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Performance Measurement of Test Management Roles in 'A' Group through the TOPSIS Strategy

Sridhar Reddy Kakulavaram*

Technical Project Manager, Webilent Technology Inc., United States

Abstract

Introduction: A Test Manager at 'A' Group is responsible for overseeing the planning, organizing, and execution of software testing activities to ensure high-quality releases that align with business objectives. A global leader in talent solutions, 'A' Group places a strong emphasis on creativity, teamwork, and project delivery excellence. Driving test strategies, overseeing cross-functional teams, and ensuring best practices in quality assurance are key tasks for the Test Manager. This role requires strong leadership, technical knowledge, and communication skills to manage risks, optimize workflows, and maintain smooth interactions with business and development units in dynamic project environments.

Research significance: Understanding how strategic test leadership helps deliver reliable, high-quality software solutions in a fast-paced enterprise environment is key to the importance of the Test Manager position at 'A' Group. As 'A' Group operates internationally, handling complex systems and a wide range of customer demands, the Test Manager's role is critical in aligning quality assurance practices with business objectives. Exploring this role shows how structured test planning, automated integration, defect management, and teamwork generally impact project success. It also provides insight into how effective test management can reduce development risks, accelerate time to market, and increase customer satisfaction in large-scale IT operations.

Methodology: A mixed-methods approach combining qualitative and quantitative research approaches is used to analyze the test manager position at Allegis Group. Structured interviews with quality experts, project stakeholders, and internal test managers are used to collect data. Project documentation, test results, and performance indicators are also reviewed. Defect density, test coverage, and release cycle efficiency are examples of KPIs that are assessed as part of the quantitative analysis. The study also includes benchmarking against industry norms to assess best practices in test management. This holistic approach ensures a balanced understanding of the role of the test manager in software quality and project success at 'A' Group. Alternative: Software Testing Leader, Test Automation Manager, Quality Assurance Lead, Verification Manager, Quality Engineering Manager

Evaluation preference: Experience in test management, Automation Expertise, Defect Tracking & Management, Team Leadership Results: Hash Table is getting first place of the table and Graph is getting last place of the table

Keywords: Software Testing Leader, Test Automation Manager, Quality Assurance Lead, Experience in test management, Automation Expertise

Introduction

With the enthusiastic help of Jose Mata, Judy McKay, Jamie Mitchell, Paul Jorgensen, and Pat Masters, the material in this book, as well as our Advanced Test Manager instructor-led and online courses, has been thoroughly researched and developed. This book can be used in conjunction with e-learning or classroom-based training covering the same topic, or for independent study in preparation for exams. It is a wonderful supplemental resource for students enrolling in Advanced Level Test Manager Courses accredited by the ISTQB. [1] To improve quality, speed up procedures, scale testing efforts, and ensure more consistency, test automation involves automatically running tests, managing test data, and deploying results. While it is often used in software testing, it also has a lot of potential for use in hardware testing, especially when combined with complex processes and robotics. The main goal is to increase efficiency by speeding up radio device testing and improving its quality, accuracy, and consistency.

Previously manual activities can now be effectively managed through automation using a test manager, which reduces the need for manual intervention and increases the efficiency of the overall test. [2] As an introduction to the topic of software testing, this paper takes the reader through the standard steps of the testing process, including test planning, execution, and results reporting, while defining important terms. The main tool used for testing is Microsoft Test Manager. The practical part of this work was completed as part of a project for the Navy's Pension Fund for my final year project in Avanade Finland. This paper only examines the testing of a public website developed for the Navy's Pension Fund, although the project as a whole involves many interrelated systems. [3] It is the responsibility of project management to determine when a product is ready for end users to access. To make this decision, a number of inherently flawed pieces of information are used, including an assessment of the product's defect status, which is usually provided by the test team. This assessment and reliability assessment are shared by the test manager. If the assessment is incorrect as a result of adequate testing, the test manager should also describe the procedures that will be followed to obtain more reliable data. Ultimately, the test manager has two main responsibilities: providing the right information and doing so in an understandable and efficient manner. [4] Test Manager is a key component of the application that helps maintenance teams test newly added features

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***Corresponding Author:** Kakulavaram, S. R., Technical Project Manager, Webilent Technology Inc, United States., E- mail: Kakulavaram@gmail.com

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or changes to existing features in large-scale systems. Test suite planning, test case design and execution, and rework issue management are some of the many testing tasks that Test Manager excels at automating. Due to its support for inheritance techniques at the test suite level, the testing process is streamlined and improved overall, allowing for smooth transitions between versions within the same test level or across multiple test levels. [5] The "Test Manager" program was specifically developed to meet these specific needs. Its primary goal is to make the testing process more efficient for operators using a matrix probe (an EMG/EP acquisition device) by streamlining and automating it. At the same time, it ensures that the business and the customer obtain the appropriate certification confirming the correct operation of the device. There are several models of matrix probe, which differ mainly in the number of input channels they support, which is explained in the upcoming chapters. [6] An independent samples t-test was used to examine the hypotheses regarding the differences between managers and employees at different scales.

