



Enhancing Defect Tracking and Reporting Efficiency in Software Houses in Islamabad through Customized Quality Assurance Tools Designed to Improve Traceability and Analytics Capabilities

Usama Iqbal

rajausamaiqbal115@gmail.com

Received: 29 Apr 2026; Received in revised form: 25 May 2026; Accepted: 01 Jun 2026; Available online: 06 Jun 2026

Abstract— As more businesses are turning to the world of software, they need to have a reliable and transparent environment. Software QA has become an integral part of software development. The need for a reliable and transparent environment is increasing in the number of businesses relying on the software that they use, and therefore, Software QA has become an integral part of software development. Nevertheless, disease management in many project program rooms (PPRs) in Islamabad is also done using fragmented disease monitoring systems or spreadsheets with limited data and limited reporting capacity. Such traditional processes often lead to late detection of defects, repeated boom disorder, and a lack of transparency when it comes to project management tendencies. This observation examines enhancing utility tracking and reporting performance with mixed tracking and analytics functions using custom-designed quality assurance (QA) tools. A blended technical studies methodology is used at the meeting for software companies working in Islamabad. The overall research and disease prevention performance measurements are used in collecting statistical data; qualitative monitoring is done by interviewing QA engineers, developers, and problem managers. Results indicate that the use of a tailored QA system has a significant impact on traceability between requirements, test cases, and defects. The results also indicate a decrease in decision time associated with the pathology process as well as a clinically validated data collection and decision-making process. The research provides practical suggestions for project teams seeking to enhance software program quality administration practices by way of localized QA solutions.

Keywords— Quality Assurance, defect tracking, software quality, analytics, traceability, QA tools, software engineering.

I. INTRODUCTION

The rapid evolution of the software program industry has increased the need for effective QA practices. The modern disease control system that can support today's software reliability, maintainability, and customer satisfaction is required for organizations. Defect tracking systems are crucial since they facilitate software teams to identify, report, examine, and fix defects throughout the software development lifecycle. Even with the advancement of technology,

there are still a lot of software houses in Islamabad that rely on spreadsheets of guides or even basic structures of problems. These tools do not have a good frequency of providing a linkage between need, monitoring activities, and named defects. In short, software groups will be dealing with difficult situations in terms of root cause analysis, malfunction prioritization, and exception reporting.

Addressing these challenges, customized QA structures present integrated traceability, automated

workflows, and analytics-driven dashboards, creating a realistic approach. This type of equipment can help to present the defect characteristics, enhance the cooperation between the QA and improvement teams, and help to make evidence-based selections. The primary aim of this research is to investigate the efficiency of the Tailored QA structure to enhance glitch tracking and efficiency reporting in software houses in Islamabad. Organizational and technical aspects affecting the successful implementation of this equipment are also reviewed.

II. LITERATURE REVIEW

- *Defect Tracking and Traceability in Software Engineering*

Defect traceability is the ability to trace requirements, cases and defects throughout the software improvement lifecycle. History evaluation and accountability enable a good traceability that can help to make software protections more efficient (Tian et al., 2021) and to decrease the probability of defects recurring. Traceability aids quicker decisions on sickness and sophisticated selection of guarantees in the pleasure.

- *Limitations of Generic QA Tools*

Sultan et al. (2013) assert that typical disease monitoring systems and spreadsheets are often beset with intimidating disease classes, duplication and reporting capabilities. These barriers reduce the power of the disorder lifecycle and in smaller to medium sized agencies can make goal analysis ineffective.

- *Analytics-Driven Quality Assurance*

Today's QA research is focused on the changing significance of analytics and statistics-based insights. The analytics is able to identify the patterns of disorder and predict high risks as shown in the on ML based disease prediction modes (MDPI, 2023). But these responses are generally complex, expensive, and not targeted to software programs with limited resources.

- *Organizational and Adoption Factors*

The Technology Acceptance Model (TAM) states that perceived usefulness and ease of use have a strong impact on the acceptance of gadgets. Even when technically viable, effective implementation of QA

equipment can be constrained by resistance to alternatives, education gaps, and various workflow issues, as noted by Muralidharan and Ganesh (2022).

- *Industry Practices and Quality Standards*

According to a report from industry (Science Direct, 2022), an organizational problem is often the culprit for traceability errors, such as inconsistent documentation, lack of school attendance, and mis-configured equipment. These results support the need for tailored responses to support local workflows and organizational readiness.

Conceptual and Theoretical Framework

This research framework is built on the bases of existing literature, and based on three major theoretical perspectives explaining defect traceability, quality improvement and technology adoption in software engineering environments.

Software Traceability Theory

Business IT software traceability theory states that a linkage between software requirements, software testing activities, and software defects records helps in enhancing the transparency of the software development lifecycle. With traceability, it is easier to identify defect sources, increase accountability, and conduct thorough root cause analyses. The theory serves as the basis for understanding how the use of custom-made QA tools can improve the software quality management practices.

