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# Examining the Factor Influencing of Manual Testing for Software Projects – Human Perspective

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**ABSTRACT:** In the IT sector, manual testing is still an essential component of software quality assurance, especially for complicated programs that call for delicate human judgment. In this study, a thorough manual testing model created especially for IT software projects is introduced. In the suggested model, the important phases including requirement analysis, test planning, test case development, environment setup, test execution, defect reporting, and test closure are all included. The model attempts to improve the efficacy and efficiency of the testing process by using best practices and more current developments in manual testing approaches. The study also looks at how human variables affect the results of manual testing, emphasizing the value of tester competence, communication, and cognitive abilities. By carefully analyzing these elements, the study offers insightful advice and useful guidance for raising software quality and lowering project risks. The results indicate that the IT industry's software products can become much more robust and reliable by implementing this organized manual testing strategy.

**KEYWORDS:** IT Industry, Defect Reporting, Test Planning, Human Factors, Software Development, Manual Testing, Software Quality.

## I. INTRODUCTION

It is crucial to guarantee the quality and dependability of software products in the quickly changing IT sector. Even with the introduction of automated testing technologies, manual testing is still a vital step in the software development process, particularly for complicated and user-interface-heavy programs. Without the use of automation technologies, manual testers carry out test cases, use their experience and instincts to spot flaws and confirm that the program satisfies requirements. Specifically, for software projects in the IT industry, this paper presents a systematic manual testing strategy. Using a framework that testers and project managers can use to enhance testing results, the model covers several phases of manual testing. The study also looks at the influence of human factors on manual testing, acknowledging that the expertise and experience of the testers conducting the testing have a significant role in how successful such testing is. However, the comparison between manual and automated testing is also studied, where each type of testing has its own characteristics [1].

The paper is organized as follows; Section II describes previous studies in the related area while Section III discusses research methodology involved in the study. Factor in manual setting is proposed in Section IV and finally, Section V presents conclusion.

## II. RELATED WORK

When software engineering first began, manual testing has been a fundamental component of software quality assurance. While efficiency and the capacity to perform repeated tasks have made automated testing popular, manual testing is essential in situations where human judgment and exploratory testing are critical. An organized approach to manual testing is crucial, as several studies have shown. For complete test coverage, [2] addressed the importance of

through requirement analysis and test design. The need of flexibility and adaptation in test planning was emphasized in [3] discussion of the integration of agile approaches with manual testing processes.

The success of manual testing is largely dependent on human variables. Cognitive traits like problem-solving abilities and attention to detail are essential for spotting flaws, claimed by [4]. The influence of communication and team dynamics on the efficacy of manual testing was brought to light by [1]. Furthermore, to execute manual testing at industry there is a need to have proper guideline and type of software or application being used [5].

A complete overview of key studies and findings in the area of Manual Test Models for Software Projects in the IT sector is given in the present literature review. The review is organized with a view to highlighting the significant contributions, methodologies, and findings of individual researchers in this area.

[2] stated that in order to ensure thorough coverage of tests have provided a detailed list of software engineering challenges for machine learning systems, emphasizing the need for a comprehensive test planning and requirements analysis. The study noted that the identification of testable aspects, as well as clarity and completeness of requirements require a systematic approach to requirement analyses. In the IT industry, this foundation is crucial to creating efficient manual test models.

[3] declared that the integration of agile methodologies with manual testing procedures was discussed and the research has shown that the flexibility and adaptability of test planning and execution can be enhanced through the use of agile practices. Incremental testing, which allows for continuous feedback and adjustments, is supported by agile methods. In an evolving and rapid changing IT environment, this integration is of particular importance.

In manual testing, [4] focused on the cognitive aspects that affect human performance. In their view, the crucial factors for effective identification of defects are fundamental skills such as attention to detail, problem-solving, and analysis thinking. Their findings demonstrate the importance of people's competence in manual testing and highlight the need for trained evaluators who are able to use their cognitive skills to detect and diagnose problems.

