A Report Generation Extension for an Open Source Human Resource Management System

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The rapid development of business enterprise software has greatly revolutionized how business is being done nowadays. However, most solutions are expensive and are more suited for large organizations, which poses a challenge for Small and Medium Enterprises (SMEs) to catch up in terms of operational excellence.

Fortunately, initiatives for the development of free and open source software for various business processes continuously flourish with the help of academic Information Technology (IT) institutions, as well as organizations that support the Open Source movement. This phenomenon effectively empowers SMEs to achieve efficiency in various activities, and promotes financial sustainability.

This study features the implementation of a free and open source Human Resource Management System (HRMS) called Orange HRM. It includes customization efforts to address the needs of some SMEs in the Philippines. It also discusses the cooperation between the academe and SMEs to promote sustainability in this project. Furthermore, it explains how scrum methodology was utilized in developing an extension for producing needed reports pertaining to work output, time sheet related information, and leaves. Various intranet and cloud-based approaches are also discussed. Opinions of employees, HR practitioners, and business owners who used the software are also summarized. Finally, recommendations and learning points are explained for future implementers.

INTRODUCTION

Various companies of different sizes aim for competitive advantage through hiring highly skilled human resources and using new technologies to outperform their competitors.

With the advancement of technology, organizations of different scales have increasingly used information systems in several or all of their processes. A common business function in which information systems are used is human resource management, which aims to get the most out of organizations' employees to meet the strategic objectives of the employer or business owner. Even though it would be appropriate to use HRM to refer to Human Resource Management, most practitioners often just use HR. There are many processes involved in the HR function, which makes it a very critical component of every business. Some important HR activities and processes are recruitment, training, development, employee information management, appraisal, leave management, and time tracking. Depending on the size of the organization, the HR function may be fulfilled by a department or by a single person, which might be performing other functions as well. Aside from the core processes mentioned, the HR function is also concerned about making sure that company policies are compliant with laws and standards imposed by the government or the area in which the business operates.

Because of its importance, HR is one of the core functions targeted by strategic information system consultants for automation and digitization. It is also a standard component of every Enterprise Resource Planning System (ERP). A Human Resource Management or Information System, which is referred to as either HRMS or HRIS, is an information system that handles the automation and digitization of HR activities and processes. It is commonly referred to as "the intersection of Human Resources and Information Technology (Rietsema, 2014)". However, well-known commercial ERPs and HRIS are usually complex, costly, and suited for large organizations.

Commercial HRIS Software

There have been several existing commercial software tools for human resources management. This list does not include the HRIS modules of popular ERPs like Oracle and SAP. Ramos (2013) enumerated these popular stand-alone commercial HRIS software.

The first in the list is *Sage HRM*, which primarily supports the tasks of the recruitment process. With this tool, a new job can be created and submitted through email by the manager. If approved, this can be placed on the company website where interested candidates can apply online from which a database is created. Searching and filtering information on the candidates with appropriate capabilities can easily be

made in the database.

Bswift, on the other hand, allows managing employee information and simplifies HR tasks. This web application also allows generation of reports. It claims that it is designed for large enterprises, where the number of employees exceeds thousands.

Mentis, a web-based HRIS, allows HR management to automate payroll. Job creation and online application are its core features. However, it suffers from its inflexible application forms and the absence of a report generation facility.

Airframe HR has several features for managing a small business. It aims to automate core processes and track documents. Moreover, it also allows retention of employee records and evaluation of employee performance.

NIIT's HR management was built to help companies manage HR records and benefits, as well as automate workflow. In addition to this, it can also store documents and create reports about the organization by location, year, and department.

The last example is *Vista HRMS*. It incorporates useful management tools such as recruitment process management and reports creation, into a single system. However, it lacks the ability to adapt to the company processes.

Unfortunately, the cost of most commercial software makes it difficult for both small businesses and startups to shift from manual or more primitive methods.

Open Source HRIS Software

However, with the popularity of Free and Open Source Software (FOSS) and the steady growth of its community, opportunities for small and medium scale enterprises (SMEs) to achieve operational excellence and business efficiency have also opened. Free and Open Source Software are software products that can be freely used, modified and distributed by anyone. The source code of such software is not obscured from the end user so that he or she can freely study and modify the code. (Barr, 1998; Dibona et al.,1999).