According to the analysis, the valence scores of the two groups were statistically significantly different. However, expectancy, instrumentality, and general motivation did not show any obvious differences. These results indicate that managers and employees have different expectations for the expected results. Small and medium-sized businesses (SMEs) can increase productivity and profitability by recognizing and addressing these differences and by customizing motivation techniques. [7] An important aspect of learning a foreign language is expanding one's vocabulary. It is widely accepted that students remember words better when they are ready for a long time. Furthermore, associating words with images, videos, and their associated pronunciations is considered a successful memorization strategy. Mobile phones and iPads are well suited for vocabulary study due to their portability. Compared to conventional methods such as audio cassettes, they offer greater flexibility and accommodate a wide variety of educational resources. [8] This paper describes how the Test Manager (TM) is currently implemented.

The purpose of the TM is to start and stop tests in a planned and organized manner. Its two primary parts are a client class that acts as the user interface and a repository class that contains multiple tests. The TM relies on a DAQ configuration database for test storage and uses a Process Manager (PMG) to manage test execution. The TM acts as a back-end service in the ATLAS framework, which enables formal test management. However, the TM itself is not responsible for creating the actual tests; rather, hardware or software specialists are responsible. [9] Today, evaluating adaptive software systems is one of the biggest concerns. As a possible solution, we proposed in our previous study to make the test system itself adaptive to the system under test. This flexibility is based on the concept of self-aware test automation, which uses system data to create, organize, or modify the test suite according to the circumstances. The S# modeling language facilitates a model-based testing strategy within our testing framework by allowing the use of a run-time model. [10] The purpose of this article is to examine how this merger could affect the hotel, food service, and passenger transportation industries – as well as the high school education programs that train future managers for these sectors – if it becomes a reality. However, two important factors need to be clarified before examining these predictions. First, it is crucial to show that the Alexis idea is a genuine innovation rather than just another typical airline-hotel joint venture that has been around for years. [11] In recent years, the tone of corporate disclosures has been the subject of increasing research in the United States. These studies primarily examine whether the tone of these disclosures provides additional useful information to financial market participants. Most studies examine the relationship between market responses, managerial incentives, and disclosure tone.

They usually use a similar approach, which involves the use of sophisticated computer software to analyze large amounts of information. [12] Improved health outcomes, increased patient happiness, and improved patient knowledge are all associated with effective communication between doctors and patients. But building a strong relationship in a clinical setting can be challenging. Many hospital doctors say their busy workloads sometimes prevent them from fully answering patient questions or talking to patients and their families about treatment options. Patients often interact with multiple healthcare professionals. [13] In Finland's corporate sector, non-native Finnish women are often underrepresented in leadership roles. To promote true diversity and inclusive growth, organizations need to work together to remove the barriers that prevent these women from advancing in their careers and leadership roles. By implementing specific initiatives, businesses can reduce this gap and improve their long-term competitiveness. The empirical part of this study is based on primary data collected through email interviews. [14] This study examines the relationship between a company's stock market valuation and its corresponding technical efficiency scores, two important performance measures. Technical efficiency measures how well a company uses its inputs to produce outputs, while the stock price reflects the true market value of the company. It is widely believed that the primary objective of corporate governance is to maximize shareholder wealth, which involves increasing the value of the company's common stock. [15] The automation of routine services and the increasing demand for cutting-edge technologies such as artificial intelligence, machine learning, and the Internet of Things (IoT) are driving a major shift in the IT industry. As a result of this shift, businesses now face uncertainty, especially when it comes to IT staffing. In the past, IT organizations used a bench model to handle varying resource needs; new hires were not immediately attached to projects. These workers were assigned to projects as needed and acted as a talent pool or buffer. [16] In today's volatile, unpredictable, complex and uncertain (VUCA) environment, talent remains a critical resource and a key factor in organizational performance. To remain competitive and navigate the rapidly evolving business landscape, organizations must rethink their approach to talent decisions, placing greater emphasis on data-driven initiatives.

