

Malaysian Freelance Software Developer Development Practice: A Preliminary Study

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Abstract. Freelance developers are highly skilled individuals hired by software development organizations to assist with development jobs. The lack of literature regarding the development practices of freelance developers has prompted this preliminary study to be conducted. Interviews with seven professional freelance developers have been conducted, and thematic analysis was performed on the data obtained. The results show that freelance developers do not strictly follow any commercial system development methods because of their rigidity and time-consuming. Freelance developers were found to utilize their expertise to incorporate reusable software assets during development to save on time and cost. This study discusses the current development practices that are employed by Malaysian freelance developers in the development of software.
Keywords: Freelance developer, development practices, system development methods, project management, information management.

1 Introduction

Freelance developers are highly skilled individuals in specific software development jobs. Freelance developers are hired by software development companies to reduce development costs and achieve high quality software (Sison & Lavilles, 2018). The freelancing platform has become attractive in not just developed countries, as there are around 250,000 freelancers registered from Asian countries, which include Pakistan, Indonesia, and Malaysia. According to the world's top freelance website, Upwork.com, IT and programming categories accounted for 37 percent of the total jobs posted on their website (Haq et al., 2018). In the IT and programming fields, software development projects are the most sought after (Walter & Ferrand, 2013), and it was reported (Hsieh & Hsieh, 2013) that software development companies have

redefined their operations to incorporate freelancers to achieve their objectives. Solutions and applications offered by freelance developers tend to be more creative and innovative, as well as customer-oriented (Walter & Ferrand, 2013). While providing competitive advantages for hiring organizations through their experience and unique skillset, freelancers are hired on a project basis. Hiring organizations would not need to pay the fixed monthly salaries, medical fees, insurance, allowance, or pension, like that of a permanent worker (Kazi et al., 2014). Although the benefits of hiring a freelancer are well noted in the literature, details on software development practices of freelance developers remain relatively unknown. Nowadays, the advancement of IT and software technologies has modernized business operations and ways of living, therefore, there is enormous pressure for software development companies to develop and deliver software applications faster, cheaper, but of higher quality (Sherif & Vinze, 2003). As freelance developers are touted as highly skilled professionals with creative and innovative solutions, this has prompted an interest in investigating the current development practices employed by freelance developers to cater to the current demands of people, businesses and technology.

2 Literature Review

In Malaysia, studies on software development practices in the context of freelance developers are scarce. Nonetheless, studies on the development practice of traditional software developers are plentiful. Studies carried out by Ahmad et al. (2014), Mohamed et al. (2014), Jusoh et al. (2017), and Yahya (2002) have revealed similar findings in which more than 40 percent of software development companies in Malaysia, both in the public and private sectors, do not strictly follow commercial development practice in terms of system development methodologies (SDMs) and project management. The reason is that there are too many deliverables and a lack of expertise (Yahya, 2002) as well as cause delay (Ahmed et al., 2014). However, despite the reluctance to use SDMs, it has been found that most organizations are well aware of the benefits of SDMs, such as quality documentation, enhanced user involvement, reduced maintenance costs, reduced design errors, and client satisfaction. The SDMs employed by Malaysian software development companies are evolving, as Object Oriented Development (OOD), Structured Systems Analysis and Design (SSADM), Rapid Application Development (RAD), Waterfall, Soft System methodology, DeMarco and Yourdon were among the SDMs used in the early 2000s. Starting from 2015 onwards, the Agile systems development method (ASDM) was found to be more favorable.

Apart from employing SDMs to develop software, Jusoh et al. (2017) highlights the need to implement project management practices to manage the development. This is because software development jobs involve various activities and stakeholders until the final product is delivered to the client or user (Mohamed et al., 2014; Jusoh et al., 2017). For instance, the designing phase only commences once the requirement analysis phase is completed, and the testing phase commences once the designing phase is completed. Effective project management practices would ensure software

development can be completed within the budget, time and scope (Shakir & Nørbjerg, 2013). From the studies, it is interesting to find out the development practice employed by the freelance developers. As the development practices employed by freelance developers are still relatively unknown, findings from this literature review were used as a basis to design interview questions.

3 Methodology

This preliminary study applied exploratory qualitative research to collect information from primary sources, as limited studies were found in the literature. This study uses both face-to-face and online interview sessions with Malaysian freelance developers as the data collection technique.

3.1 Study Setting

This study was carried out in the Klang Valley province of Malaysia. Most software development companies in Malaysia are located in the Klang Valley. According to statistics on truelancer.com, most of these freelancers are based in the Klang Valley because more projects are offered there.