The impact of team dynamics and communication on the success of manual testing has been examined by [1] and his colleagues. They have found that the defect tracking and resolution process is significantly enhanced by effective communication and collaboration between team members. Their research indicates that an enhanced collaborative environment can help to increase the efficiency of automated testing efforts.

[6] stressed that in order to improve the test efficiency, the researcher examined the role of digital twins and intelligent production systems. Their study has shown that advanced technology can enhance the setup and operation of test environments, enabling them to be more effective and accurate. While their focus was on manufacturing, the principles can be applied to software testing environments to simulate real-world conditions more effectively.

[7] stated that the use of AI based defect prediction techniques to assist manual testing was investigated and the research has shown that the integration of artificial intelligence tools can help to identify potential problems early in the testing process, thereby improving early detection of defects and reducing overall testing time. This approach proposes a hybrid model in which AI driven insights complement manual testing.

An empirical study was carried out by [8] on the development challenges for deep learning applications. Their findings pointed out that for complex applications, where automated testing may be insufficient, the importance of manually carried out tests remains important. The human judgment necessary for the validation of complex and nuanced aspects of software is provided by manual tests.

[9] studied has shown that automated tools may complement manual testing efforts by handling repetitive tasks and producing a large number of test cases. In order to increase the overall coverage and effectiveness of tests, this combination enables testing operators to focus on evaluations and analytical investigations.

The importance of training and continuous learning in software engineering for the development of skilled testers has been emphasised by [10]. Their research supports the need for ongoing professional development in order to ensure that testers have the most up to date knowledge and skills required of an effective manual test.



In order to make the management of test data and documentation more efficient, [11] have looked at using Annotation tools. Their study shows that such tools can improve the accuracy and efficiency of testing case development and defects reporting, which in turn would lead to a more coherent and simplified method of performing tests. Below are studies conducted by previous researched as depict in Table 1 below:

Table 1: List of study conducted by previous researcher

Study by Author	Key Findings	Relevance to Manual Testing Model
[2]	Detailed test planning and requirement analysis is essential for comprehensive test coverage.	Emphasizes the need to thoroughly analyze requirements and plan tests.
[3]	Agile methodologies can be integrated with manual testing to enhance flexibility and adaptability.	Support to include agile practices in the planning phase of testing.
[4]	Cognitive aspects such as attention to detail and problem-solving skills are critical for identifying defects.	Focuses on the importance of the tester's expertise and cognitive abilities in the execution of the test.
[1]	Effective communication and team dynamics significantly impact the success of manual testing.	The role of team dynamics and communication in defect reporting and test execution is outlined.
[6]	Digital twins and smart manufacturing systems can improve testing efficiency.	It suggests the potential of advanced technologies to enhance environmental configuration and testing.
[7]	AI-based defect prediction can assist in identifying potential issues early in the testing process.	Displays the advantages of including AI tools for defect reporting and testing planning.
[8]	Challenges in developing deep learning applications highlight the need for manual testing.	Provides further information on the continuing importance of manual testing for difficult applications.
[9]	Automated test case generation can complement manual testing efforts.	It proposes a mixed method of testing for comprehensive coverage, which includes the use of hands and machines.
[10]	Education and training in software engineering is vital for developing skilled testers.	This will reinforce the need for continuous training and development of skills in the field of manual testing.
[11]	Annotation tools can aid in managing test data and documentation.	It recommends that specific tools be used for the efficient development of test cases and defect reporting

The impact of new technologies and methodologies on traditional testing has also been examined recently. For example, the adoption of digital twins in smart manufacturing systems [6] and the integration of artificial intelligence in defect prediction [7] represent emerging trends that influence manual testing practices.

Here’s a comprehensive manual testing steps are presented:

1. Requirement Analysis

The first step in the manual testing model involves thorough requirement analysis. To identify testable aspects testers must understand the software requirements in detail. This stage includes reviewing requirement documents, user stories, and use cases to ensure clarity and completeness.