The introduction of big data has opened up access to vast amounts of talent data, providing organizational leaders with unprecedented insights into the trends and behavior of their workforce. [17] As younger generations begin to enter the workforce; a significant trend is beginning to emerge. These early career workers are setting high standards in terms of pay packages, financial incentives, and various workplace benefits and perks. As this new generation of workers enters the workforce, which is vastly different from other generations, employers are now facing new challenges in attracting and retaining talent. Referred to as Generation Z, this new generation has the potential to significantly change the changing nature of the workplace. [18] This article examines the common law of intentional invasion of privacy in relation to employment in the private sector. The introduction is followed by a disclaimer section that outlines the scope of the article and points out that the legal analysis is limited to the private sector and does not apply to employment in the public sector. The discussion then turns to the possible protections that companies can provide for the surveillance, searching and monitoring of their employees. An important aspect that is underlined is how important it is for employers to have a good basis for any actions that could be interpreted as privacy violations. [19] The tendency for a market to operate more efficiently is one of its most important paradoxes. In particular, high activity may indicate volatility and potential inefficiency, while a lack of activity may indicate a market that is less efficient or incomplete. Price fluctuations and trading volume are two key indicators of market activity. A prolonged lack of activity or price movement may indicate that external forces are controlling the market. [20]

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Material and Method

Alternative:

Software Test Lead: A software test lead is responsible for overseeing all testing activities throughout the software development lifecycle. They coordinate with developers, QA teams, and stakeholders to ensure that software products meet defined quality standards. Alternatives to this role include a test architect who focuses on defining test strategies and frameworks, or a scrum master in agile environments, where responsibilities may overlap with managing test timelines and quality milestones.

Test Automation Manager: A test automation manager leads the design and implementation of automated test frameworks, tools, and processes. This role ensures faster feedback cycles and improved test coverage. A potential alternative is a DevOps engineer who focuses on CI/CD integration and automated test pipelines. Another related role is an automation architect, who designs reusable automation frameworks at an enterprise level.

Quality Assurance Leader: The Quality Assurance Leader manages QA planning, execution, and documentation to ensure product quality and customer satisfaction. This role ensures that testing is aligned with business requirements. Alternatives include a Quality Control Analyst who focuses more on product inspection and validation, or a QA Analyst who is more experienced in test execution and reporting under the guidance of the QA Leader.

Verification Manager: A verification manager oversees the verification phase of the software development process, ensuring that the system meets specified requirements. They typically manage test environments, tracking teams, and formal verification procedures. An alternative might be a compliance manager, especially in regulated industries where verification is tied to following industry standards. Another overlapping role is the verification manager, especially in industries such as healthcare and aerospace.

Quality Engineering Manager: A quality engineering manager drives continuous quality improvements by embedding quality into development and operational processes. They promote practices such as left-shift testing, root cause analysis, and defect prevention. Alternatives include a reliability engineer who focuses on system performance and uptime, or a site reliability engineer (SRE) who ensures that production systems are robust and scalable with quality metrics in mind.

Evaluation preference:

Experience in Test Management: Experience in test management is an important evaluation criterion when assessing a candidate's ability to lead testing efforts across various project lifecycles. This includes planning, organizing, and controlling the testing process to ensure that deliverables meet required quality standards. Strong test management experience demonstrates familiarity with methodologies such as agile, waterfall, or hybrid models, and the ability to effectively manage risk, resource allocation, and test reporting.

Automation Expertise: Automation expertise reflects a candidate's ability to implement and maintain test automation tools and frameworks to improve performance and consistency. This includes knowledge of scripting languages, integration with CI/CD pipelines, and use of tools such as Selenium, JUnit, or Test NG. This preference is important in environments where speed, repeatability, and scalability of testing are critical. A solid background in automation indicates the ability to reduce manual efforts and improve test coverage.

Defect Tracking & Management: Effective defect tracking and management are essential to ensuring software reliability and customer satisfaction. This assessment option highlights a candidate's experience in identifying, logging, classifying, and remediating defects using tools such as JIRA, Bugzilla, or Azure DevOps. This includes the ability to perform root cause analysis and coordinate with developers to find timely solutions. A structured defect management process reduces risk and improves overall product quality.

Team Leadership: Team leadership is a key quality for driving performance, fostering collaboration, and maintaining high morale within a test team. It involves guiding junior testers, resolving conflicts, setting goals, and aligning team efforts with organizational objectives. Leadership skills also refer to a person's ability to handle pressure, manage cross-functional communications, and motivate team members towards continuous improvement and accountability in quality assurance tasks.