The fact that its source code is open makes it easier for the software to evolve in terms of enhancements because more people can be able to spot the errors and correct them in the code. There are four open source HRIS software that are used by many small and medium scale businesses mentioned in the review made by Jack Wallen (2013).

Simple HRM is a free web-based HRIS software that can easily run in an Apache-MySQL-PHP enabled server. It also has a professional version, which offers more features than the open source version for a fee. It has most of the basic

HRIS features, which include leave management, task tracking, and employee information management. However, before it can work completely, it requires the Apache rewrite module to be installed and enabled in the server.

Waypoint HR is a free HR solution that can be used efficiently to manage data of company employees whose business model includes a dedicated support package and an on-demand solution. Features of Waypoint HR include Employee Management, Leave Management, and Performance Appraisals.   The makers also have a form for feature suggestions so that they can improve their software.

iCE HRM is a solution for managing employee information, attendance, leaves, documents, time tracking, and reports. Based on the demo, graphics are sleek and functionalities are easy to learn and use. It offers its cloud-based solution for a small price, which is called On-demand. It is also free for the first 15 employees, which is perfect for small companies.

From among these, **Orange HRM** was selected as a solution for the companies in this study by virtue of its amount of documentation and the size of its community for support.   The range of features that it also offers fits the organizational requirements of these companies, which are startups. Orange HRM, according to its creators, is a comprehensive HRIS, which covers most of the core activities and processes in the HR function. The company who created it is also called Orange HRM.   It has an open source version, a cloud based solution, and a market for its add-ons. Aside from the Employee Information Module, the core features that attracted the decision-makers and made them choose it for testing are the recruitment module, employee appraisal module, leave management, and a separate attendance function from time-tracking.

Furthermore, the study features customizations and add-ons that were needed by the organizations and were implemented through a practicum program, which made the process cost-effective and sustainable.

Objectives:

The study, therefore, aims to:
(1) Test the capabilities of a modified open source HRIS in two small organizations
(2) Extend the reporting capabilities of an open source HRIS (Orange HRM) cost-effectively and sustainably.
(3) Evaluate the usability of the reporting tool among the users of the module, and,
(4) Enumerate the benefits of the cost-effective and sustainable activities devised to create the reporting module for the open source HRIS.

RELATED LITERATURE

Practicum Program in the Philippines

The Philippines' Commission on Higher Education has issued a memorandum order, which states that students from Higher Education Institutions (HEIs) are to undergo a program that aims to equip them in terms of their industry's practical knowledge and skills by partnering with host companies in training them as interns (Commission on Higher Education, 2009).

This practicum program is beneficial to students as they get to experience how things are being done in the industry of their specialization. At the same time, they get to acquire corporate values necessary for them to be retained and even promoted in a real job. At the same time, it benefits companies in terms of adding human resources to some of their needed functions and projects with minimal cost.

According to a study conducted by Taladtad, Bala and Rodelas, the most effective method to develop the competence and skills of students is through an on the-job training or practicum program. This gives several avenues for the students to learn. This also allows them to become familiar with the actual operations and facilities of the company (2010).

Ralph in 2007 mentioned that "a supervised practical experience through an on-the-job training is an essential part of the pre-service preparation of professionals" in various disciplines including IT. The study by Domingo (2014) further solidified this claim. She listed down the positive and negative aspects of practicum and field experiences by soliciting responses from 225 practicum students.

Some positive effects include supportive relationships among students who participated in the practicum programs, development of their perception in terms of professional as well as technical achievements, and feelings of self-efficacy and a positive contribution to the welfare of clients they were serving.

On the other hand, the negative elements identified from their practicum experiences include personal as well as professional challenges, site-based interpersonal concerns, and university-related policy and procedural problems.

Individual personal and professional challenges include the tasks that the supervisors currently have while overseeing the interns. Their job description and deliverables precede their obligation in leading the students in their respective projects and tasks. Sometimes, personal issues in both the interns and supervisors' lives lessen their attention to the projects thereby making the program less effective.

Companies, especially large enterprises, are also hesitant to give tasks that are appropriate for their field as these tasks might be critical to them. Therefore, they only open administrative and clerical tasks for interns. This results in IT students having a hard time finding the right company for internship as some universities, especially the good ones, impose policies that require such students to be able to experience programming or system administration in their host companies. As SMEs have less structure and restrictions, they have the advantage of getting more qualified trainees or interns as supplementary human resources for their internal projects. However, a good training and project plan should be in place in order to maximize the experience for both the companies and the students.

