

Research Article

Freelance Software Developer and Software Reuse Practice: Development of Freelancing Portal for Information Systems Management Students and Alumni

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Abstract: Information Systems Management program in UiTM have provided students with exquisite knowledge and skills on managing information. In the world of technological advancement, information is managed using sophisticated information systems, which requires extensive development skills. From the data acquired, 80% of UiTM students in the Kelantan branch are having financial issues. Moreover, developing information systems requires extensive practicality and involvement in real-life projects. Thus, the development of IMfreelancer.org would provide platforms for students and alumni to be exposed to real life development project, practicality, while generating side income. The portal is developed based on extensive research and theoretical framework that have been presented in multiple international conferences to receive meaningful input through scrutinization. The portal is developed based on constructs that have been selected through rigorous research practices. This portal has started to generate income through development projects.

Keywords: Freelance Portal; Software Reuse Practices; Student Poverty.



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1. INTRODUCTION

Information Systems Management (ISM) is a program offered at UiTM with the objective of producing information professionals through dedicated courses and lessons. Among the courses offered in the ISM program are systems analysis, systems development, database management, and various programming languages such as C++, HTML, PHP, and JavaScript. This program has produced many information professionals who currently serve in both public and private organizations.

The economic uncertainty and ongoing conflicts in Ukraine and Palestine have significantly affected UiTM students, particularly in terms of the escalating prices of essential goods and necessities. These external factors have created a challenging financial environment for students pursuing their

education at UiTM. The cost of food and other essential items has dramatically increased, leading UiTM students to face financial struggles. The objective of this research is to develop a freelancing portal for ISM students to utilize their knowledge and skills to generate additional income, thereby exposing them to real-life project requirements and practical development. This research is the final piece of previous research that starts with literature review, development of conceptual framework (Osman, M.A.F Masrek, M.N., & Wahid, K.A, 2022), preliminary study (Osman, M.A.F Masrek, M.N., & Wahid, K.A, 2022), questionnaire development, pilot study (Osman, M.A.F Masrek, M.N., & Wahid, K.A, 2022) analysis, and development of freelance portal in accordance to those findings.

2. LITERATURE REVIEW

Moore et al., (2021) explained the numerous factors that contribute to financial strain among higher education students. Among the severe factors that have been pinpointed by Moore et al., (2021) is that a significant portion of students express worry about the extent of their student loan debt and their capacity to manage repayment after graduation. According to Sani, Nafuri, and Othman (2020), the majority of students in higher learning institutions in Malaysia were from low-income families. The authors found out the impact of poverty among students is severe to their performance, as it contributes towards student dropout. In another research by Shafie and Mutalib (2020), the authors found out poverty issues have a significant effect towards students in higher learning institution's mental health. The effect of mental health among students would impact how they feel, think, behave and communicate with others.

Although nowadays there are numerous opportunities for students to make side income to cover their daily expenses, those jobs are not specifically designed to match their skills and knowledge that they were taught in their university courses. Students often find themselves taking up jobs like grocery delivery, becoming agents to sell various products, or even working as insurance agents. While these jobs can be lucrative, they may not fully utilize the specialized skills and expertise that students have developed through their program courses. Thus, the development of this IMFreelancer.org portal would contribute in plugging this significant gap.

Fahimirad et al., (2019) highlights the importance of integration and development of student's employability skills into Malaysian higher education context. The authors highlighted the issue and challenges in integrating employability skills, in which the challenge is to expose students to real-life projects and extensive practical exercises. Information Systems Management (ISM) courses offer many technical subjects, such as programming courses, which require extensive practical exercises and exposure to real-life projects. Programming subjects necessitate that students learn new languages, symbols, and syntaxes. Engaging in extensive exercises involving practical and real-life projects is essential to enhance students' skills and knowledge. This, in turn, equips them with the appropriate employability skills that are highly valued in today's competitive job market. The development of the IMFreelancer.org portal serves as a valuable solution to address this need. By providing a space for students to take on freelance projects related to their coursework, they gain hands-on experience in solving real-world problems and developing solutions. This not only reinforces their technical skills but also hones their problem-solving abilities, teamwork, and project management skills.

3. METHOD & MATERIAL

The study starts with literature review to identify existing gaps that need to be plugged in to improve return on investment and quality of life. From the literature review, conceptual framework is

developed (see Osman, M. A. F., Masrek, M. N., & Wahid, K. A., 2022). Prior to conceptual framework development, a preliminary study has been conducted to gain insight from professional freelance developers pertaining to the construct and variables identified in the conceptual framework (see Osman, M. A. F., Masrek, M. N., & Wahid, K. A., 2022). After the verification of conceptual framework, the research instrument is developed through rigorous pre-test with both 5 professional software practitioners and 5 professional freelance developers with minimum of 5 years of experience in software development and freelancing respectively, and 5 academicians with minimum of 5 years of experience in research and holds a PhD degree. The instrument was then undergone a pilot test (see Osman, M. A. F., Masrek, M. N., & Wahid, K. A., 2022). Next, clustering analysis were conducted to identify relationships between constructs and variables. Then, the constructs and variables were used to develop this freelancing portal to ensure the portal is developed based on rigorous academic research findings. The portal is developed using reusable software assets from the Php programming language and Laravel framework. Among the reusable assets used are the source codes, frameworks, libraries, components, and design.

4. FINDINGS

Findings from prior research have identified software reuse development practices as a flagship development approach to achieve software quality and development efficiency. Starting development from scratch would take a longer time, as the source code needs to go through rigorous testing phases to eliminate bugs. Conversely, development using reusable assets would save a significant amount of time, as these assets have already undergone multiple testing rounds by previous developers. These reusable assets are also considered robust, as they have been used in various development fields, such as portal development, e-commerce platforms, booking and reservation systems, and ranking systems. Among the constructs employed in the development of this freelancing portal are software reuse development practices, quality, achievement goals, individual characteristics, project characteristics, and technological characteristics.