Total Quality Management (TQM) Theory

The focus of TQM is on continuous improvement, process efficiency, involvement of all stakeholders, and quality control based on data. The incorporation of analytics and reporting dashboards in custom software QA tools helps in implementing the TQM principles, allowing organizations to track the performance of their software quality and take evidence-based managerial decisions.

Technology Acceptance Model (TAM)

According to the Technology Acceptance Model, the adoption of technological systems relies on a number of factors; one of the most important is perceived usefulness and the perceived ease of use. Resistance from employees, training constraints, and work flow disruptions can affect the successful adoption of customized QA tools in software organizations. TAM

contributes to understanding organizational and behavioral aspects of user acceptance of QA systems.

III. CONCEPTUAL MODEL

These moderating factors affect the relationship between the capabilities of the customized QA, the improvement of process, and the management of defects.

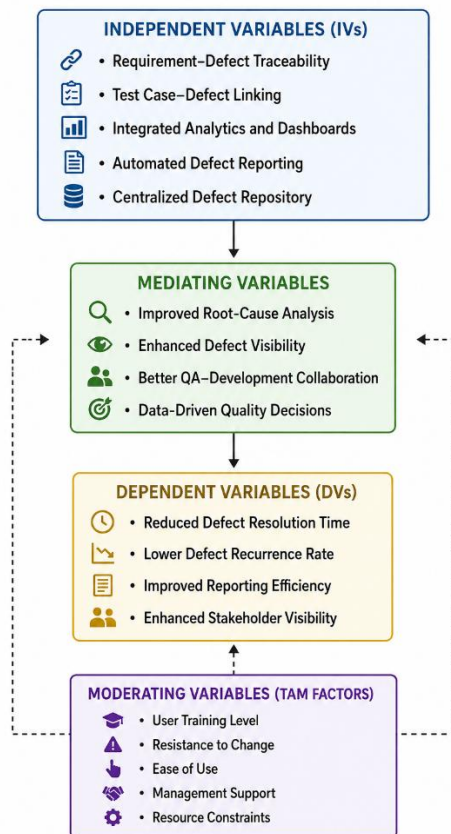


Fig.1: Conceptual Model

IV. RESEARCH DESIGN AND METHODOLOGY

Research Design

This research employs a mixed techniques research design; which is combination of quantitative and qualitative techniques. Before and after software company’s performances with the implementation of Tailored QA structures were evaluated using a semi-experimental design.

Population and Sampling

The population consists of software houses which operate in Islamabad with their staff of 20–200

employees. Fifteen organizations are selected for the research by purposeful sampling.

Data Collection Methods

Data was gathered by using the following approaches:

1. Structured questionnaires
2. Semi-structured interviews
3. Defect management reports
4. System-generated analytics dashboards

The participants involved are QA engineers, developers, project managers and senior management.

Data Analysis

Descriptive statistics and matched sample t-tests were used to analyses numerical statistics. Qualitative responses are analyzed using a thematic approach to identify common organizational and technical themes.

Ethical Considerations

Both informed consent and voluntary participation. Confidentiality and anonymization of organizations maintained. Ensured that the data is stored securely and responsibly reported. A low risk of professional and organizational harm and low risk of work and organizational harm.

V. RESULTS AND ANALYSIS

There was significant improvement in over one performance indicator – the implementation of Tailored QA structures. The disease decision time has been substantially reduced in average, the information reporting accuracy has been significantly enhanced and stakeholders' visibility has been significantly enhanced. The other survey responses demonstrated positive ratings on the automation, ease of use and decision support.

Table 1: Comparison of QA Performance Indicators

Performance Indicator	Before Implementation	After Implementation
Average Defect Resolution Time	8.5 Days	4.2 Days
Defect Recurrence Rate	28%	12%
Reporting Accuracy	65%	91%
Stakeholder Visibility	Moderate	High
Traceability Efficiency	Low	Improved
Customer Satisfaction	58%	88%
Testing Coverage	62%	89%

