Comparative Analysis Study of Open Source GIS in Malaysia

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Abstract. Open source origin might appear like a major prospective change which is qualified to deliver in various industries and also competing means in developing countries. The leading purpose of this research study is to basically discover the degree of adopting Open Source Software (OSS) that is connected with Geographic Information System (GIS) application within Malaysia. It was derived based on inadequate awareness with regards to the origin ideas or even on account of techie deficiencies in the open origin instruments. This particular research has been carried out based on two significant stages; the first stage involved a survey questionnaire: to evaluate the awareness and acceptance level based on the comparison feedback regarding OSS and commercial GIS. This particular survey was conducted among three groups of candidates: government servant, university students and lecturers, as well as individual. The approaches of measuring awareness in this research were based on a comprehending signal plus a notion signal for each survey questions. These kinds of signs had been designed throughout the analysis in order to supply a measurable and also a descriptive signal to produce the final result. The second stage involved an interview session with a major organization that carries out available origin internet GIS; the Federal Department of Town and Country Planning Peninsular Malaysia (JPBD). The impact of this preliminary study was to understand the particular viewpoint of different groups of people on the available origin, and also their insufficient awareness with regards to origin ideas as well as likelihood may be significant root of adopting level connected with available origin options.

1. Introduction

Open Source Software (OSS) is now a significant option means of arranging this output involving software program and possesses accumulated with reputation and make use of for the rewards and costs relative to this prominent private software program design [1]. One of several initial recognized advantages of OSS would be the price tag reduction, not just licensing income nevertheless for the particular progressively more readily available skills regarding OSS techies in the employees [2]. In Malaysia, a report by the OSCC mentioned that the overall cost of savings for open source software products was recorded to about RM 46.9 million in 2011 [3].

Although the main advantages of including Open Source Software program (OSS) to organizational devices are already widely suggested, OSS should be implemented in addition to use by prospects before these positive aspects can be recognized [4]. The objective of this research study is to find out the reason of poor adoption of Open Source GIS tools by Malaysian community. Meanwhile, this paper was also established to get information about the views and concerns from developers or organizations whom opt GIS in open-source platform rather than proprietary platform, and also to discover the technical tools deficiencies that discourage users from widely adopting them.

Initial understanding was that all agencies including the Government sectors and Universities have been adopting OSS in their work. Report showed that the improvement was substantially high from 25 companies to 707 companies, which is 97% of final amount of agencies recorded [5]. Throughout this research, two methodologies consisting of interview session and also survey questionnaire were investigated in order to get a closer look at the current situation of open source GIS acknowledgment in Malaysia.

2. Literature Review

Technology changes since the 1980's derived the development of data storage as part of database management system. Result visualization and quantitative analysis are the most important elements in any GIS software programs. As mentioned by Filippo Randelli [6], the open source software (OSS) is basically similar to other database programs, it analyzes and store data; with unique characteristics of location based function where the information has a link with a unique point on the earth's surface.

Referring to the open source movement written research by Deek and McHugh [7], an international seek to advertise a great available model of computer software growth much more aligned with the accepted cerebral model of scientific discipline rather than the amazing modes associated with new technology, which were trait associated with contemporary business. The theory – as well as eyesight – is always to maintain controlled advances put together by computer software growth freely available for everyone to broaden and enhance after. So, this gives neighborhood associated with programmer-developers to create a collaborative sociable composition where by members change program code to add changes and deal with parasites. Computer programmers create these types of additions of the very own free will with regard to many different reasons, for example: increasing recognition from the FOSS group, improving it because of their very own requirements, improving his or her technological knowledge, improving it with regard to the use of people, receiving taken care of producing OSS, in addition to advertising OSS while movements [7]. Because of the actual openness with the course of action as well as the pool connected with competent, eager contributing factors, open origin computer software may create and also enhance quickly [8] [9].

In order to apply the OSS concepts, many authors have come out with different studies and findings on the subject matter. According to Anderson and Sanchez [10], Open Source GIS (OSGS) is a program for users to run for any purpose, modify and redistribute freely without any limitations or royalty payments. Open software allows for code modification and tools invention without any changes implied to the existing data functions and data processing. In addition, OSS is free software that available and accessible in the market such as GRASS, QGIS, SWAT, MapWindow and Diva GIS.

