

The Influence Of CASE Tools Traits On The Successful Design Of Web Applications

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Abstract: The purpose of this research paper is to examine the Influence of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the Successful Design of Web Applications. To achieve the research goals, a random sample of 173 systems analysts, database designers, web application developers and systems administrators were randomly selected from a research population of 17 companies working in the software development sector. The outcome showed positive Influence of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of Web Applications. This paper provided new contribution to the existing knowledge related to the use of CASE Tools in the successful design of Web Applications.

Keywords: CASE Tools; Web Applications; Web Engineering; Web Development..

1. INTRODUCTION

The introduction of server side scripting languages such as PHP, Perl, Python and other CGI web programming languages has made it possible for web applications developers and programmers to design and build complex and robust web applications [2]. Web applications has created a new intuitive and collaborative experience to the users of web applications [10]. Not only did sites become more dynamic, but also it made it possible for users to interact, share information and store all kind of information and multimedia items online [15]. Designing a web application is a complex task, since it involves designing the user interface components, the processes, the business workflow, the business components, the service agents, the data access components and the web application database in addition to designing security and deployment measures [5]. Web applications are designed in a layered approach and the web engineering approach has many CASE tools to help developers perform this complex task. Most web application developers rely on the UML – Unified Modeling Language to design web applications [18]. Web engineering CASE tools do provide developers with the means to achieve flexibility and integration in their final release. OO-H process provides a viable approach to systematic development [5]. Although CASE Tools has existed before the introduction of the internet, research shows that most of web based applications has not been developed using a structured, systematic, quality assurance process [11]. Historical review indicate that the use of computer aided software engineering tools in the development of web applications is debatable [7]. However, what we try to show in this paper is the Influence CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications. We shall start by proposing a research model showing the effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications [8]. We shall then test the model statistically based on the results of a questionnaire to reach a conclusion..

I. CASE TOOLS

The term CASE Tools is short for Computer Aided Software Engineering, these tools that are used to help software developers and systems analysts in their development efforts. CASE tools support several design activities in the system development life cycle [8]. CASE tools range from tools used in the early stages of planning such as project management tools, going through the main development of the system including, system functionality design, database design, data dictionary, coding, versioning, testing and implementation. Applications developed using CASE tools are of high quality since they have moved through a detailed and trusted process that guarantees software integrity and good quality [9]. Systems integration and installation can become an easy task by using CASE tools. They allow for robust systems development and maintenance throughout the entire systems development life cycle – SDLC [3]. All stages of the SDLC are supported by CASE Tools. They support structured analysis and design methods in addition to object oriented analysis and design methods [3]. There are tools that support the structured approach such as OpenModelSphere and DBdesigner, and tools that support the UML approach such as rational rose. In a structured systems approach, CASE tools can help design the Context Diagram and the Data Flow Diagrams [4]. In designing database, it can be used in the creation of Entity Relationship Models, testing the components of the model, including the Entities, Relations, and data flow. It can also be used to construct a conceptual model, a logical model and transferring it into a physical database dependent design called and Entity Relationship Diagram - ERD. Additionally, they aid in the generations of the Data Dictionary which can be used by programmers as a reference tool [9]. CASE tools also help generate the SQL code that can be imported into the database management system to be executed as an SQL query which shall result in building all the entities, attributes, primary and foreign keys and set the relations between them in the database based on the original model [9]. It can also generate classes for use in object oriented programming languages such as VC++ and VJ++ and Visual Basic. User documentation and system documentation is another field that we can employ CASE tools to help reduce the time needed to generate these documents. In the web design field CASE tools can play a major role in the generation of a SITEMAP which is an XML file that lists URLs for a site along with additional metadata about each listed URL within that site. It can also be used to generate Meat Tags to be inserted into the Head of a website

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page for Search Engine Optimization among other things. There are tools that can help users edit and modify the Cascading Style Sheet (CSS) used by the web application. Some are used to create and test online databased and to design HTML forms and Database reports. CASE tools are classified as Upper CASE Tools, Lower CASE Tools and Integrated CASE Tools [14]. The Upper CASE tools support the systems analysis and design tasks. The Lower CASE tools support coding, versioning and testing tasks [14]. Integrated tools support both upper tasks and lower tasks. Case tools has several characteristics that web application developer enjoy, include flexibility, integration, and a quality control. CASE tool are flexible since programmers can change and update their designs within the comfort of their development environments [12]. CASE tools are integrated and can support all development stages. changes at any stage, are reflected in the design, the code and documentation. CASE tools automat testing for systems achieving the desired requirements and this by itself guarantees software quality.

