Development of Building Submission Checklist System (BuSCLI)

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Abstract. In this research, we present the development of Building Submission Checklist System (BuSCLI). The objective of developing BuSCLI is to simplify the management of submission of building plan approval through online system for the Local Authority (LA) or State Town and Country Planning in Malaysia. Besides minimize human contacts thus provide fast, efficient, transparent and effective service to contractor, engineer and architect. Heuristic and web base method applied in this system with combination of PHP and MySQL as database. Therefore this system can facilitate user by computerized all the form accordance to the building categories, submission, endorsement or approval through online.

Keywords: BuSCLI, construction, PHP, software, OSC

1. Introduction

Construction industry has been one of the last industries to harness the power of information and communication technology (ICT). With the view that construction is a business like others and clients now expect quality product, this perception should begin to change. Using ICT may helps construction industry such as facilitate integration of various processes in the construction, standardization of information and faster and fewer flow of information in industry. It needs a mechanism that promotes knowledge sharing among its diverse industry players. To set up a knowledge database for the construction industry would require a huge amount of resources especially in the application of information and communication technology. Regardless of the potential of Enterprise Resource Planning systems to increase productivity and internal ICT efficiency, construction companies hesitate to adopt these ICT solutions. Because of utilizing of ICT become wisely, some changes need to do in activities and process in constructions industry. In Malaysia, the government has carried out several programs in gearing toward realizing global information in the information and communication (ICT) age. In construction industry, application of ICT become wisely because rapid developments of computer technologies have change the way of working environment. To assist in the process, the utilization of ICT and automated software can provide efficiency and effective solutions to the problems of mass data and information handling [1,2]. Object-oriented software engineering methodology the idea object model for the business relates to the use case model of the supporting information system [2]. One of the changes that have to make in construction industry is submission of building plan approval checklist. Before the advent of system, organization kept all their data in manual or conventional files. Basically, the manual system workflow is very inefficient and ineffective. Submission of building plan approval in manual use many forms and consumes time. Thus, it is error prone in endorsement the form.

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In this paper, we focus on the development for Building Submission Checklist System (BuSCLI). BuSCLI facilitate users by computerized all the forms accordance to the building categories, submission, endorsement or approval through online. Heuristic and software engineering method are deployed while developing this system. BuSCLI has been developed for Operational Submission Center (OSC) in Majlis Perbandaran Kuantan (MPK), Malaysia. This computerized system helps user in manage the submission of checklist for building plan by user such as contractor, architect, and engineer in construction industry. Using programming language PHP and MySQL database, this system is an online system, where user sharing their data using internet. Other software had been used include xampp as Apache Web Server to support the database, Acrobat Professional to design the interface for the form and Microsoft Word and Microsoft Project to make documents.

2. Literature Review

This section discusses the conventional system and existing used systems in Malaysia.

Conventional System is used at Operational Submission Center (OSC) in Majlis Perbandaran Kuantan (MPK), Malaysia. All activities and process in manual system such as customer information, documents for endorsement, submission form and calculation on temporary permit payment will discuss details. Previously, submission of building checklist plan used manually, where engineers, architect, and contractor have to come to the Local Authority to submit all the form that related to the building plan approval. User need to full fill several forms before use the checklist form. The checklist form contents list of things to be checked before send the checklist to the local authority (LA). Next, user need to tick to the checklist based on types of building checklist. The checklist consists of four (4) parts which are for site services, building without lift, and building with lift and for industry. Lots of papers used during the process and activities for the submission of the project. Besides, user has to come to the local authority to submit their checklist by themselves or through the postmen. After submit the checklists and forms, user have to wait until the approval time. They did not know whether the submission is approved or not.

An electronic Submission (or e-Submission) is a set of registration files submitted in electronic form during an approval or variation or renewal procedure (Centralized, National, Mutual, And Decentralized). It could be a set of files (Portable Document Format (.pdf), Microsoft® Word files (.doc) or Rich Text Format (.rtf) and picture files like jpeg, or png, etc.) usually submitted in folders. The basic concept of the e-submission is to enable the public to submit planning application to the Local Authority (LA) or State Town and Country Planning and receive the answer via the electronic or Internet. This process will minimize human contacts thus provide fast, efficient, transparent and effective service to the public [3]. The effectiveness with which this process activities is undertaken depend on the availability and appropriate utilization of information of different types which are obtain from various sources.