3.2 Study Design

The exploratory qualitative research design was chosen to explore freelance developer development practice in order to cope with the current demands of business, clients and technology. This research design was selected because empirical research on freelance developer development practice is limited around the world. This exploratory research is designed to gain a deeper understanding of how freelance developers strategically deploy software development practices to cope with the demands of business, technology, and clients.

3.3 Sampling Procedure

The purposive sampling method was used to recruit participants. Participants were included if they met the following criteria: (1) of Malaysian nationality; (2) have been previously involved in the development of either web-based information systems/smart phone applications/games/websites as a freelancer; and (3) have at least 5 years' experience in systems development. Individuals who met the above-mentioned criteria were contacted by the researcher through online freelancing websites and close contacts to participate in the study. Moreover, they were asked to identify any other freelancers through their contacts. The recruitment was guided by rich information. In total, seven (7) participants were interviewed. Most participants were between 25 and 40 years of age, and all of them were male. Although the samples were all male, there are also female freelance software developers on various freelancing websites. The majority of participants have at least a Bachelor's degree qualification

from public universities in Malaysia. Table 1 below shows the demographic characteristics of the participants:

Table 1. Demographic Information

Demographic Characteristic		Participants (n)
Gender	Male	7
	Female	0
Age	18-24 years	1
	25-35 years	4
	36-45 years	1
	More than 45 years	1
Highest Academic Qualification	SPM	0
	Diploma	0
	Bachelors' degree	6
	Masters	1
	Phd	0

3.4 Ethical Considerations

Ethical approval for this study was obtained from the Research Ethics Committee (REC) of Universiti Teknologi MARA, Malaysia. Before conducting the interviews, information sheets written in both English and Malay were given to the potential participants to read. The information sheet contained the study aims and objectives and the roles of the participants in the study. Participants were informed that participation was voluntary and that they could withdraw at any time should they wish to do so. Those who agreed to participate in the study were requested to sign a consent form. Participants were informed that their identities would be withheld using pseudonyms during data analysis and discussion.

3.5 Data Collection

Data was collected using a semi-structured interview guide. The interviews were conducted in English and Malay through face-to-face interviews and Google Meet. The interviews lasted between 60–120 minutes for each session and were conducted between June 2021 and October 2021. The participants were asked questions about their experience, project characteristics, client characteristics, development practice, and perceived project success. With the participants' consent, the interviews were recorded. During the data collection process, rich answers were reached when the participants provided abundant information in response to researcher questions.

3.6 Data Analysis

Thematic analysis was used to analyze the interview transcript. Thematic analysis allows richer and in-depth ontological and epistemological viewpoints. Following the completion of the data collection process, all the recorded interviews were transcribed. After transcription, interviews conducted in Malay were translated into English. Following transcription and translation, the researcher read and reread the transcripts for data familiarization and to generate initial codes. The reason for coding

was to reduce the raw data to a manageable size and to parts that are relevant to the research questions. Subsequently, the initial codes produced were reorganized and rearranged to acquire refined codes. Afterwards, codes with similar ideas were clustered together to form sub-themes, and those sub-themes with similar concepts were grouped to form the final themes. Finally, the themes were checked for appropriateness, described and supported by quotes from the transcribed data.

3.7 Trustworthiness and Rigor of the Study

In this study, rigor and trustworthiness were established through conformability, credibility, dependability, transferability, and a reflexive approach to the inquiry and analysis. The confirmability of the study was established by providing verbatim transcripts of the participants' responses. The credibility of the study was ensured by allowing participants to express themselves freely during the interviews. To ensure dependability, methods of data collection and analysis were described in detail. A detailed methodology that includes the study setting, participants, and data collection procedures was provided to ensure transferability for this study.