As the availability and accessibility are the advantages of Open Source Software, the capability of OSS in providing varieties of modules is also in line with proprietary or commercial software. It is a huge impact to the overall management as the modeling products can be referred to support the decision making in business strategy. For instances; GRASS provides GIS standards to support modeling and programming without the needs to develop the algorithms required for basic spatial processing. Scott et al. [11] explored the GRASS-GIS based system in spatial partitioning as to handle spatial heterogeneity issue of environmental modeling. Filippo Randelli [6] discussed the use of OSGS application from spatial analysis to business strategy on new logistic infrastructure as location based functions to track production chain.

Apart from modelling, the distribution and application of OSS may be large depending on the sectors applied. Nevertheless, many argue on the cost and benefits offered by the advent of this technology relative to the dominant proprietary. Different aspect influences the lower adoption of open source software in industry or government agencies. According to the survey and semi structured interview

by Dhanaraj Thakur [12] in Canada and United States firms, many factors contributes to the level of adoption and acceptance; among the factors are industry structure, skills requirement, laws and policy. In developing countries, the open source approaches give benefits for socio economic development. There is a study done by Ademola A. Adenle, et al. [13] in area for biotechnology innovation as to deal with the intellectual property right issues. Nevertheless, the adoption of OSS can be applied in developing countries by the considerable amount of training and adequate resources as well as equip infrastructures.

In the modernisation era of IT technology, the piracy problem arises due to the abundance of software that affects the industry itself. OSS can be adopted as the strategic mean to prevent the problem without confronting the war but the free access dominate the piracy war. According to T. Pykäläinen [14], the OSS strategy is dependent on how and what condition OSS strategy can be adapted to prevent privacy and the effectiveness can be indicated.

The insight knowledge of OSS can be build up by understanding the fundamental or variable of the factors that favour OSS activities. According to Sebastian and Andreas (2013), [15], a culture characterized by interpersonal trust and self-determination values influenced the OSS activities and number of developers. Hence, the personnel of OSS users and workplace environments play a major role in OSS adoption and acceptance level.

3. Methodology

Two investigations were performed in order to fulfill the objective of this research study. The first investigation was primarily conducted through surveying form that is related to the general information regarding detail of users and their experience in Open Source GIS. This particular survey had been likewise conducted to consider the particular problematic elements connected with impacting GIS in open source platform compared to exclusive proprietary software. The second analysis was accompanied through an interview by site visiting the real implementation scenario of Open Source GIS in Malaysian public sector.

4. Data Collection and Analysis of Findings

A total of 27 volunteers from local Government Officers, student of Masters and PhD, as well as Lecturer from Local Universities have participated in the questionnaire form. Earlier in the survey, we found out that among the candidates, there were a very huge gap in terms of their level of experience in any GIS tools. These ranged from first time users until up to 10 years of experience. Considering experience as a major factor, only candidates dealing with GIS of 2 years or more were selected for the surveying results and analysis.

4.1 Awareness of open source concepts

In Part A, the level of awareness of open source GIS platform between the Government sectors and the University sectors we studied. The results from given questions were pointing out whether the candidates know about any open source GIS software, and about the acceptance level of using it in their work or research in the future. Results are shown on Figure 1.

In Government sector, 6 candidates have been known to be using GIS in open source platform and all of them prefer using it in their work. Only 3 candidates have not encountered with open source GIS yet, but 2 of them are willing to try. Whereas, in the University sector, only 4 candidates know about open source GIS platform and 3 of them are willing to use it in their work and research. Another 3 candidates have not encountered open source GIS yet, and only 1 of them are willing to try.

In Part A, we are able to get two distinctive results between the Governments sector against the Universities, which shows that the awareness and acceptance level of open source GIS platform is more dominant and higher among Government agencies rather than users from the Universities. Our view is that this occurrence may be due to regular training and campaign from the Open Source Competency Center (OSCC) agency under MAMPU, which has been more focus within the Government agencies only, while the Universities lack the attention from the agency itself, or most probably due to campaign have not yet reached the university intensively.