Several systems that related to submission and approval system has been reviewed. Some of another system also reviewed to know the system characteristic, provided facilities, and module in the system. The systems are E-submission [3], E-government [4] and CWorks [5]. E-submission system is a web application system which all the submission through online system. One of the applications is e-Bangunan which is implemented in the Majlis Perbandaran Sepang (MPS). MPS takes advantage of ICT’s benefits and Geography Information System (GIS) to develop a system to ease user deal with them. E-Bangunan used by people who involved in submission of building plan with MPS. Several modules have been develop to make the system meets the user needed and make the process and activities in submission and approval become more efficient. This system allowed user to make application on new project and review the current status of their application in MPS through online. Figure 1 shows the main page of MPS, whereas Figure 2 shows the main page of e-Bangunan. E-government is a web application system. It has improved both how the government operates internally as well as how it delivers services to the people of Malaysia. It seeks to improve the convenience, accessibility and quality of interactions with citizens and businesses; simultaneously, it will improve information flows and processes within government to improve the speed and quality of policy development, coordination and enforcement. Poorly, E-government have some problems in security, credibility and technology knowledge. Figure 3 shows the main page of E-government. CWorks Free is a Computerized Maintenance Management System (CMMS). It is a Maintenance Software
for Plant and Facility Management and its stand alone system that did not use internet. Its purpose is to ease people start on maintenance software to track and record their maintenance activities. Using CWorks, users may start their CMMS initiatives at a cost effective pace as they can start simple tracking of asset, locations and employee registers. Track outstanding and completed work type, description, times and costs. CWorks is simple preventive maintenance freeware and free unrestricted software. It delivers various benefits to organizations by delivering information to maintenance engineers and managers. Figure 4 shows the main page of CWorks.
3. Methodology Development

Rapid Application Development (RAD) is one of methodology development lifecycle designed to give much faster development and higher quality than the traditional lifecycle [6]. It compresses the step-by-step development of conventional methods into an iterative process. The RAD approach thus includes developing and refining the data models, process models, and prototype in parallel using an iterative process. The structure of the RAD lifecycle is thus designed to ensure that developers build the systems that the users really need. RAD methodology was chosen in developing Building Submission Checklist System. RAD is a programming system that enable programmer to quickly build working program. RAD consists of four phases as shown in Figure 5.

RAD is suitable in developing BuSCLI because:

**Time constraint:** Request from the users of the system estimate the development of the system between three to four months. Since submission of the applications and checklists is main thing in order to get approval for development of building, users needs the system develop as fast as possible to ease the process and activities submission and approval of customer projects. RAD methodology design for a faster development and higher quality because RAD model provides “high-speed” development process.

**Medium size of system:** BuSCLI is developing for OSC staff in MPK and people that involved in the construction industry such as contractor, consultant and architect.

**Ability to identify and repair problems in early stage:** In developing this system, developer and user are worked together to get the best result of the system, therefore, if user needs changes on the requirement, developer will do the changes at any stages to fulfill the user requirement. This method improved working relationship and trust between developers and clients in order to get the best system result and the system meets the user requirement.

4. System Design

Computerize system is more reliable and accurate. Data analysis will be process very fast and safe. But most software is delicate: even the slightest error, such as changing a single bit, can make it crash. Thus, development techniques emphasis on design should be managed correctly to overcome this fragility [7].
particular, to make a clearer understanding on how the BuSCLI design, we present the flowchart of the system. Figure 6 shows the flowchart of BuSCLI.

**Figure 6: Flowchart of BuSCLI**

**Interface Design**

In this phase, the method of the interface design detail explained. Macromedia Dreamweaver 8 has been used as a tool in designing the interface for Building Submission Checklist System (BuSCLI). Interface plays the important role in interaction between human and computer. Good interface design makes user feel comfortable while accessing the system. In Building Submission Checklist System several of 10 heuristic by Jacob Nielsen that suitable in the system has been implemented.

a) Practical application.

BuSCLI is a web based application that developed for Operational Submission Centre (OSC) in Majlis Perbandaran Kuantan, Malaysia. This system has followed the manual form that OSC provided for their client. Besides, makes the management in the OSC more efficiency in managing the submission of form by client.

b) Consistency and standards

In developing the interface for BuSCLI, consistency and standard of the interface has been carefully designed. Besides, consistency and standard in designing the interface help user feel they monopoly the system. Consistent in color layout, font and icons applied in this system.
c) Help users recognize, diagnose, and recover from errors
When the users of the system did not fill the required fill which is important information, system error massage will be appear to help user from mistake.

![Error message as a guidance to user.](image)

Figure 8: Error message as a guidance to user.

d) Error prevention
Error prevention used in order to alert the user when the user makes the mistake. For example user did not login to access the system. Error massage will appear to inform the mistake of user.

![Error message to alert user has to login to access the system.](image)

Figure 9: Error message to alert user has to login to access the system.

5. Conclusion
BuSCLI is developed for OSC in Local Authority in Kuantan. Basically, this system used Rapid Application Development (RAD) methodology during developing this system. Consist of four phases which are requirement planning, user design, construction and cutover, this method is suitable implement for developing this system because the size and scope for the system is medium and developed for staff in OSC and client of the OSC. By using RAD methodology, this system developed to solve the problem occurs in manual or current operation in submission of application in building plan. This system enable in helps user manage their times in submission the application, the approval times and reduce the usage of form by using electronic form.

6. References