4 Findings

After the data collection and analysis, various themes were generated. The themes include individual characteristics, project characteristics, development practice and project success. The themes are presented below:

4.1 Individual Characteristics

Individual characteristics encompass many levels of aspects that allow differences between individuals to be categorized. Freelance developers differ in terms of experience, status, skill and expertise (Sison & Lavilles, 2018). Participants are asked about their length of experience in software development, length of being a freelancer, programming language used, expertise and freelance status. From the transcription, information such as experience, job status, and expertise were coded into this theme. Most of the respondents have more than five (5) years of experience as freelance developers and have more than 10 years of experience in systems development. Four of the respondents were full-time freelancers, while the other three freelancers reported being part-time freelancers, as they already had permanent jobs. One of them worked for a public agency while the other two worked for private agencies. Five of the respondents reported having a high fluency in the PHP and Java languages. According to one of the respondents, freelance developers can be categorized into front-end developers, back-end developers, full-stack developers, project managers, and business owners. Front-end developers are the ones who are fluent in building the front-end portion of websites and web applications. Back-end developers build and maintain the system that receives, processes, and displays the actions of the user. Unlike front-end developers, who control everything the user can see on the website, back-end developers are involved in behind-the-scenes activities such as data storage, security, and

server-side scripting. Full-stack developers are able to do both front-end and back-end developer work. Table 2 illustrates the individual characteristics of respondents.

“I’m a full-stack developer, I can work on the client-site, database-site, and server site as well.”

“I have more than 10 years of experience in systems development.”

“I only do freelance when I am free.”

“Requirement gathering skill is utmost important as sometimes client doesn’t know what they really want and need.”

“Marketing skills also important to showcase what you can do to your client.”

“Basically, we cannot do everything a smart client should divide software development job into modules.”

Table 2. Individual Characteristic

Individual Characteristics		Parti- pants (n)
Experience in Systems Development	0-1 years	
	2-5 years	
	6-9 years	
	More than 10 years	7
Experience as Freelance developer	0-1 years	
	2-5 years	
	6-9 years	3
	More than 10 years	4
Expertise	Front-end	1
	Back-end	1
	Full-stack	4
	Business owner	1
Job Status	Full-time freelancer	5
	Part-time freelancer	2

4.2 Project Characteristics

Freelance developers have been involved in different types of system developments, ranging from new development, upgrading, and maintenance. In this theme, project type, project cost, project duration, and documentation requirements are coded. Developing information systems was the most common project experienced by freelancers. E-commerce websites and software applications are the other types of projects developed by these freelancers. Project costs range from RM1,000 to RM150,000. The project duration experienced by these freelancers ranges from 1 to 24 months. Only two (2) freelancers reported to have been involved in documentation, while the other freelancers weren’t involved in documentation at all. Table 3 illustrates the project characteristics of freelance developers.

Table 3. Project Characteristic

Project Characteristics		Participants (n)
Project Type	Smart Phone Apps	5
	E-commerce Website	1
	Web-based IS	1
Project Cost (RM)	Less than 1,000	1
	1,000-4,999	1
	5,000-9,999	2
	10,000-19,999	1
	More than 20,000	2
Project Duration	Front-end	1
	Back-end	1
	Full-stack	4
	Business owner	1
Documentation Requirement	Yes	2
	No	5

4.3 Development Practices

The main concern of this study is to investigate the development practices employed by freelance developers. From the literature, it is learnt that the software development community often succumbs to software crises, in which software development projects become over budget, released late to market, of low quality, require modifications after delivery, or project cancellation (Ahmad et al., 2014; Mohamed et al., 2014). In this section, freelance developers were asked to describe development practices they employ in software development while coping with the current demands of business, clients and technology. Surprisingly, the majority of freelancers preferred to not use any commercial SDMs. However, if the client was from a public agency, they would have to follow certain SDMs to comply with the agency’s policies. In this case, there are similarities between freelance developers and traditional developers in that they both do not prefer to employ SDMs during development.

“I do not use any SDMs.”

“The SDMs is irrelevant to follow.”

“SDMs are time consuming, we don’t have that time.”

Although there were freelancers who claimed to employ the Agile system development methodology (ASDM), their answers were quite cryptic: -

“I use any method that is suitable for my project, maybe I can say it is agile.”

Although they are aware of the benefits of using certain methodologies, due to their complexities and time consuming characteristics, they opted to not use such methods. For those who are not applying any method, the researcher further probed questions to find out how they actually develop the systems and found an interesting answer:

“I asked my client what kind of software do you want, is it something like grab food?”

When the client specified the type of software that they desired, the freelancer would search for a reusable template that was similar to the software specifications. It is learned that the templates can be purchased online from neighboring countries, such as Indonesia, at a very low price. The templates were developed by Indonesian developers for the purpose of reuse and have been tested rigorously by other developers so that the testing phase can be shortened, and the templates are considered reliable with fewer bugs. The freelancers also explained that the reusable templates needed to be modified first, such as their currency, language or time zone, as Indonesia uses a different currency, language and time zone from Malaysia.

“I know where to find all these reusable templates, they are all over the places”.