TOPSIS

A key aspect in ensuring the success of an organization is the selection of qualified human resources. Considering the complexity and importance of this process, analytical methods are preferred over intuitive ones. This research seeks to improve the decision-making process by using the fuzzy technique for order prioritization by similarity (TOPSIS) to a best solution. The veto limit, a key element frequently used in significant outranking strategies, is incorporated into the method in an innovative way to rank alternatives. [1] In capital investment, group decision-making is a collaborative process where various stakeholders exchange ideas, knowledge, and perspectives to evaluate investment opportunities and make informed decisions. Depending on the objectives of the organization, the industry in which it operates, and the state of the market, this process can have different methodological and practical goals. Improving the quality of decision-making, increasing efficiency, reducing risks, adapting to changing conditions, and promoting the development of knowledge and skills within the organization are the driving forces behind research on group decision-making in capital investment. [2] Effective fragmentation, low fly ash, and cost efficiency are some of the essential requirements for blasting operations. All of these elements must be considered together to determine which of the previously implemented blasting designs is the best choice.

The technique of order prioritization by similarity (TOPSIS), a popular technique in multi-criteria decision-making frameworks, is a contemporary way to do this. [3] One of the most popular and well-appreciated approaches in multi-attribute decision making (MADM) is the Technique for Ranking Prioritization by Similarity to Ideal Solution (TOPSIS). This study evaluates four popular normalization strategies by looking at their sensitivity to weight changes and stability in rankings when applied within the TOPSIS framework to general MADM problems under various selection situations. Two key performance indicators – rank stability and weight sensitivity – are used to justify the comparison. A novel simulation technique is used to generate a large number of MADM problems with different features and preferences. [4] Decision-making is an essential activity in selecting the best option from a variety of possible choices. The decision-making process is often a complex and complex process that involves multiple criteria. Finding a solution that satisfies all of these requirements simultaneously is challenging because they often conflict with each other. Decision-makers use multi-criteria decision-making (MCDM) techniques to address these problems.

There are a number of methods for successfully solving MCDM problems, all of which are designed to manage the complexity of weighing and ranking multiple, often conflicting, criteria. [5] A decision-making problem is one in which the best option is selected from a variety of possible options. In all of these situations, these options are evaluated

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and differentiated using a variety of criteria. As a result, many situations involving decision-making are presented as multi-criteria decision-making (MCDM) problems. Many view MCDM as a complex and dynamic process that typically involves both management and engineering perspectives. To arrive at the best solution, input and analysis are required at multiple levels. [6] For a manufacturing company, choosing a plant location is very important because it affects cost reduction and resource utilization. When choosing a specific location, several important factors (criteria) need to be considered, including the cost of investment, availability of skilled labor, access to raw materials, and climate. Generally, these factors are divided into two groups: subjective and objective. Factors that are assessed qualitatively rather than quantitatively are called subjective factors. [7] The technique of ranking by similarity to the best solution, or TOPSIS, is a popular multi-criteria decision-making approach for evaluating a limited number of alternatives and selecting the best one.

The original TOPSIS method made the assumption that the criteria by which alternatives are judged are independent of each other. However, this assumption is often not fulfilled in real-world applications. Despite this shortcoming, most TOPSIS research and scholarly publications do not specifically address the problem of interdependent criteria in practical decision-making situations. [8] This study examines how technology acceptance variables, online service quality, and specific holdup cost components can provide a competitive advantage to e-commerce websites. It begins with a review of the research body on the competitive advantages of shopping websites to develop a conceptual framework.

The importance (weights) of each criterion is then determined by investigation using the fuzzy TOPSIS approach as an analytical tool. Fuzzy theory is a useful strategy in this decision-making system because it is well suited to handle complexity and uncertainty. [9] A key component to achieving organizational success is the selection of competent human resources. Due to the complexity and importance of this endeavor, intuition alone is not enough, which underscores the need for analytical methods. To effectively assist the decision-making process, the fuzzy technique for order prioritization by similarity (TOPSIS) is used in this research. To improve the evaluation of alternatives, this method incorporates a new ranking concept based on the veto limit, which is a key component frequently used in significant outranking techniques. [10]

Result and Discussion

Table 1: This table provides a comparative assessment of five software quality roles across four key competencies

	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	8.28	6.36	7.36	9.28
Test Automation Manager	6.64	0.67	6.36	6.36
Quality Assurance Lead	7.36	4.36	8.28	6.64
Verification Manager	9.28	7.64	4.36	0.67
Quality Engineering Manager	6.36	8.28	7.64	7.36

This table provides a comparative assessment of five software quality roles across four key competencies: experience in test management, automation expertise, defect tracking & management, and team leadership. The software test lead demonstrates strong leadership (9.28) and well-developed expertise. The test automation manager, while skilled in test management and defect handling, shows a significant gap in automation (0.67). The quality assurance lead excels in defect management (8.28), while the validation manager has more experience in test management and automation but lacks leadership skills (0.67). The quality engineering manager demonstrates a balanced skill set with the highest level of automation expertise (8.28)

