search library collection.
ii. To overcome the limited number of OPAC terminals and problems whenever exists uncertainties in internal network connection.
iii. To make a more personalized OPAC client in conjunction with the rise of smart phone usage.

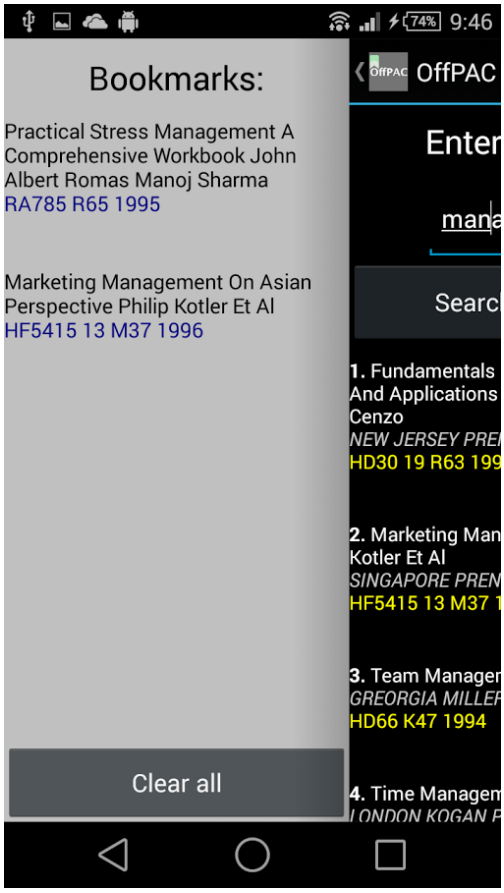



**Screenshot 14:** OffPAC (alpha version) main screen with search results

With OffPAC, users do not need an active Internet connection in order to search for library items. OffPAC simplify searches where only relevant information will be shown on screen. If a user requires to check an item status (whether it is available on the shelf or on loan), only then Internet connection is needed.

OffPAC also provides function for users to scan any ISBN or ISSN codes that will be cross-referenced with OffPAC internal database. If the material is available at Tuanku Bainun Library, the user will be promptly alerted.

Apart from all these functions, OffPAC users can also bookmark any searchable items. These bookmarks may ease users in finding books for their future reference and for their own self benefit such as if they want to acquire the books at any bookstore.




**Screenshot 15:** OffPAC bookmarks bar

OffPAC internal database will be updated whenever a user is connected to Google Play Store as it rides on Google app-update mechanism. This will be automated if the user sets their app to automatic-update mode when there is Internet connection.

At present, OffPAC is developed for Android devices and future versions may be available to Apple's iOS in future. In terms of commercial values, the Tuanku Bainun Library positions OffPAC as a customizable Android apps based on client requirements. OffPAC may be customized to suit any libraries, documentation organizations or archives institutions.

**Future Developments**

Both SiberPROP and Pustaka VRS were developed using PHP and MySQL that are open source softwares. In that respect, there is no financial implications in order to develop the final systems.

As for iPUSTAKA and OffPAC, these in-house systems were developed using Appcelerator Titanium that utilizes Android Software Development Kit (SDK). The main challenge in developing an Android app is to consider some thousands of screen sizes. With Titanium, it can be carefully managed and this issue can easily be overcomed.

All systems and apps articulated in this article in fact have commercial values. The Tuanku Bainun Library is linked to UPSI Holdings Sdn. Bhd. which assists in finding new opportunities for promoting, marketing and commercialization of library products. Building and designing our own software depend on our needs in assisting the library to cut cost in several operational aspects. In addition, the library gets to reach faster to its clients and obtain user feedbacks in order to make changes accordingly. Libraries in this century need to have its own IT staff to work side-by-side with librarians. When this happens, any new apps that can be envisioned whether for mobile or web-enabled application can be developed and delivered without much hassle.

The in-house systems development in academic libraries especially the Tuanku Bainun Library, UPSI has brought a new era in fulfilling user needs thus keeping up with new trends and developments in ICT.

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