Lean/Agile Software Development

Agile is an emerging discipline in the field of software engineering. It has been gaining acceptance in the mainstream software development community. Advocated by many professionals, Agile is different from the traditional software development methods, such as the waterfall model. The traditional methods have been often criticized to be far from how software engineer functions in developing a software. Agile principles are designed to address the ever-changing requirements in software environments. This is helpful for the customers who found it hard to define their needs. According to Rao, Naidu, and Chaka (2011), "The main theme in Agile methods is to promote and speed up responses to changing environments, requirements and meeting the deadlines."

Some of the most common methods for Agile software development include eXtreme Programming (XP), Scrum, and Crystal. The most applicable method for this study is the Scrum Methododogy or simply Scrum.

Scrum starts with understanding the primary functions of the project and representing them with stories. The person who writes and manages these stories is often called the *Product Owner*. Each story needs to speficy the requirement itself, the person who needs to use it, and the reason why the requirement needs to be done. This will give the team an idea in terms of prioritizing the stories. Each story is also given a priority weight by the product owner so that one story can be easily prioritized over another. Each story will be collected and stored in a story list called the product backlog.

A session where the Product Owner, the team, and stakeholders are invited to join will take place to turn the feature stories into tasks that are more meaningful for the developers in the team. This process is called *Sprint Planning*. The Product Owner will discuss each feature story and tell its corresponding priority weight. During this period, clarification questions can be raised by any member of the team so that the team can carefully estimate each story's complexity.

The team composed of developers and other workers is often called the *Scrum Team* and is led by a *Scrum Master.* The team will engage into a consultative process in which each task will be given points, which represents its complexity. Some teams directly translate it to man-hours while others just put complexity points. Appropriately called Planning Poker, the activity is usually facilitated by the scrum master and is aided by poker cards. The website PlanningPoker.com (http://www.planningpoker.com) describes the process in a gist:

"The idea behind Planning Poker is simple. Individual stories are presented for estimation. After a period of discussion, each participant chooses from his own deck the numbered card that represents his estimate of how much work is involved in the story under discussion. All estimates are kept private until each participant has chosen a card. At that time, all estimates are revealed and discussion can begin again. (PlanningPoker.com, 2014)"

Once this is done, the tasks that can be done in a sprint, which usually spans one to two weeks, are included in the sprint backlog. During a sprint, the scrum team works on each task and checks on updates daily.

This daily meeting called scrum or standup meeting usually lasts less than 15 minutes. In this meeting, three questions are answered by each member. These are:

1. What did I accomplish yesterday?
2. What will I do today?
3. What obstacles or challenges I am facing that need to be addressed?

The daily scrum activities will culminate in a sprint review and a sprint retrospective where the scrum team and the stakeholders meet again to see their progress against the sprint backlog. The sprint review specifically pertains to this as its goal is to see if all of the stories in the sprint backlog was done. If this is not the case, these stories will be returned to the product backlog and will be tackled again in the next sprint planning. The sprint retrospective, on the other hand, is a meeting where the team tackles the processes involved during the sprint with the goal of improving how things are done in the next sprint.

The best features of the Agile methods are implementing or developing the software and satisfying the customer through continuous delivery of that software. This is achieved by having short iterations of the development cycle. An iteration corresponds to a timely delivery of parts of the software, which provides value to the customer.

The ideal approach is to break large projects into smaller projects, making the development process more flexible. In the same study by Rao, et al (2011), which has

been brought up by their respondents in India, they noticed that companies that were mostly developing small projects have been successful in using Agile methods. However, they have also observed that companies were not encouraging using varieties of the Agile methodology because of a lack of proficiency in this field. The different practices of XP and Scrum differs from company to company.

According to Bagel and Nagappan, who conducted their study on Agile at Microsoft, a third of the respondents used Agile in varying degrees. The respondents viewed it favorably because of improved communication among team members, quick releases and increased flexibility. Moreover, Scrum is the most popular variant of Agile at Microsoft. However, their findings also indicate that developers were most worried about using Agile in larger projects (with more than 20 members), which entailed attending too many meetings and coordinating Agile and non-Agile teams.

There are numerous studies of Agile in the academic and educational setting, but there have been far less reporting on its actual usage and success in professional software development organizations. Therefore, more empirical research should be carried out.