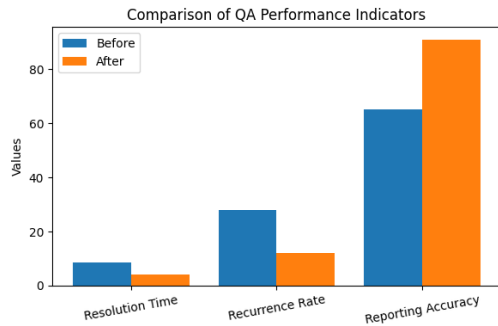


Fig.2: Decline in Defect Recurrence Across Six Months

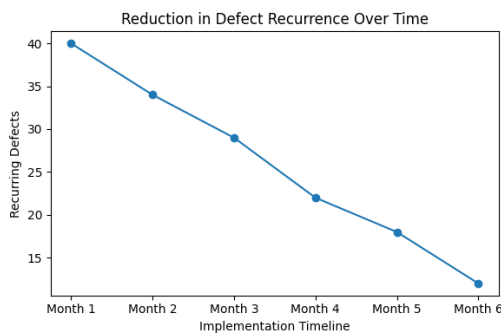


Fig.3: Reduction in Defect Recurrence Over Time

VI. DISCUSSION

According to the results of this research, customized quality assurance (QA) equipment can significantly enhance the efficiency of software program businesses in Islamabad in tuning and reporting defects. These upgrades come primarily from the use of embedded traceability systems and real-time analytics dashboards, which help solve the problems typically seen in older ways of managing defects. One most important change is that the time it takes to fix faults has been reduced from eight, five days to 4.2 days. This enhancement allows for faster handling of issues with development and QA teams as they have some visibility at a given stage in the development methodology. Hyperlinking needs, test cases and defects allows one to quickly identify the source of problems, thereby making the debugging process and determining the target of problems easier.

A significant achievement is that the cost involved with returning all the defective products has been reduced from 28% to twelve%. This indicates that software program nice is more improved with time. Groups not only resolve issues, however they also find out more about the device's vulnerabilities so that

you can prevent comparable issues from occurring in future versions. There was also a significant improvement in accuracy in the reporting of loads, which rose from 65% to 91%. This is because the custom QA engine automatically reports. Manual reporting is prone to error and may be inconsistent, achieving trendy, real-time, and more reliable first-class reporting with automated dashboards. This enables stakeholders to see progress in the challenge and potential defects at a greater level, making better and quicker decisions.

The results are consistent with the Technology Acceptance Model (TAM) from an organizational behavior point of view. Either the system can be used successfully or it can follow its technical benefits, but it is dependent on the users' perception of it. This observation demonstrated that the groups who were provided with the correct scale did better than the others, the others refused due to changes in their working practices and because they had to use the machine. The observe also demonstrates that analysis equipment paints while also using day to day in the QA procedures.

Businesses that utilized dashboards to strategy, monitor and prioritize defects experienced a significant improvement in comparison to the businesses that relied on the machine to document. In general, the combination of traceability, analytics, and customization contributes greatly to the maturity of QA in medium-sized software agencies in Islamabad. Development is a continuous process, however, and needs the help of the organization, continuous schooling, and monitoring engagement.

VII. CONCLUSION

In this research, author was interested in the impact of customized QA systems on the performance of disease tracking and reporting in software application firms in Islamabad. It implies that traditional approaches like spreadsheets and simple management software, which lack accurate traceability and have limited analytical capabilities, are no longer adequate for current software development. The custom QA system brought a significant improvement in several areas including resolved defects in real time, reduction of common

problems, accurate reporting and increased stakeholder visibility.

It demonstrates that an integrated traceable system and analytic dashboards are able to provide considerable improvements in operation efficiency and decision making in software improvement environments. The have a look at additionally reveals that greater age is not enough to be a success full QA alternate. The success of implementation depends on factors like school users, correctness of the smartphone standard and correctness of the group handling transitions. These results validate the technology acceptance model (TAM), which states that humans' perception of the usefulness of the machine and how easy it is to use are the principle motives by which they will adopt it. Overall, Tailored QA frameworks provide a practical and scalable approach that can enhance software mindfulness management for software agencies in Islamabad. They drive a more strategic, transparency and analytics-focused approach to great safety and make disease tracking greener.

VIII. FUTURE WORK

This perspective is important for several reasons, and could be the focus of future studies. Another is the possibility of implementing synthetic intelligence to predict potential failures before they happen, that may help to lower resolution times and make systems more reliable. Another possible enhancement could be to create automated objective analysis systems that would be able to intelligently locate defect areas based on the historical facts and machine behavior, looking for looking for styles in the historical facts. Future work can investigate integrating DevOps practices with continuous QA pipelines to enable real-time testing, deployment and comment loop. Finally, large-scale implementations in more than one city or national software industry could provide broader insights into, how properly custom QA frameworks can scale and paintings in individual settings.

REFERENCES

- [1] Pressman, R. S., & Maxim, B. R. (2020).
- [2] ang, T., Liang, P., Wang, C., Khan, A. A., & Babar, M. A. (2021). The impact of traceability on software maintenance and evolution. arXiv Publications. z

- [3] Sultan, T., Ahmad, R., & Babar, M. A. (2013). "A proposed defect tracking model for classifying inserted defect reports." *Journal of Software Engineering and Applications*, 6(5), 235-242.
- [4] Ramesh, B., & Jarke, M. (2022). "When traceability goes awry: An industrial experience report." *Journal of Systems and Software*, 187, 111243.
- [5] Zhang, Y., Li, X., & Wang, S. (2023). "Machine learning-based software defect detection for software quality improvement." *Applied Sciences*, 13(4), 2156.
- [6] Uralidharan, N., & Ganesh, N. (2022). *integrating software issue tracking and traceability into engineering processes*. Anna University.
- [7] Sommerville, I. (2021). *Software Engineering* (11th ed.). Pearson Education.