A. CASE Tools Flexibility

Users of CASE tools has experienced the flexible the CASE Tools. Its flexibility leads to expedited modification of the designed process or tasks. CASE Tools are flexible in the use of editors and other tools [18]. They offer flexibility and several choices for users to enhance the designed system. They support online modification and testing of modules, models and generate reports. They are used as benchmarks for future modification. Unlike early design and development methodologies, users can generate several versions of the design and test each one separately. There is no need to redesign or re build the design or the module since it's flexibility feature allows developers to extend and build on existing designs.

B. CASE Tools Integration

CASE tools support all stages of the design and development process. If a change is made at any stage it has to be reflected in the code, and all related designs including the documentation. [16]. CASE tools expedite the integration of software components, features, functions and activities. The integration activity is seamless because it is user-friendly, Internet accessible, and transparent to the users. It includes an intelligent online conversion of diagrams and design texts into other forms such as program codes, or encryptions. The integration covers all phases of the design activities, and helps the system to become multi-user and available through the Internet [4].

C. CASE Tools Quality Control

Quality means to continuously update hardware, software, and user interface, modernization of the hardware, software, and interface; and adaptation of the industry standards and practices [4]. CASE Tools can provide developers with the means to adherence to standards, integrity of documentation, centrally held data dictionary, fast capture of requirements, quick modification to designs, trace requirements from model to code, guide the development process, easy, consistent code-generation. All important in maintaining quality of the software application being developed [4].

II. WEB APPLICATIONS DESIGN

Web applications, are applications that has evolved after the introduction of the Internet technology which made client server applications a thing of the past. This implies that the web application resides on the server and users can access the application using any web browser available on a desktop, laptop or web enabled device [6]. We applications must work inside a container such as a web browser which issued the HTTP request to the server through a unique URL. The URL points to the application main page on the server [1]. When the request is received by the server its runs the application script and returns the HTML version of the web application page to be displayed on the user machine [13]. All this could not have happened without the server side scripting technology. The web application is usually designed to have several layers [6]. Usually it's a three layers' approach comprised of presentation, business and the data layers. Web application design and development is a fairly complex job, and by using CASE Tools the web designers and developers can reduce the amount of complexity by handling each task separately resulting in the design of a high quality, secure and robust web application [15].

III. IMPORTANCE OF THIS RESEARCH

This research is important since it attempts to identify the Influence of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications. Web application developers, software project managers and designers, shall appreciate the importance of using CASE Tools in the SDLC of any web application project.

A. Research Problem

The research problem shows that the web application developers do not take into consideration the use of CASE Tools in the design of their web applications. There is also the need to consider CASE Tools traits in the development and design of web application. The literature review identified three dimensions that shall be used as a basis for building the research model. These dimensions are: Flexibility, Integration and Quality Assurance.

B. Research Objectives

The research aims at proposing a model that measures the effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications.

The following model builds for the research argument by studying the influence of the independent variables of Case Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications.

C. The Proposed Model

Figure 1 shows the research model, where we have the Independent Variable, Case Tools Traits (Flexibility, integration, Quality Assurance) and their effect on the Dependent Variable (Successful Design of Web Applications). The model was constructed based on previous research in this field.

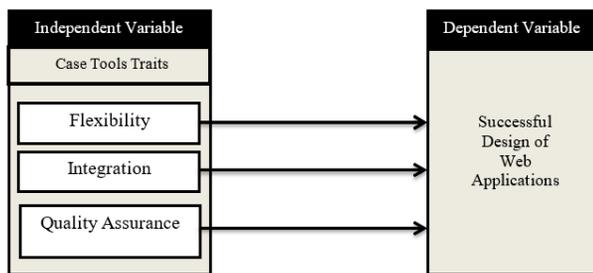


Figure 1: Research Model

D. Research Hypotheses

Ho: There is no significant moderate effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications at level ($\alpha \leq 0.05$).