METHODOLOGY

The implementation of Orange HRM was introduced in two small companies with less than 50 employees. Both companies can also be considered as startups. The first company had to monitor workers' time as the projects that they were involved with required making sure of each worker's attendance. The other company, which is based in the US, had both attendance-based and activity-based monitoring, and had more developed processes.

The first startup company is called Phileosoft (http://www.phileosoft.com), which is a full service provider of Learning Management Systems for schools and training organizations. It started with five employees but had interns and contractual consultants depending on the scale of its projects. One of its projects had the need to implement an attendance tracking system. Since it was a company with a small budget, ERPs and paid systems were not considered as options. The company has servers both hosted in-house and in the cloud so FOSS HRIS were identified as options. After careful consideration, OrangeHRM was selected due to the simplicity of its attendance and time-tracking modules and its extensive documentation. An instance of Orange HRM 2.7 was setup in the physical server, and in the cloud based server. Like any FOSS products, Orange HRM is licensed under GNU General Public License version 2 (GNU GPL), which allows the user to freely see and modify the source code of the software released with such license. The modified version of the software can be used either privately by anyonee who modified or customized the

software or released in public for free or for a fee provided that it is released with the same license.   Two on-the-job trainees under the practicum program were assigned to setup and customize the Orange HRM instance for each of the servers.   Some of the frontend code were changed.   They were also encouraged to rebrand their instance as Buco HR with a different color scheme befitting the name.   The new brand Buco HR was used to inspire nationalism among the prospective users of the Philippines-based company. Most of the front-end related parts of the code were modified to reflect the name change. The physical server was first used so that workers who had to check the condition of each tablet computer that will be delivered to clients can electronically punch-in and punch-out instead of using a time card everyday.   This made attendance tracking and compensation more efficient as they were paid on an hourly basis.

However, some accuracy problems were encountered when some of the workers forgot to punch out as the system counted extra hours where they did not work.

Some records had to be checked and modified to correct the data and produce the right reports. Despite this, the new system was favored over the traditional paper-based process. The cloud-based instance utilized the timesheet module to track the activities of work from part-time consultants who answered tier-two inquiries and problems about a learning management system that Phileosoft was hosting for two companies. This also made it convenient and efficient for the managers to view the output of each consultant each week.   In a survey conducted among the employees and supervisors of the company, Buco HR was considered to be a big improvement to the previous process of paper-based attendance and time-tracking.

The system was later introduced to Efficio, which was later known as Leafnode, an IT consulting company in the US. It needed to manage its Manila based consultants through HR specialists that were also located there. Since most of the workers worked from home at that time, they needed some way of systematically reporting their daily activities, which were also used to invoice clients in the USA. This time, a recruiting module was also needed to track status and interview schedules of applicants aside from time-tracking and attendance. A small team who was assigned to a certain client was using Replicon to track their time and generate reports that were used to also invoice the client. The cost for using Replicon was shouldered by the client during that time, which made it a no-brainer to use this premium cloud-based application.

However, once the contract ended and another client was assigned, an open source solution was preferred. Another important module needed was the tracking of time-offs or leaves. The company needed the cloud implementation as its workers were mostly telecommuting or working in satellite offices in different parts of the world. Another instance of Buco HR was setup in the company's server and the employees, supervisors, and HR personnel were trained on how to use it.   The

manual produced by the trainees who first implemented it was used to train these users.

Buco HR was implemented in the cloud and was able to run smoothly after the setup. The HR team was first trained for the administration functions of the software. It just took three days of training, and they were able to train the employees in using the Employee Self Service (ESS) functions.

Problems and Solutions:

The implementation almost went smoothly and had a few problems. Since most of the employees were developers, they discovered some bugs especially with a few fields in the profile module. Some of the employees also encountered problems with updating rows in their timesheets. The problems with the field and updating rows with time sheets stemmed from unhandled cases in the javascript files in the timesheet module. Additional scripts and modifications were done in those files to fix them.

Email notifications did not work correctly at first, and some of the approvers were not able to receive notifications whenever their team members applied for leaves. These problems stemmed from the emails being supported by google apps. Apparently, the configuration of the system was not compatible with google apps. To solve this, the notification email was first sent to an email address from a different mail server, which was then automatically forwarded to the recepient's corresponding google account.

After a few months, the system crashed due to an issue that the server experienced. The good thing about the problem is that the database was not really affected by the crash. Only the files were corrupted. However, the modified templates were lost and a fresh set of files had to be copied in the same path, which restored the system but lost the new look of Buco HR.