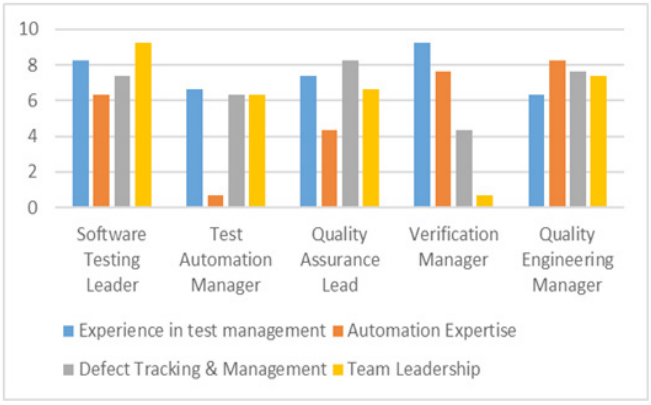

Figure 1: Test Manager – 'A' Group

The bar chart compares five roles in software quality management across four assessment parameters: experience in test management, automation expertise, defect tracking & management, and team leadership. The software test lead and validation manager score highly in test management and team leadership. The quality engineering manager demonstrates strong automation and defect management skills. The quality assurance lead excels in defect tracking, while the test automation manager shows a significant gap in automation expertise. Overall, the chart highlights how different roles have varying strengths, indicating that role fit depends on project-specific requirements in leadership, automation, or quality tracking skills.

Table 2: This data provides a ranked and scaled assessment of five key roles in software quality management

Sort & Sum

	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	69	40	54	86
Test Automation Manager	44	0	40	40
Quality Assurance Lead	54	19	69	44
Verification Manager	86	58	19	0
Quality Engineering Manager	40	69	58	54

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This data provides a ranked and scaled assessment of five key roles in software quality management, based on four criteria: experience in test management, automation expertise, defect tracking & management, and team leadership. The software test leader ranks highest overall, with strong scores in leadership (86) and test management (69). The quality engineering manager performs well, especially in automation (69) and defect tracking (58). In contrast, the test automation manager shows a major deficiency in automation expertise (0), despite receiving moderate scores elsewhere. The verification manager excels in test management (86) and automation (58), but scores very low in leadership (0).

Table 3: The normalized data provides a balanced comparison of the five software quality roles across four performance metrics

Normalized Data				
	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	0.4834	0.4653	0.4745	0.4904
Test Automation Manager	0.3877	0.0490	0.4101	0.4237
Quality Assurance Lead	0.4297	0.3190	0.5339	0.5517
Verification Manager	0.5418	0.5589	0.2811	0.2905
Quality Engineering Manager	0.3713	0.6058	0.4926	0.5090

The normalized data provides a balanced comparison of the five software quality roles across four performance metrics. The Software Test Lead maintains strong, consistent scores across all areas, especially in Team Leadership (0.4904). The Quality Assurance Lead stands out in Defect Tracking (0.5339) and Leadership (0.5517), indicating solid reliability. The Verification Manager leads in Test Management (0.5418) and Automation (0.5589), but lags behind in Leadership (0.2905). The Quality Engineering Manager demonstrates excellent automation expertise (0.6058) and good team leadership (0.5090). The Test Automation Manager scores low in Automation (0.0490), indicating a significant skill gap in their core responsibility.

Table 4: The table provides an equal weight distribution across four key assessment criteria for five software quality roles

Weight				
	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	0.25	0.25	0.25	0.25
Test Automation Manager	0.25	0.25	0.25	0.25
Quality Assurance Lead	0.25	0.25	0.25	0.25
Verification Manager	0.25	0.25	0.25	0.25
Quality Engineering Manager	0.25	0.25	0.25	0.25

The table provides an equal weight distribution across four key assessment criteria for five software quality roles – experience in test management, automation expertise, defect tracking & management, and team leadership. Each criterion is assigned a uniform weight of 0.25, ensuring an unbiased and balanced assessment. This approach allows for fair comparisons by considering all performance areas equally important in determining overall performance. By using equal weights, organizations can evaluate each role holistically without favoring any one skill area, thus promoting objective decision-making when assessing team skills or selecting candidates for quality management responsibilities in software development environments.

Table 5: The positive matrix shown assigns equal normalized values to all roles and evaluation criteria

Positive Matrix				
	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	0.1354	0.1514	0.1335	0.1379
Test Automation Manager	0.1354	0.1514	0.1335	0.1379
Quality Assurance Lead	0.1354	0.1514	0.1335	0.1379
Verification Manager	0.1354	0.1514	0.1335	0.1379
Quality Engineering Manager	0.1354	0.1514	0.1335	0.1379

The positive matrix shown assigns equal normalized values to all roles and evaluation criteria, such as experience in test management, automation expertise, defect tracking & management, and team leadership. Each role, including software test lead, test automation manager, quality assurance lead, verification manager, and quality engineering manager, has the same values for each parameter. This uniform distribution, with values such as 0.1354 for test management and 0.1514 for automation expertise, represents a baseline or standardized positive ideal solution. Such a matrix is often used in decision-making models such as TOPSIS or VIKOR to rank actual performance values against an ideal scenario for ranking or evaluation.