“The use of reusable templates is tricky, you need to study the reusable templates first”.

“To use this reusable template, you must be creative and innovative”.

“Sometimes the reuse template is so complicated, out of date, lack of documentation”.

“Sometimes, using reusable assets might take longer time than develop from scratch”

From the literature, it is learnt that traditional developers are bound to policies set by organizations regarding development practices. Freelance developers are able to employ their experience, expertise, creativity and innovative development practices to ensure that the software can be delivered according to the time frame, with less cost, and higher quality. One freelancer had shown all the reusable templates that had been purchased through various websites. The reusable templates are treated as assets. These assets are managed and organized in a library for future use. All the reusable assets are purchased from foreign countries, such as the United States, the United Kingdom, and Indonesia.

Table 4. Development Practices

Development Practices		Participants (n)
System Development Methods (SDMs)	Rapid Application Design (RAD)	2
	Agile (ASDM)	2
	Software Reuse	3
Project Management	Phases/ Milestones	1
	To do List	2
	Github/ Trello	2
	Pomodoro Timer	2

Developers were asked how they managed their projects, given that the majority of them have experience of running more than one (1) project at a time. However, only three (3) of them reported using commercial project management software, such as GitHub and Trello, to manage projects. The rest use to-do lists, Pomodoro timers and

phase division, milestones and prioritization techniques. Table 4 illustrates the development practices of a freelance developer.

5 Discussion

This study explored how Malaysian freelance developers employed development practices in order to cope with the current demands of business, clients, and technology. The study revealed that Malaysian freelance developers prefer to not employ any commercial SDMs for various reasons. This is in line with the findings of Bakar & Kasirun (2014) and Ahmad et al. (2014). The main reasons of not following this commercial method, is due to its being time-consuming, lacking expertise, and complex. The dramatic reduction in the software life cycle prompted freelance developers to practice even more innovative ways of delivering software. Interestingly, it is found that freelance developers creatively develop software using reusable software assets that are purchased from neighboring countries such as Indonesia. While some reusable assets can be purchased online, some are freely downloadable. Among the reasons to implement software reuse practices are the impact on development cost and time (Barros-Justo et al., 2018; Bauer & Vetro', 2016; Deniz & Bilgen, 2014; Mellarkod et al., 2007; Slyngstad et al., 2008), as well as effectiveness in capturing system requirements (Bakar & Kasirun, 2014). The reused assets have also been tested rigorously by previous developers, in which the testing phase can be shortened (Kishore & McLean, 2007). The benefits of applying reused assets have been well known, however, using reusable assets still presents challenges and failures. To overcome these challenges, it is suggested that the software development community in Malaysia develops its own reusable templates that fit the current project model in Malaysia. Other neighboring countries, such as Indonesia and Thailand, reportedly have their own reusable templates, as it is evidenced that Malaysian freelancers repeatedly purchase from them. Malaysian software development practices can be greatly improved by having self-developed reusable templates.

6 Conclusion and Recommendation

Freelance developers are highly skilled individuals that contract their niche skills in specific software development areas. As they are self-employed, they are not bound to any organization policy in terms of development practices. They are free to innovate effective development practices as long as they can deliver to their clients. Therefore, it is crucial for the software development community to study the development practices of these freelancers to further advance the software development field. Nowadays, the trend of hiring freelance developers is on the rise, as evidenced by the number of jobs offered on freelancing websites. The hiring of freelance developers promises cost flexibility for hiring agencies. This study has found that commercial SDMs are not used by these freelancers because of their being time consuming, having too many deliverables, and lack of expertise. More importantly, this study has uncovered the software reuse practices employed by these freelance developers to

cope with the demand and pressure from clients. It is highly recommended for researchers in this field to conduct more empirical studies. This is to support and generalize this finding, to advance the knowledge of software development practices that are often criticized for late deliverables, low quality, and over budget software projects. Other than that, individual characteristics and project characteristics captured in this study need generalization. The generalization of these characteristics will allow trend identification and hence lead to the creation of reusable assets for local software projects as previous studies have found that developers tend to overlook reusable assets because of the difficulties in understanding and modifying foreign assets. Although the study of software reuse in Malaysia can be found in Bakar & Kasirun (2014), in the context of freelance developers, it is still at its infancy level. Consequently, more and more studies are needed to classify project characteristics and technological characteristics of reusable assets, hence, reusable software assets can be developed in-house. Therefore, it is suggested that the software development community in Malaysia develops reusable assets for the use of local software development. This will promote effective development practice.

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