Managers also suggested additional reports related to leave management and time sheets, which prompted the implementers to commission another project to address these issues.

BucoReports

Since most of the consultants of the company were busy to implement internal projects, which were the time sheet reports and the leave calendar, a solution based on the practicum program was implemented through a local partner –Phileosoft.

Universities such as the University of the Philippines and Cavite State University

engage their students in summer internship or practicum programs so that they can get experience from the industry.   More strictly, computer science departments of these institutions require them to be able to practice their programming knowledge and learn software engineering pragmatically in various companies.   Sadly, many large companies due to security and tight deadlines are not able to address these needs, which made them provide clerical tasks with minimal IT housekeeping tasks, such as backup and helpdesk support.   At this time, the Phileosoft's team wanted to train the students in developing a simple reporting module quickly using the agile approach called: Scrum Methodology.
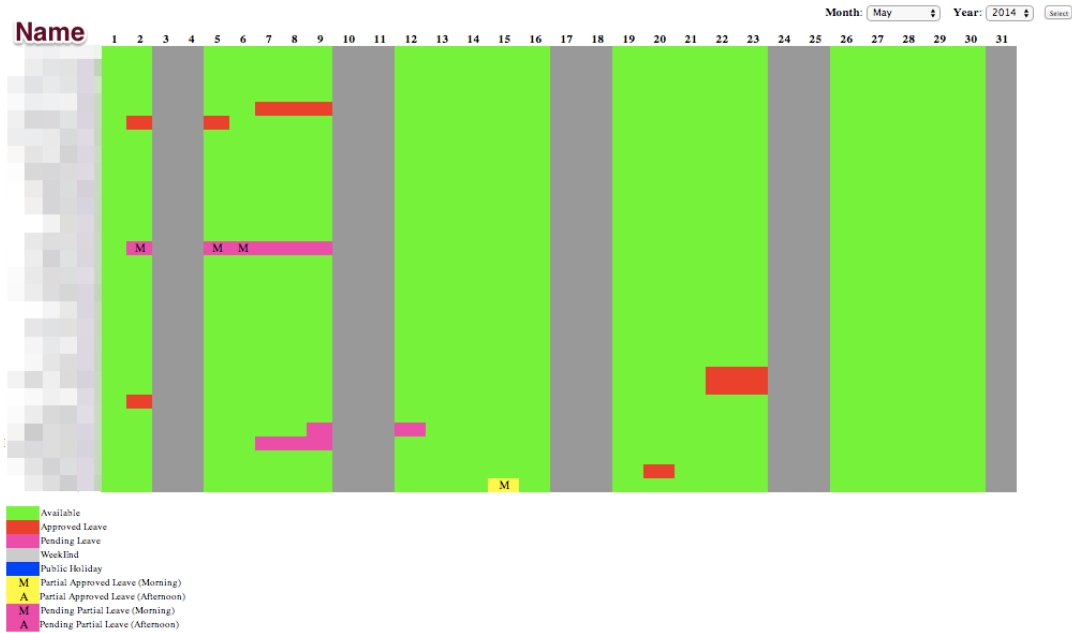
Figure 1. BucoReports Interface.
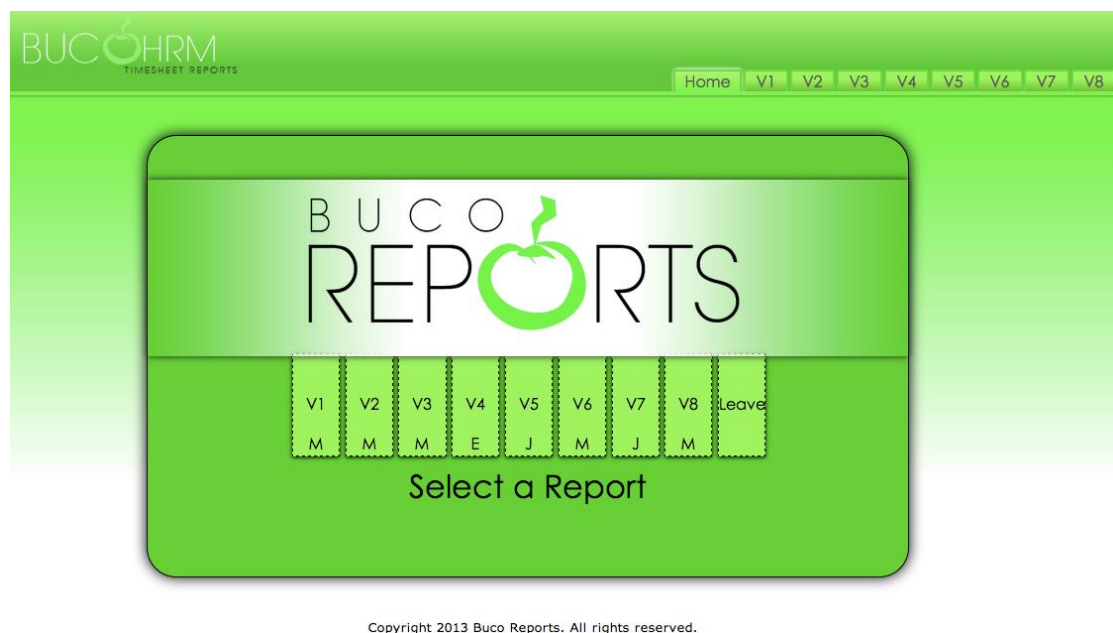
Each report was converted into user stories and a meeting was conducted to do planning poker.   The points were already converted into time units (hours) because of the simplicity of the project.   The project had four week-long sprints.   During each week, a sprint review and a sprint retrospective were done to measure the velocity of the team and make better estimates in the succeeding sprints and do some improvements in how some tasks were done.   The standup meetings were done online as the scrum master was not always in the same location as the team.   After the third sprint, the team realized that 4 sprints were not enough and extended the project to two months. The end of the 8 sprints produced nine report modules including a leave calendar, which came from an open source add-on module called leaveplan (Tenreiro, 2010).   Some bugs were identified during testing and were repaired by the interns. Once their summer term ended, refining was continued by the supervisor and was later documented by the team.