Based on the above we derived the following sub-hypotheses:

Hoa: There is no significant moderate effect of the Flexibility trait of CASE Tools on the successful design of web applications at level ($\alpha \leq 0.05$).

Hob: There is no significant moderate effect of the Integration trait of CASE Tools on the successful design of web applications at level ($\alpha \leq 0.05$).

Hoc: There is no significant moderate effect of the Quality Assurance trait of CASE Tools on the successful design of web applications at level ($\alpha \leq 0.05$).

Ho: There is no significant moderate effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications at level ($\alpha \leq 0.05$).

1) Sample and Population: The research population is made up of systems analysts, database designers, web application developers and systems administrators working at 17 website development companies in Jordan. A total of 173 valid questionnaires were used out of 371 distributed [16]. The number of returned questionnaires was 189, the difference of 16 questionnaires were discarded since they were incomplete.

2) Measures and Data Collection: The research was conducting based on the literature review, related websites and the results of the questionnaire that was distributed on web development companies in Jordan.

IV. RESULTS AND DISCUSSION

Multiple regression statistical testing tested the responses from the questionnaire and the following results were achieved:

Ho: There is no significant moderate effect of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications at level ($\alpha \leq 0.05$).

Table (1) shows the effect of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications. The regression model achieve a higher degree of fit, as reflected by (R) and (R²) value (0.572) , (0.327), which asserted that (32.7%) of the explained variation in Successful Design of Web Applications can be accounted for CASE Tools Traits (Flexibility, Integration and Quality Assurance). Additionally, the regression results in Table (1) for the Flexibility shows a slope value of (0.567); (0.532) and (0.468) for the regression line. This suggested that for a one-unit increase in CASE Tools Traits (Flexibility, Integration and Quality Assurance) can significantly predict a (56.7%); (53.2%) and (46.8%) increase in Successful Design of Web Applications. As well as Table (1) shows that the

analysis of variance of the fitted regression equation is significant with F value of (90.137). This is an indication that the model is a good one. Since the p-value is less than (0.05), it shows a statistically significant relationship between the variables at (0.95) confidence level. The results also indicate that CASE Tools Traits (Flexibility, Integration and Quality Assurance) has an effect on Successful Design of Web Applications with a coefficient of (0.567); (0.532) and (0.46.8). Thus, CASE Tools Traits (Flexibility, Integration and Quality Assurance) actually affected on Successful Design of Web Applications. This further supported the hypothesis: CASE Tools Traits (Flexibility, Integration and Quality Assurance) has an effect on Successful Design of Web Applications at level ($\alpha \leq 0.05$). Table (1): Multiple Regression Analysis - Influence of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications.

TABLE I

MULTIPLE REGRESSION ANALYSIS - INFLUENCE OF CASE TOOLS TRAITS (FLEXIBILITY, INTEGRATION AND QUALITY ASSURANCE) ON THE SUCCESSFUL DESIGN OF WEB APPLICATIONS)

Dependent Variable	B Sig*	
	Flexibility	0.567
Integration	0.532	0.001
Quality Assurance	0.468	0.000
Successful Design of Web Applications	R	0.572
	R ²	0.327
	F	90.137
	Sig*	0.000

V. CONCLUSIONS

Based on the results and discussions above, we conclude that Flexibility trait had the largest influence on Successful Design of Web Applications with a beta of 0.567 at a significance level of 0.000. This indicates that 56.7 of the variation in Successful Design of Web Applications is based on the Flexibility of use. Integration had the second largest influence Beta number of 0.532 and at last the Quality Assurance had an influence of Beta score at 0.468 at significance level of 0.000. Given these results we conclude that since web application development process is complex and expensive web developers and designers must take into consideration the use of CASE Tools to help them in the different stages of Design of a successful Web Application. CASE tools provide flexibility, Integration and Assures Quality in the development of complex web applications.

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