



Proposed Business Strategy for PT AceInno Technologies to Increase Revenue by Implementing Software Test Automation Services

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ABSTRACT: This paper explores PT AceInno Technologies, the ways it has strengthened the company's value that would allow differentiation and new business strategies to boost the company's revenues and the trends in IT software testing industry. In the SWOT analysis, business strength is characterized by high customer satisfaction and stability of the market; in the TOWS analysis, possibilities for development are long-term partnership with clients, and increasing effectiveness of time and test automation; in PESTEL analysis legal actions are discussed as a threat to the business; some risks which may be minimized are delays with time and poor test coverage. Some of them include; Employing the use of AI and other advanced test automation tools, diversification of services, constant feedback with clients to enhance the existing relations. Adjacent expansion, efficient operations, and constant training of employees can also be seen as the proposed business strategy to sustain competitive advantage. Thus, the integration of AI-augmented capabilities and innovative functions in PT AceInno Technologies allow it to create unique opportunities to improve the quality of services, generate new growth points, and become a market leader. Further research should investigate the impact and success of employing AI-supported QA in general and the consequences of enhancing the quality assurance process on the customers' satisfaction and loyalty in the long term.

KEYWORDS: AI Integration, Test Automation, Value Proposition, Business Strategy, IT Software Testing

INTRODUCTION

Businesses are becoming more and more digitalized, which emphasizes how important it is to have efficient software automation testing to make sure apps function as intended and don't have any serious problems before being released. Recent reports like The State of Software Quality Report 2024 and the World Quality Report 2023–2024 have emphasized the necessity of various aspects of software quality, such as automation, quality engineering, agile quality management, and advanced testing techniques like cloud-based testing and generative AI (Sogeti, 2023). Keeping up with new developments in test automation is essential for firms looking to maintain a competitive edge as they continue to embrace digital transformation.

With a predicted 14.5% compound annual growth rate (CAGR), the global market for automated testing is likely to rise significantly, from USD 28.1 billion in 2023 to USD 55.2 billion by 2028 (MarketsandMarkets, 2022). This strong expansion emphasizes how crucial it is to keep up with the most recent automated testing techniques in order to stay competitive. To improve quality and productivity, especially in the context of Agile and DevOps techniques, organizations need to properly integrate automated testing into their development processes.

Driven by significant improvements in internet availability, a burgeoning middle class, and a vibrant start-up ecosystem, Indonesia has emerged as a leader in the digital economy within the Southeast Asian region (Turban et al., 2021). The digital economy of Indonesia is anticipated to grow to over \$214 billion by 2027, driven by industries including digital media, finance, mobility, and e-commerce, according to the Market Analysis Report Empowering Indonesia by Indosat & Twimbit (Indosat & Twimbit, 2023). Robust software testing is becoming increasingly important as these sectors rapidly shift digitally to guarantee the dependability and security of digital services.

The Otoritas Jasa Keuangan (OJK) regulates the financial services industry in Indonesia, which includes banks and fintech companies. It also sets strict cybersecurity standards. To guard against data breaches and guarantee the integrity of financial transactions, regular software and penetration testing is crucial. The significance of upholding robust IT security protocols, such as frequent penetration testing to find weaknesses and improve cybersecurity resilience, is emphasized in OJK Circular Letter No. 29/SEOJK.03/2022 (Otoritas Jasa Keuangan, 2022).



Events that have occurred recently, including the incident that involved CrowdStrike's Falcon sensor on July 19, 2024, further highlight the significance of proper test automation. Widespread problems impacting over 8.5 million Windows machines—including those on popular cloud platforms like Microsoft Azure and Google Cloud—were caused by a flawed configuration update. This catastrophe, which may be the worst IT failure in history, caused major disruptions to a number of industries, including government institutions, banks, airlines, and hospitals (Williams, 2024). These incidents demonstrate how important thorough automated testing is to preventing and lessening the effects of software errors.

The following ground research questions have been developed to address these major issues on PT AceInno Technologies IT services sector especially on Software Test Automation. The first is the creation of a competitive advantage plan that involves coming up with a well-articulated value proposition that would help improve the company's positioning in the market. Thus, constant identification of various approaches and their implementation would be a major aim of the company that aims to become a major key player in the automation testing industry. Furthermore, this research question seeks to identify potential business segments that PT AceInno Technologies can venture into to increase revenue generation in the IT services sector. Last but not least, the research will analyze the trends in the IT software testing industry to develop new sources and show how PT AceInno Technologies differs from similar companies. These objectives are geared towards providing a blueprint that will assist PT AceInno Technologies in optimally exploiting the shift in digital environment to gain a competitive edge.

