UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE MANAGEMENT SYSTEM FRAMEWORK FOR COLLABORATIVE OPEN SOURCE SOFTWARE DEVELOPMENT

MODI BIN LAKULU

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

KNOWLEDGE MANAGEMENT SYSTEM FRAMEWORK FOR COLLABORATIVE OPEN SOURCE SOFTWARE DEVELOPMENT

By

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March 2012

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The global economy crisis has made software development a prohibitively expensive undertaking, thus forces developers to look for a viable alternative, namely the Open Source Software (OSS). In addition to low acquisition cost, free access to OSS source codes and components provides a more flexible, highly customizable development process. In the realm of software development, the emerging Open Source Software Development (OSSD) brings in altogether a new concept of software engineering that revolutionizes the software process and working culture. In this regard, some researchers have raised critical questions pertaining to the appropriate life-cycle that underpins an OSS model, the optimal methodology to support the OSSD, and the essential toolkits to support the OSS methodology. Currently, there is a lack of knowledge concerning a development model for Knowledge Management System (KMS), and the architecture to support a collaborative OSSD that can facilitate knowledge sharing among practitioners. Thus, the researcher undertook a study to

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investigate the current practice and to identify the relevant system components that lead to a sound and viable KMS framework for knowledge sharing in the OSS development. The formulation of the framework was realized through a critical review of the current and major methodologies in software development; however, the development of a system prototype, which was based on the prototype approach, only focused on the System Development Life Cycle (SDLC**).** A survey was conducted on selected OSS developers in Malaysia for the following purposes: to measure their awareness of OSS and KM, to elicit feedback on the proposed framework that could support a collaborative software development, and to validate the proposed framework's components. Data gathered were analyzed using the Rasch Model and the internal reliability statistical procedure in SPSS that revealed a highly reliable instrument, which was based on Cronbach Alpha's reliability coefficient of 0.97. The findings also indicated that an overwhelming majority of the respondents agreed that OSS tools for software development were urgently needed. They also concurred that using and managing these tools had to be carefully appraised for a particular knowledge domain, which could expedite the software development process. Overall, this study provides useful insights regarding the formulation of a viable KMS prototype underpinned soundly by theoretical and methodological judgments that fosters a collaborative software development environment. Lessons learned can also help create a new KM society that strives on the principles to work in a more supportive and responsible fashion.

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Abstrak tesis yang dikemukan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

MODEL SISTEM PENGURUSAN PENGETAHUAN UNTUK KOLOBORASI PEMBANGUNAN PERISIAN SUMBER TERBUKA

Oleh

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Krisis ekonomi global telah membuatkan pembangunan projek perisian sangat mahal, maka para pembangun perisian mencari satu alternatif berdaya maju, iaitu Perisian Sumber Terbuka (PST). Ini kerana mereka mendapat manafaat bukan sahaja kos pemerolehan rendah, tetapi juga capaian percuma kepada kod sumber PST dan komponen-komponennya yang lebih fleksibel dan proses pembangunan yang amat customizable. Dalam alam pembangunan perisian, muncul Pembangunan Perisian Sumber Terbuka (PPST) yang membawa masuk satu konsep baru kejuruteraan perisian yang merevolusikan proses perisian dan budaya kerja. Dalam bidang ini, beberapa penyelidik telah membangkitkan soalan-soalan kritikal berkaitan dengan kitaran hayat sesuai yang menguatkan model PST, metadologi optimum yang menyokong PPST serta alatan yang menyokong kaedah PST. Dewasa ini, terdapat kekurangan berkenaan model pembangunan untuk Sistem Pengurusan Pengetahuan (SPP), dan seni bina untuk menyokong koloborasi PPST yang memudahkan perkongsian ilmu di kalangan pengamal. Maka, penyelidik mengambil peluang untuk membuat kajian menyiasat

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amalan semasa dan mengenal pasti komponen-komponen sistem berkaitan dan rangka kerja SPP yang berdaya maju bagi perkongsian pengetahuan dalam pembangunan PST. Hasilnya, fomulasi model telah direalisasikan melalui ulasan kritikal semasa dan berdasarkan methodologi utama dalam pembangunan perisian; bagaimanapun, pembangunan prototaip sistem, yang berdasarkan pendekatan prototaip, hanya bertumpukan kepada Kitar Hayat Pembangunan Sistem (KHPS). Satu kajian telah dijalankan terhadap pembangun PST terpilih di Malaysia untuk tujuan berikut: mengukur kesedaran PST and PP mereka, mendapatkan maklum balas model yang dicadangkan yang boleh menyokong koloborasi pembangunan perisian, dan mengesahkan komponen-komponen model yang dicadangkan. Data dianalisis menggunakan dua alat yang amat dipercayai iaitu Rasch Model dan SPSS, kebolehpercayaan berdasarkan Cronbach Alpha adalah 0.97. Penemuan-penemuan juga menunjukkan bahawa majoriti responden bersetuju bahawa alatan PST untuk pembangunan perisian amat diperlukan. Mereka juga bersetuju menggunakan dan menguruskan alatan PST untuk domain pengetahuan tertentu, boleh mempercepatkan proses pembangunan perisian. Secara keseluruhan, kajian ini menyediakan wawasan berguna mengenai perumusan satu prototaip KMS yang berdaya maju yang ditunjangi oleh teoretis dan metodologikal yang menggalakkan persekitaran pembangunan perisian secara koloborasi. Pengajaran-pengajaran yang didapati boleh juga membantu mewujudkan satu masyarakat PP baru yang berusaha pada prinsip bekerja untuk memberi lebih sokongan dan tanggungjawab.

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I certify that a Thesis Examination Committee has met on **14 March 2012** to conduct the final examination of Modi Bin Lakulu on his thesis entitled " **Knowledge Management System Framework for Collaborative Open Source Software Development**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

_____

MODI BIN LAKULU

Date: 14 March 2012

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