4.1 Software Reuse Development Practice

The construct software reuse development practice consists of 2 variables, namely replicative usage, and innovative usage (Zhou, 2020). Replicative usage concerns with how developers replicate the reusable software assets in developing new software. Replicative usage involves little modification of the asset and following the guidelines from previous developers and developer's forum. In order to apply replicative usage, developers need to extensively study the asset from its documentation and frequently participate in the forums to seek solutions. Replicative usage would be enhanced through experience and training. Innovative usage concerns with developers creatively innovate the reusable assets through modification, integration, and combination to develop new software. In this innovative usage, developers usually used their experience and skills to enhance the reusable assets to cater the solution for developing complex software. According to Makitalo et al., (2020), the advancement of ICT has allowed these reusable assets to be modified and used to develop new systems even though the reusable assets were not originally created to work with each other. The application of innovative usage allows developers to create innovative and creative solutions for clients, by offering more interactive features that would enhance the client's business process.

4.2 Quality

In the literature, the benefits of software reuse development practice were widely reported. Among the tangible benefits of software reuse practice is higher software quality (Barros et al., 2018). This is because the reusable assets have gone through rigorous testing phases and have generalized in multiple types of software. Another tangible benefit of software reuse practices is development quality.

Development quality concerns the golden triangle, in which the software is efficiently developed in accordance with agreed timeframe, cost and specifications. It is important to note that software development often succumbs to software crises in which software development is completed overtime, over budget, and needs further modification upon delivery (Bakar & Kasirun, 2014).

4.3 Individual Characteristics

Individual characteristics of software developers are different according to their experience, expertise, and self-efficacy (Osman et al., 2022). In selecting candidates among freelance developers, it is important to rate their experience, expertise, and self-efficacy to predict their software reuse development practice. Individual characteristics is a construct that can be improved through training, learning, and experience. The more training attended, the more learning acquired, and the more experienced the developers, the more likely they will deploy software reuse practices to get the development job done quickly with top notch quality.

4.4 Project Characteristics

Software development projects often differ in terms of cost, duration, and complexity (Osman et al., 2022). There are software projects that only need maintenance, upgrades from existing software, migration from paper based into electronics, and development of new software. For project costs, there are software projects that only incurred RM5,000, while there are software projects that could incur cost up to RM1,000,000. The cost of the project often depends on the number of modules to be developed, number of users of the software, and complexity of the software scope. Software projects need to be characterized in order to find suitable reusable assets such as the components, libraries, design, source codes, and requirement analysis. The more characteristics of the software is determined, the more success and convenience the reusable assets would contribute to the development project.

4.5 Technological Characteristics

Technological characteristics concern with the reusable assets technical characteristics in terms of its compatibility, relative advantage, trialability, and result demonstration (Kishore & McLean, 2007). Compatibility refers to how developers perceive using reusable assets is compatible with their workflow, development platform, client requirements, and rules and regulations. Certain developers are not compatible with reusable assets due to several reasons such as Not Invented Here (NIH) syndrome that present a serious threat to software reuse practices. This compatibility can be increased through training and experience. Relative advantage concerns the advantage of using reusable assets as perceived by developers. Among the advantages are reusable assets that allow developers to avoid repetitive work and concentrate on the unique aspect of software requirements. Another advantage is developers are able to accomplish tasks more quickly and enhance effectiveness of developing software. Trialability is the special features of the reusable asset that allow developers to try out the asset before deciding to use it or purchase it. This trialability is important as developers are significantly able to reduce uncertainty about the assets, explore the tools and functions of the asset and see how they fare while being able test the integration of the asset into their project. Result demonstration is the ability of the developers to tell and inform other developers regarding their success in using reusable assets to develop new software. This means the result of applying reusable assets is tangible and apparent for developers. The result demonstration was also able to convince other developers in practicing reusable assets in software development projects.

5. DISCUSSION

From the constructs and variables identified through rigorous academic research methodology, the freelancing platform name IMFreelancer.org is developed. IM stands for information systems

management as this platform is specially designed to promote IM students and alumni to become freelance developers as they have all those necessary skills and knowledge to succeed in this field. This platform shall remove the student weakness identified in the literature and through observation in which students in university often were not exposed to real-life development projects from real clients. Another important contribution of this platform is that the software development project would require a lot of practical experience other than theory, hence this platform consists of many reusable assets and projects for students to explore and find solutions practically.

This platform allows students to make side income as they are guided by software professionals who are the senior lecturers who taught this program with more than 10 years of experience in software development. Apart from software development, this platform also offers solutions to website development, information systems development, video editing, business marketing and advertising, and other necessary information professional jobs. The unique part of this platform is the fees for hiring this freelancer. Given that the freelancers are student and alumni, the fees for the solution are offered at discounted price or student price. This is because students have limited professional experience but their work will be guided by highly experienced senior lecturers in development.

The main objective of this platform development is to aid students in financial issues while providing practicality on real-life projects. Hence, the income generated from this portal will be dedicated to the Faculty of Information Management, UiTM Kelantan.

6. CONCLUSION

This platform has been developed based on constructs and variables that have undergone rigorous academic research practices, supported by empirical evidence. The hiring of freelancers was based on individual characteristics, and the provision of reusable assets is rooted in technological characteristics. Projects were characterized based on cost, duration, and complexity. These constructs have demonstrated a significant ability to predict software reuse development practices, consequently predicting software and development quality. This platform enables students of Information Systems Management to become professional freelancers with guidance from senior lecturers, helping them generate additional income, gain exposure to real-life projects, and develop practical software development skills.

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