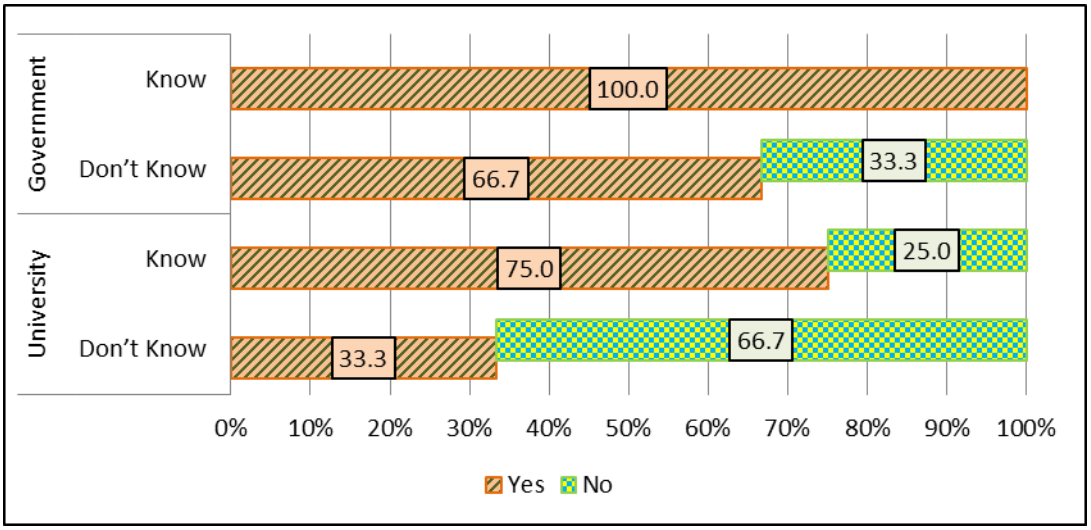

Figure 1: Acceptance of Open Source GIS Platform.

4.2. Comparative analysis between Open Source GIS and commercial GIS.

In Part B, a total of 8 questions were asked to the candidates about the implementation of open source GIS in Malaysia particularly. These questions were mainly to get an overlook about the few limitation factors which contributes to the acceptance of open source GIS in Malaysia, such as software design, security issues, system documentation, technical knowledge, software installation, user friendliness, bugs, and licensing factors.

In the results as shown on Figure 2, we can see that there is a wide range of understanding of Open Source GIS amongst the frequent users in Malaysia. Notably, most users are very well informed that there is no licensing limitation of using open source software. This also can be applied to reduce the cost of operating such software's in commercial GIS which require user to have subscription and licensing fees.

In the meantime, respondent main concerns were due to problem arising caused from installation with other extensions of the software that has not been bundled together as compared with most mainstream GIS. This was supported with results on open source GIS as not being user friendly especially for beginners, and also respondent agree that most open source GIS may require user to have additional technical knowledge especially in computer language and programming.

None the less, users perception are well balance in terms of few criteria's, such as difficulties in designing the output of open source GIS, security issues that increases threat from viruses, system documentations or system testing, and the presence of bugs that increases snags. These results can be viewed in such that users are neutral and have their own argument in their choices.