Table 6: The negative matrix represents the least favorable or least acceptable values across four key evaluation criteria

Negative matrix				
	Experience in test management	Automation Expertise	Defect Tracking & Management	Team Leadership
Software Testing Leader	0.0928	0.1514	0.1335	0.1379
Test Automation Manager	0.0928	0.1514	0.1335	0.1379

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Quality Assurance Lead	0.0928	0.1514	0.1335	0.1379
Verification Manager	0.0928	0.1514	0.1335	0.1379
Quality Engineering Manager	0.0928	0.1514	0.1335	0.1379

The negative matrix represents the least favorable or least acceptable values across four key evaluation criteria, such as experience in test management, automation expertise, defect tracking & management, and team leadership, for all five software quality roles. In this matrix, each role—software test lead, test automation manager, quality assurance lead, validation manager, and quality engineering manager—shares similar values, such as 0.0928 for test management and 0.1514 for automation expertise. This uniformity represents a baseline reference point for poor or less desirable performance. It is commonly used in multi-criteria decision-making methods such as TOPSIS, which help measure the distance from negative ideal solutions.

Table 7 : The table shows the Si positive and Si negative values used in techniques such as the TOPSIS method

	Si Positive	Si Negative
Software Testing Leader	0.0436	0.2648
Test Automation Manager	0.1511	0.2825
Quality Assurance Lead	0.0770	0.2854
Verification Manager	0.0916	0.2242
Quality Engineering Manager	0.0451	0.2654

The table shows the Si positive and Si negative values used in techniques such as the TOPSIS method to evaluate the relative performance of software quality roles. Low Si positive values and high Si negative values indicate a closer proximity to the ideal solution. The quality engineering manager and the software testing leader show the most favorable profiles, with low Si positive (0.0451 and 0.0436, respectively) and high Si negative values (0.2654 and 0.2648). In contrast, the test automation manager shows the least desirable outcome, with the highest Si positive (0.1511), reflecting a greater distance from the ideal performance criterion.

Table 8: Ci values indicate that each software quality role is relatively close to the ideal solution

Ci	
Software Testing Leader	0.8586
Test Automation Manager	0.6515
Quality Assurance Lead	0.7876
Verification Manager	0.7099
Quality Engineering Manager	0.8547

Based on TOPSIS analysis, Ci values indicate that each software quality role is relatively close to the ideal solution. A higher Ci indicates better overall performance. The software testing leader ranks highest with a Ci of 0.8586, reflecting its strong alignment with the desired criteria. The quality engineering manager follows closely at 0.8547, also demonstrating balanced and effective skills. The quality assurance leader shows solid performance with a Ci of 0.7876. Meanwhile, the verification manager and test automation manager score lower at 0.7099 and 0.6515, indicating room for improvement in alignment with optimal performance standards.

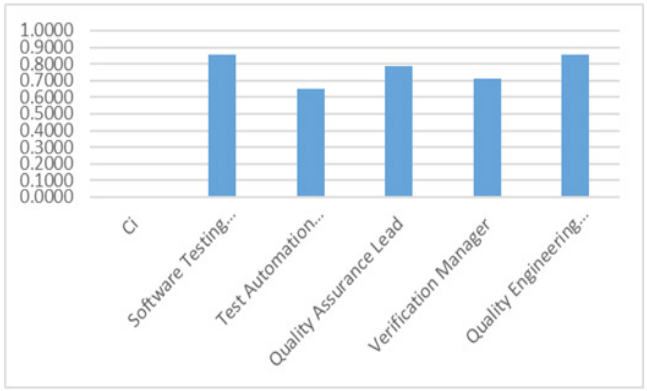

Figure 2: Ci value

The bar chart illustrates the comparative performance index (Ci) for five software testing and quality management roles. The quality engineering manager and the software testing leader both rank very high, with a Ci of around 0.87, indicating strong overall performance across the assessed parameters. The quality assurance leader also performs well, with a Ci of around 0.79. Meanwhile, the verification manager and the test automation manager show moderate performance, with indices of 0.71 and 0.66, respectively. These results highlight that while all roles contribute significantly, leadership and engineering roles exhibit high collective performance, making them well-suited for strategic quality initiatives.