Figure 2. Leave Calendar for BucoReports

May 2014

Available
Approved Leave
Pending Leave
WeekEnd
Public Holiday
M Partial Approved Leave (Morning)
A Partial Approved Leave (Afternoon)
M Pending Partial Leave (Morning)
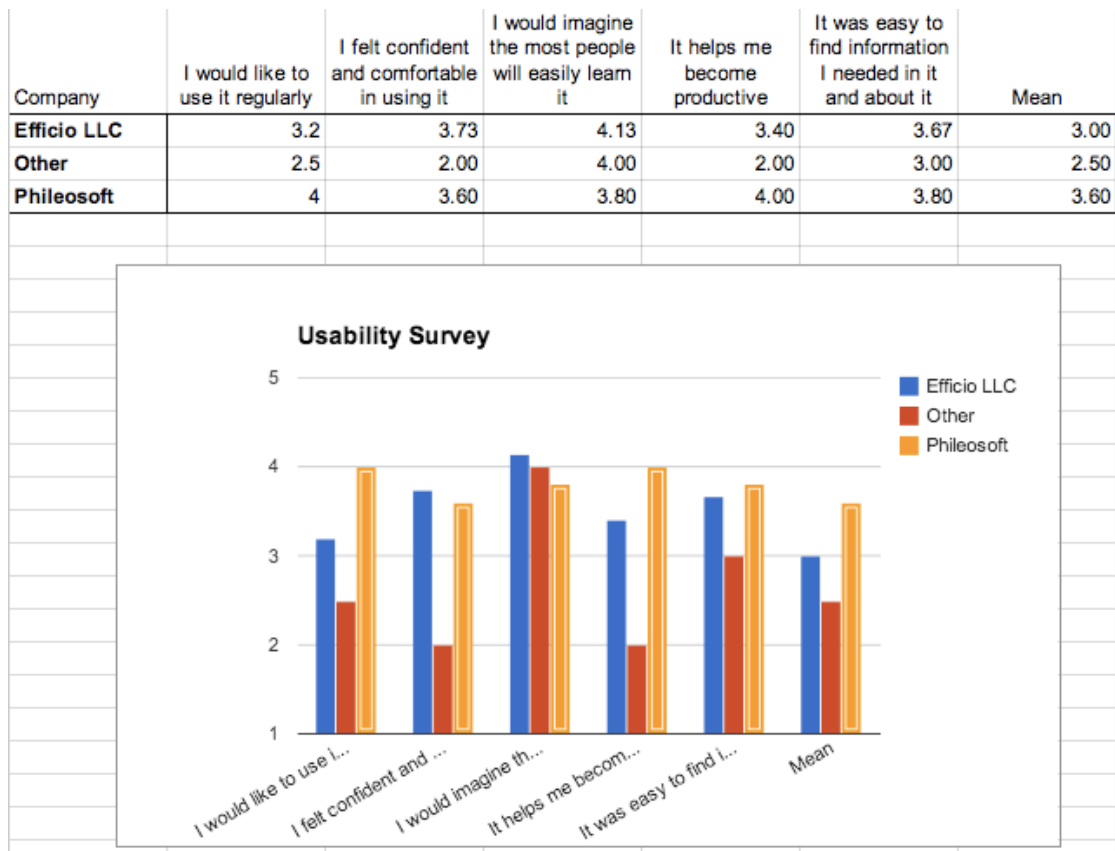A Pending Partial Leave (Afternoon)