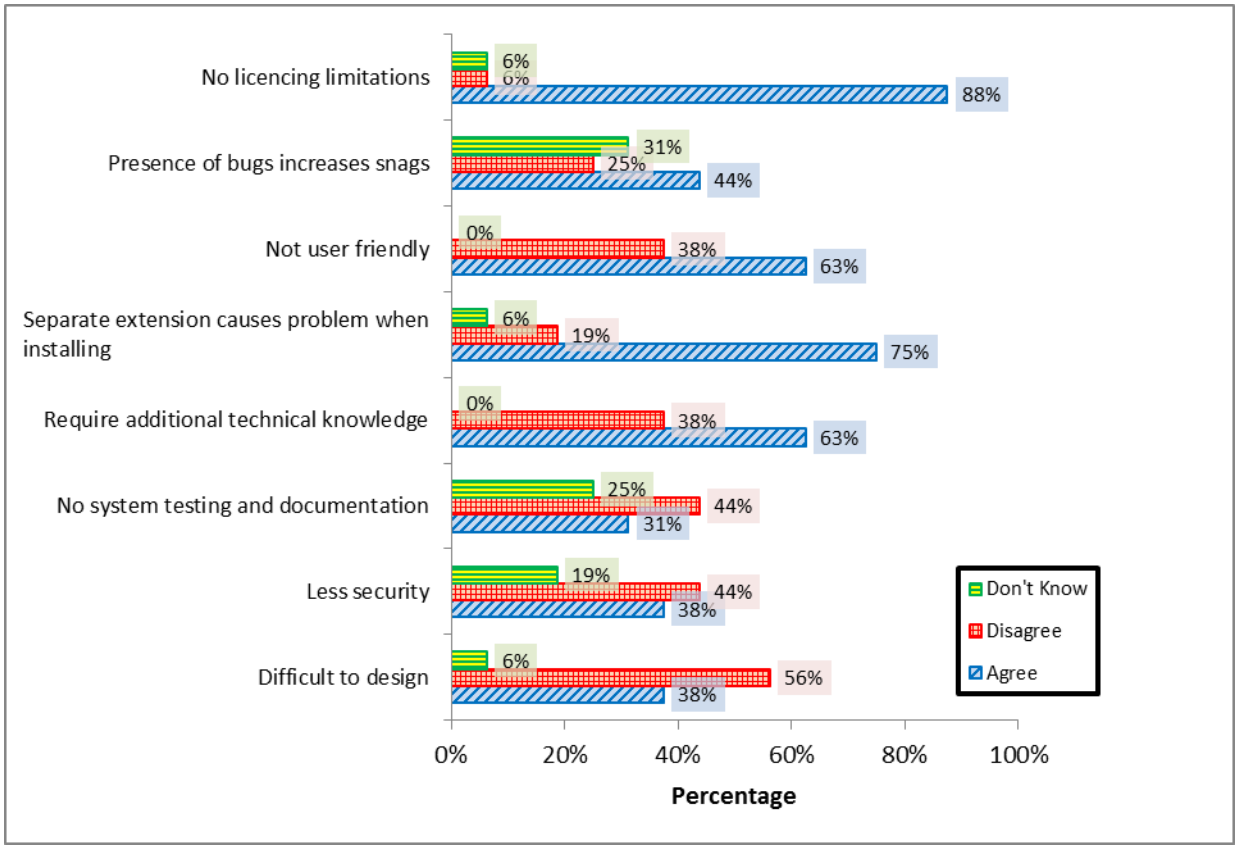

Figure 2: Availability Implementation of Open Source GIS in Malaysia.

5. Moving Forward of Open Source GIS in Malaysia

Open source software is an alternative geospatial technology despite commercial software that available in the current market nowadays. The interoperability offered by OSGS made it reliable in terms of sharing information and modification that useful for future research investigation.

In Malaysia, the establishment of a long-term Malaysian Public Sector Open Source Software (OSS) program is executed to steer the aim of being a develop nation. The OSS helps to pave the aim road and to strengthen the solid ICT plan as to build up the capacity among the people as not to dependent on 100% foreign built proprietary software. Malaysian Administration Modernisation and Management Planning Unit (MAMPU) is the main agency that coordinates the roadmaps for open source in Malaysia. Malaysia Government supports the use of Open Source Software through the established mechanism of OSS framework and Strategic Thrusts that was launched on 16th July 2004. This agenda have been to reduce the overall price tag associated with property, boost the freedom of choice intended for computer software use, hence increasing the growth of the local ICT as well as knowledge based society.

MAMPU through its Open Source Competency Centre (OSCC) has led the OSS pathway as the Phase III: Self Reliance that consists two term; short and medium term. According to MAMPU, the three strategic themes – Sustainment, Enablement and Empowerment are the framework in order to achieve the overall target objectives. The Sustainment component of Self Reliance is a continuous enhancement of OSS solution includes the capability of agencies' adoption of standards, policies and guidelines that established by MAMPU. The Enablement component enhances the IT personnel through OSS training and deployment of technology environment as to support the localized OSS

operations. The Empowerment component accelerates the content growth of OSCC Knowledge Bank and e-market by distributed sourcing from agencies.