Table 9: The ranking table provides a clear performance hierarchy of the five key roles in software quality management

Rank	
Software Testing Leader	1
Test Automation Manager	5
Quality Assurance Lead	3
Verification Manager	4
Quality Engineering Manager	2

The ranking table provides a clear performance hierarchy of the five key roles in software quality management based on multi-criteria decision analysis. The software test leader achieves rank 1, demonstrating the most balanced and effective skills across all assessed criteria. The quality engineering manager receives rank 2, indicating strong technical and leadership skills. The quality assurance leader stands at rank 3, reflecting solid performance in defect tracking and overall reliability. The verification manager is placed at rank 4, showing good expertise in specific areas but lacking leadership. The test automation manager is placed at rank 5, indicating significant room for skill development.

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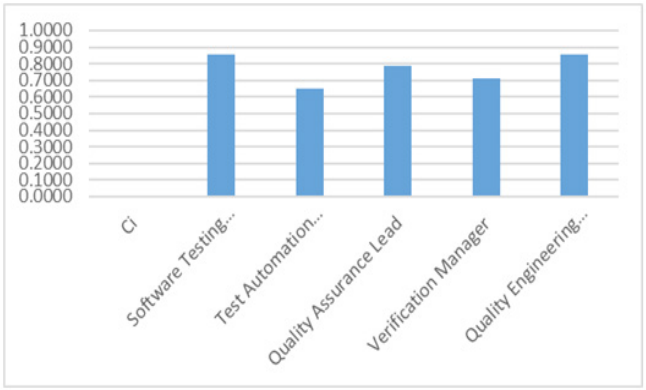

Figure 3: Rank

The bar chart provides a ranking of five roles in software quality management based on overall performance. The software test leader takes the top spot (rank 1), indicating a strong profile across the parameters assessed. The quality engineering manager follows closely with rank 2. The quality assurance leader and validation manager have moderate rankings at 3 and 4, respectively, reflecting balanced skills. In contrast, the test automation manager ranks lowest (rank 5), indicating significant areas for improvement. This ranking helps decision makers identify the most effective leadership roles for quality efforts and team performance within software testing environments.

Conclusion

At 'A' Group, the Test Manager position is critical to safeguarding software quality and achieving delivery excellence from a strategic and operational perspective. 'A' Group, a leading global provider of talent solutions, maintains high standards in technologically advanced environments, and the Test Manager plays a key role in meeting these demands. The role requires good test management skills, including planning, execution, and defect handling, as well as a solid understanding of automation tools, good team leadership, and the ability to communicate and work effectively with a variety of stakeholders. According to a systematic review of several positions in the software quality management industry, the test manager is a well-rounded position that combines strong leadership, technical knowledge, and operational oversight, including those of the software test lead, quality assurance lead, and verification manager. From the use of analytical techniques such as TOPSIS, it is clear that leadership skills, practical test execution experience, automation expertise, and proficient defect tracking skills are key differentiators for success in these roles. The role of a Test Manager at 'A' Group goes beyond standard quality assurance duties, establishing the person as a change agent. This includes following agile methodologies, supporting the integration of DevOps, and encouraging creativity in testing approaches. Leading test teams, ensuring industry standards are followed, overseeing project schedules, and actively supporting business goals by monitoring performance and mitigating risks are all part of the job description.