Â© 2010 - Leave Plan Plugin for OrangeHRM - Under GPL

RESULTS AND DISCUSSION

A usability survey was given to employees of both companies after a year of implementation. Users from other companies who did not receive any enhancements for Orange HRM or Buco HR, but were using Orange HRM as is were also asked to fillout the survey.   There were 22 respondents to the survey.

Usability related statements were given to each respondent.   They were then asked to rate how much they agree with each statement using a lickert rating of 1 to 5 where 5 represents their strong agreement and 1 represents their strong disagreement. The table shows that those who used Orange HRM as is from another company, on the average, slightly disagreed with most of the usability statements.   This is not surprising because of the bugs that needed to be addressed in the software.   On the average, users in Efficio/Leafnode veered towards slightly agreeing with the statements.   It was the users from Phileosoft who had the highest average agreement scores in the usability statements. This can be attributed to the simplicity of the HR functions in the said company compared the the American company that it supported.

Figure 3. Usability Survey Results

Company	I would like to use it regularly	I felt confident and comfortable in using it	I would imagine the most people will easily learn it	It helps me become productive	It was easy to find information I needed in it and about it	Mean
Efficio LLC	3.2	3.73	4.13	3.40	3.67	3.00
Other	2.5	2.00	4.00	2.00	3.00	2.50
Phileosoft	4	3.60	3.80	4.00	3.80	3.60

The three supervisors and HR consultants who answered interviews regarding bucoreports all agreed that they have benefited from the free add-on. They commented further on how the add-on was useful for them. They have expressed positive statements such as : "The filtering of records works great. You could see the details clearly and only the needed fields which includes the total or summary.", "Buco has a good report system where you could view the timesheet report in grid form before extracting it.", "It was presented very well, very organized, and accurate", and "the calendar time-off report was very useful in visually pinpointing resources that will be missing in a certain time period, which will help managers plan for deliverables". This represents the efficiency and productivity effects of Buco HR and Buco Reports in the HR function of both companies.

Another set of interviews was conducted among the interns and the following themes were collected:
1. Doing the project with scrum methodology during the internship made them more confident in their profession.
2. They enjoyed the training because they were able to positively contribute to the welfare of a company.
3. They loved resolving problems through web development.

4. They found activities, such as configuration and installation of open source apps in the servers and customization by modifying the code, to be very helpful for their careers.

In addition to this, the implementers found that training interns in a practicum program is a sustainable means to automate some functions in small companies. They also realized that they were able to contribute to society by training the students in their appropriate field effectively using the Scrum Methodology. Since practicum programs in various schools are scheduled in well-defined intervals, planning for IT improvements and internal projects can also be scheduled accordingly.

CONCLUSION & RECOMMENDATIONS

The study showed that the use of Orange HRM and customizations like Buco HR helped in digitizing and automating important tasks in the HR function of a small enterprise when implemented correctly. Small projects, such as a module for timesheet and time-off reports can be implemented through practicum programs without having to spend a lot of money while maximizing the internship experience of the students. Agile methods like Scrum not only helped in the effective facilitation of the project, but also introduced the interns to similar situations and processes in the software industry.

Despite the benefits of having an open source software for HR functions, the managers still desired for security and scalability. It is therefore recommended to use a Virtual Private Network (VPN) to make sure that only employees are really able to access the system remotely. Internet Protocol (IP) or Media Access Control (MAC) address filtering can also be done in the future implementations or improvements of the system. Finally, a payroll module can be added, which conforms to both US and Philippine policies. Interested researchers are invited to collaborate in this endeavor for the benefit of SMEs.

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