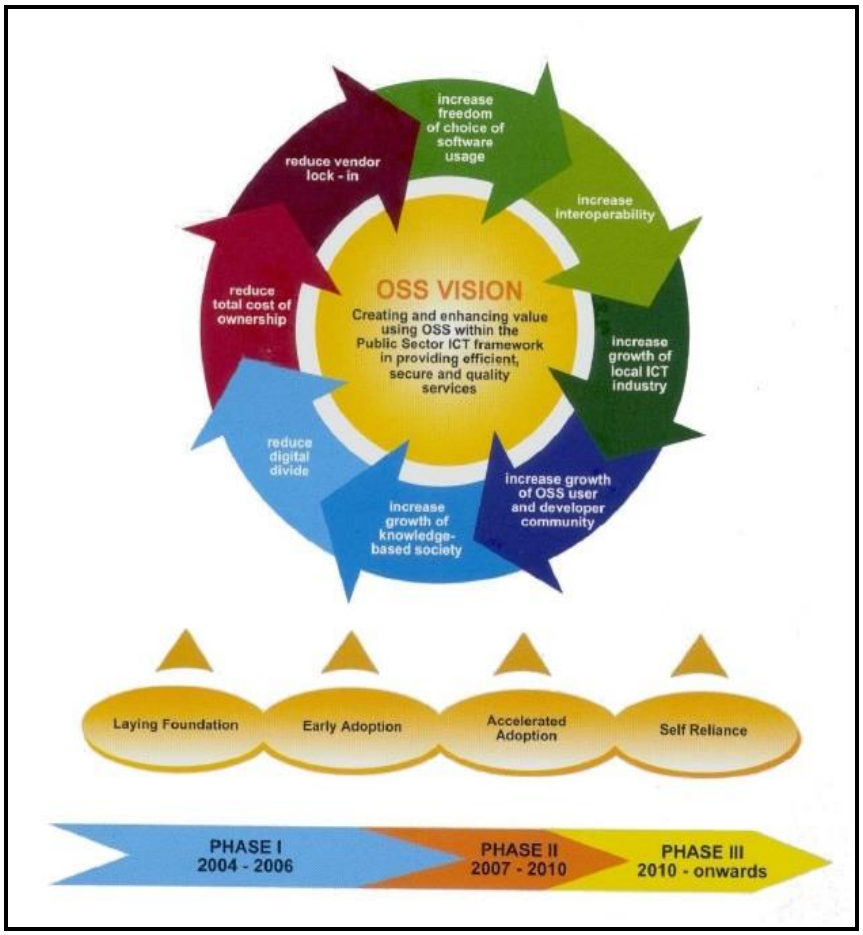

Figure 3: OSS Vision, Objectives and roadmap.

As to date, the OSS implementation in Malaysia is in progress as the set up Medium Term Roadmap for Phase III. Medium Term plan commences from 2013 to 2015 with the hopes that OSS innovation can be accelerated by the establishment of agencies' Smart Partnership. In addition to that, the actual creation associated with firm distinct boosted OSS program answers apart from targeting fresh OSS goods pertaining to home and also worldwide employment.

The key success of OSS implementation plan in Malaysia involves the respective agencies and the Malaysian Government's agenda for IT in the public sector. Nevertheless, the fundamental are being set up as early as the education approaches by the formulation of Learning Management System (LMS). The LMS Roll Out to Schools under Ministry of Education fostering the promotion of OS LMS and create awareness among 120 schools enrolled in Short Term plan.

Saipunidzam et al. [16] discussed this M-Learning as a brand new studying paradigm about the advancement regarding cell and cellular technologies. They had proved that Mobile Math is the developed model that suits to the mathematic lesson by mobile technology. According to Andrea Barker et al. [17] also found out in their study of which establishing nations can catch up with this specific brand new understanding paradigm throughout the educative venture on cell understanding.

Recent research study was done by Norazah [18], the learning management system (LMS) emphasized on the designing and developing the system prototype called E-Headship. Apart from that, the evalution results from 60 participants from Institution level known as Institut Aminuddin Baki (IAB) envisaged the succeeded in promoting the OS learning strategies to a higher degree.

Apart from education line, the OSS products has potential in Malaysia market but still not yet favorable in public sector agencies. According to Khadijah et al. [19], the selection criterion comprises the system quality, information quality and service quality that influences the OSS adoption. The characteristics defined each dimension that favors the factors of OSS implementation.

The Government of Malaysia supports the opportunities embedded in Open Source software through MAMPU's roadmap plan but there are still limitations on real practices and acceptance level among users. There are many aspects to be considered in implementing the OSS approaches either involves the target groups, the procedure and policy wise matters. Based on Nor Zairah et al. [20], the malfunction regarding OSS setup can be significantly influenced by means of organizational variables. Hence, appropriate guidelines and corrective actions should be taken into account to realize the OSS implementation.

5. Conclusion

This paper has a complete evaluation review of Open Source GIS platform amongst Malaysian individuals by Government servant and also University students and lecturers. This paper also acknowledges the current situation of adoption level from those frequent users of GIS.

The result from the first survey investigation has shown that the Government sectors are more mindful about the presence of open source GIS platform as compared to the University sector. This may be due to the campaigning work from respective agencies may lack promotions towards the Universities.

The second investigation through the interview session was mainly highlighting the current situation of open source GIS platform from an agency conducting such work. With the known advantages of operating open source GIS as well as the benefit of reducing the cost of operations, it clearly shows that open source GIS is the way to the future for Malaysian to implement and adapt.

None the less, this study is only a preliminary investigation thus requires more data and analysis for a comprehensive conclusion. Therefore, further research should be conducted with adequate numbers of participants and different field of users as to examine and validate the study analysis. The acceptance level of Open Source GIS also needs to be carried out in other variables as to enhance the research study.

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