Reference

1. Black, Rex. Advanced Software Testing-Vol. 2: Guide to the Istqb Advanced Certification as an Advanced Test Manager. Rocky Nook, Inc., 2014.
2. Mantere, Teemu. "Test Manager Tool For Automated Testing." (2022).
3. Petäjäniemi, Teemu. "Software Testing With Microsoft Test Manager." (2016).
4. Stukenborg, Steve, and Pure Atria. "The Test Manager at the Project Status Meeting." (1997).
5. Interesse, Michelangelo. "Test manager: the test automation component for the maintenance of large-scale systems." In International Conference on Software Maintenance, 2002. Proceedings., pp. 0284-0284. IEEE Computer Society, 2002.
6. De Lorenzi, Marco. "Test manager: collaudo automatico di dispositivi di acquisizione per neurofisiologia."
7. Puplampu, Bill Buenar, and Samuel Adomako. "What he wants is not what she wants: Using VIE theory to test manager and worker motivation in Ghanaian SMEs." IFE PsychologIA: An International Journal 22, no. 1 (2014): 1-10.
8. Ishikawa, Masatoshi, Kazunori Hasegawa, Satoko Amemiya, Keiichi Kaneko, Haruko Miyakoda, and Wataru Tsukahara. "Design and Implementation of an Online Vocabulary Test Manager on Podbase." In Proc. IADIS International Conference on Cognition and Exploratory Learning in Digital Age, pp. 131-138. 2007.
9. Hart, R. Implementation of the Test Manager for the ATLAS DAQ Prototype-1. Vol. 2. Technical Note 111, 1999.
10. Eberhardinger, Benedikt, Hella Ponsar, Gerald Siegert, and Wolfgang Reif. "Case study: adaptive test automation for testing an adaptive hadoop resource manager." In 2018 IEEE International Conference on Software Quality, Reliability and Security Companion (QRS-C), pp. 513-518. IEEE, 2018.
11. Palmer, John D. "The Allegis Attempt to Integrate the Travel Industry: What If It Had Succeeded?." Hospitality Education and Research Journal 12, no. 2 (1988): 11-17.
12. Michelon, Giovanna, Saverio Bozzolan, and Charles H. Ho. "Impression management and organizational audiences: The Fiat Group case." (2015).
13. Mittapally R (2023). Intelligent Framework Selection: Leveraging MCDM in Web Technology Decisions. J Comp Sci Appl Inform Technol. 8(2): 1-8.
14. Golden, Blair P., Sean Tackett, Kimiyoshi Kobayashi, Terry S. Nelson, Alison M. Agrawal, Jerry Zhang, Nicole A. Jackson et al. "Wall-mounted folding chairs to promote resident physician sitting at the hospital bedside." Journal of hospital medicine 19, no. 5 (2024): 356-367.
15. Michael Mahader, Luam. "Exploring the Lack of Promotion Opportunities for Non-Native Women in Finland." (2021).
16. Alam, Ila M. Semenick, and Robin C. Sickles. "The relationship between stock market returns and technical efficiency innovations: evidence from the US airline industry." Journal of Productivity Analysis 9, no. 1 (1998): 35-51.
17. Rajthilak, R., and Swati Alok. "Productive Behavior among Temporary Agency Workers: Conceptual Framework."
18. Qin, Chuan, Le Zhang, Yihang Cheng, Rui Zha, Dazhong Shen, Qi Zhang, Xi Chen et al. "A comprehensive survey of artificial intelligence techniques for talent analytics." Proceedings of the IEEE (2025).
19. Pekica, Goran. "Expectations of Generation Z When Entering the Job Market in Croatia." (2020).
20. Cavico, Frank J., and Bahaudin G. Mujtaba. "The intentional tort of invasion of privacy in the private employment sector: Legal analysis and recommendations for managers." International Journal of Business and Law Research 4, no. 3 (2016): 37-57.
21. Zuckerman, Ezra W. "Structural incoherence and stock market activity." American Sociological Review 69, no. 3 (2004): 405-432.
22. Kelemenis, Alecos, and Dimitrios Askounis. "A new TOPSIS-based multi-criteria approach to personnel selection." Expert systems with applications 37, no. 7 (2010): 4999-5008.

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23. Aliyeva, Kamala Rafig. "Research on group decision making in capital investment based on fuzzy technique for order preference by similarity to ideal solution (TOPSIS)." Journal of fuzzy extension and applications 5, no. 3 (2024): 313-329.

24. Monjezi, Masoud, Hadi Dehghani, T. Narain Singh, Ahmed Reza Sayadi, and Ahamad Gholinejad. "Application of TOPSIS method for selecting the most appropriate blast design." Arabian journal of geosciences 5, no. 1 (2012): 95-101.

25. Chakraborty, Subrata, and Chung-Hsing Yeh. "A simulation comparison of normalization procedures for TOPSIS." In 2009 International conference on computers & industrial engineering, pp. 1815-1820. IEEE, 2009.

26. Zulqarnain, Rana Muhammad, M. Saeed, N. Ahmad, F. Dayan, and B. Ahmad. "Application of TOPSIS method for decision making." IJSRMSS International Journal of Scientific Research in Mathematical and Statistical Sciences (2020).

27. Jahanshahloo, Gholam Reza, F. Hosseinzadeh Lotfi, and Mohammad Izadikhah. "An algorithmic method to extend TOPSIS for decision-making problems with interval data." Applied mathematics and computation 175, no. 2 (2006): 1375-1384.

28. Chu, T-C. "Selecting plant location via a fuzzy TOPSIS approach." The International Journal of Advanced Manufacturing Technology 20, no. 11 (2002): 859-864.

29. Vega, Alberto, Juan Aguarón, Jorge García-Alcaraz, and José María Moreno-Jiménez. "Notes on dependent attributes in TOPSIS." Procedia Computer Science 31 (2014): 308-317.

30. Sun, Chia-Chi, and Grace TR Lin. "Using fuzzy TOPSIS method for evaluating the competitive advantages of shopping websites." Expert systems with applications 36, no. 9 (2009): 11764-11771.

31. Kelemenis, Alecos, and Dimitrios Askounis. "A new TOPSIS-based multi-criteria approach to personnel selection." Expert systems with applications 37, no. 7 (2010): 4999-5008.

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