2. Test Planning

The scope, goals, materials, timetable, and deliverables of the testing process are all set during the critical test planning step. Effective resource allocation and coverage of all important areas are guaranteed by a well-organized test strategy, which acts as a road map for the whole testing endeavour.



3. Test Case Development

Testers create thorough test cases at this phase by using the requirements as a guide. Test cases must cover both positive and negative events and be succinct and easy to understand. A complete testing process and early problem detection are guaranteed by well-designed test cases.

4. Environment Setup

Configuring the hardware, software, and network necessary for testing is part of setting up the test environment. Because a well-prepared test environment closely resembles the production environment, testers can find problems that might occur in actual use.

5. Test Execution Testers manually perform the test cases during test execution and record the outcomes. Meticulous attention to detail and the capacity to adjust to unforeseen problems are essential during this phase. To find and report flaws, testers need to be extremely watchful.

6. Defect Reporting

The process of defect reporting is recording found flaws in a defect tracking system, classifying them according to severity, and following them through to resolution. Clear information for the development team to work with and timely issue resolution is guaranteed by effective defect reporting.

7. Retesting and Regression Testing

To make sure the fixes are working, testers retest once defects have been corrected. Regression testing is also carried out to ensure that recent modifications have not negatively impacted previously implemented functionality. For software to remain stable, this stage is essential.

8. Test Closure

Test closure is the last stage of the manual testing paradigm. It entails making sure that all scheduled tests have been run, that all faults have been fixed, and that a test closure report has been prepared. An outline of the testing process and its results is given in this paper.

However, Manual Testing have their advantages and disadvantages as in Table 2 below:

Table 2: Manual Testing advantages and Disadvantages

Advantages	Disadvantages
Comprehensive coverage: It ensures that all requirements are fully tested to reduce the risk of undetected defects.	Time-consuming: Manual testing can take a lot of time and effort, particularly for extensive projects.
Human insight: It uses human intuition and cognitive skills, which are particularly useful for exploratory testing as well as UI/UX evaluations.	Inconsistency: Depending on the expertise and background of each tester, results may differ, which could produce unpredictable results.
Flexibility: Allows for on-the-fly adjustments and exploration, which is particularly valuable in agile and iterative development environments.	Scalability: For large and sophisticated applications that require considerable test coverage, manual testing might not be feasible.
Collaboration: Improves communication and cooperation between the team members, contributing to a deeper understanding of the application under testing.	Resource-intensive: Needs a substantial number of human resources as well as continuous training to ensure testing efficacy and competency.

In summary, the goal of manual testing as stated by [1] is:

- To prepare software product which should be defect free.
- It should work according to the specified functional requirements put by the customers.
- Testcases which are designed during testing phase has large percentage test coverage
- It promises that reported defects will be tested by the developers. Retesting should be performed manually by testers on the fixed defects.

### III. RESEARCH METHODOLOGY

#### a) SCOPE OF THE STUDY

The study will be conducted for software projects in IT company. The IT company will be selected based on their current nature of business and the willingness to be part of the participant.

#### b) RESEARCH QUESTION AND OBJECTIVE

- I. RQ - What is the factor or element affect a manual testing
- II. RO - To identify the factor or element affecting a manual testing for software project

### IV. PROPOSED FACTORS IN MANUAL TESTING

Based on the discussion above, a list of suggested factors has been identified which influence software product to have defect free. However, this list needs to be verified with the practioner in order to have an accurate factor in current practice.

### V. CONCLUSION

The suggested factors for manual testing offer an organized method for doing manual testing in the IT sector, including all the important topics from requirement analysis to test closure. The methodology seeks to improve the efficacy and efficiency of manual testing procedures by integrating best practices and knowledge from recent research. For manual testing to be successful, human elements including tester abilities and team relationships must be properly addressed. Implementing this paradigm can result in a more dependable software development lifecycle, lower project risks, and better software quality.

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