On this basis, the subject of investigation for this research is strictly defined by the focus on how the concept of software test automation can be implemented as a strategic resource to improve PT AceInno Technologies' competitive advantage and revenue streams. Astute concentrate leaves out other possible technological and business opportunities that might also determine the firm's financial performance. The research is focused only on the aspect of automation testing in the general concept of IT services and does not consider other mechanisms or innovations that can influence business performances. The several limitations of this research include the following; To get some of the data in this research, the study relies on public information as well as internal information some of which may be classified. This may limit the extent of the financial analysis section. Furthermore, the ever-changing nature of technology and the market means that it becomes difficult to ascertain the long-term outlook, Instead, industry changes that occur with time mean that it becomes necessary to adapt the strategies in the market as the latter changes. Another useful factor is the increased cooperation of stakeholders since the effectiveness of the proposed strategies in this case depends on the contribution of the employees, managers, and partners. This conveys that either resistance to change or different priorities might influence the practicable implementation of the formulated strategies. Last but not the least; it should be noted that the research findings are specific with reference to PT AceInno Technologies while the generalization of these findings in similar context of other organizations may be preceded by slight modifications. The following restrictions must be taken into account while evaluating the outcomes and the conclusions of the investigation:

LITERATURE STUDY AND HYPOTHESIS

2.1 Theoretical Foundation

2.1.1 Software Testing

Web and mobile apps are becoming indispensable tools in many different businesses, greatly improving user experiences in areas including banking, financial services, telecom, retail, healthcare, education, and entertainment. These apps greatly improve convenience by enabling online shopping, virtual education, telemedicine, and streaming services. But the efficiency of software testing, which finds and fixes issues before release, is what keeps these apps running smoothly. Applications with inadequate testing can result in poor quality, disgruntled customers, and significant financial losses for the company. Integrating DevOps, CI/CD, and test automation is essential given the requirement to produce rapidly in the face of fierce competition (Pando & Dávila, 2022).

The formal method of determining if a system satisfies the basic criteria established at the start of the development cycle is known as software testing. In order to close the gap between expected and actual results, it consists of validation and verification to make sure the system complies with user-defined requirements. Testing software is essential for finding bugs, features, or problems in produced software and giving stakeholders important information. Its significance for software quality assurance arises from the necessity of guaranteeing the dependability and appropriate operation of digital applications, particularly those that are vital to life, such as flight control systems (Jamil et al., 2016).



Software testing includes a range of approaches designed to guarantee the operation, quality, and dependability of software systems. These techniques may be divided into two primary groups: feature testing and quality testing, or specification and structural testing (Mears, 2020). By supplying input and examining the output, functional testing verifies that software operates as required by the specifications. It focuses on examining user instructions, data handling, functional regions, and confirming that the software complies with business needs. Contrarily, non-functional testing evaluates factors like effectiveness, appropriateness, reliability, security, and interoperability. Scalability and capacity testing gauge the software's ability to withstand increasing load, whereas performance testing assesses system effectiveness under various workloads. Usability testing guarantees usability, compatibility testing verifies performance across several platforms, and security testing finds vulnerabilities.

2.1.2 SDLC

The Software Development Life Cycle (SDLC) outlines the phases involved in developing software from an idea to a finished product. It aims to produce high-quality software efficiently by dividing the process into distinct phases: planning, designing, building, testing, deployment, and maintenance.

Development projects are managed via SDLC frameworks like Waterfall, Agile, and DevOps, each of which incorporates unique tactics based on the demands of the project (Amazon, 2023). Developed in the 1970s, waterfall projects are best suited for projects with strict specifications and stable environments because of its linear, phase-driven execution from requirement collecting to deployment. Agile was first presented in 2001 and is based on a collaborative, iterative methodology with short sprints that emphasizes customer involvement and periodic delivery of functional software. Agile approaches that prioritize cooperation, adaptation, and feedback include Scrum and Kanban. In order to promote continuous improvement, DevOps, which first gained popularity in 2009, integrates development, operations, and testing into Agile procedures. Through improved quality assurance, DevOps accelerates iteration, development, and implementation by encouraging teamwork and communication.

2.1.3 DevOps CI/CD

In order to guarantee product dependability, DevOps CI/CD (Continuous Integration and Continuous Delivery/Deployment) focuses on process efficiency and faster delivery timeframes for new products and versions (Amaro et al., 2022). In order to close gaps between development and operations teams and handle problems like protracted release cycles and involved deployment procedures found in conventional models like Waterfall, DevOps integrates "Development" and "Operations."

In order to avoid integration conflicts and guarantee a solid build that is prepared for deployment, continuous integration, or CI, merges code changes more often while delivering feedback through builds and tests. Continuous Delivery (CD), which necessitates further permission for production, encourages code modifications through staging or testing environments. Reducing human interference and expediting the release process, Continuous Deployment automates the promotion of tested code modifications to production (IBM, 2024).

DevOps relies heavily on continuous testing, which permeates every stage of the development process to preserve software quality and avert problems at the last minute. Testing is a part of the development cycle; automation speeds up testing and gives developers feedback quickly. Test coverage and software quality assurance are enhanced by automated testing, including unit, integration, performance, and security tests. Teams may more effectively resolve problems by using continuous feedback loops, which improve software performance and dependability.

2.1.4 Quality Engineering and Quality Assurance

Enhancing application and system attributes like reliability, security, usability, efficacy, and efficiency, quality engineering and quality assurance (QA) are essential components of the software development life cycle (SDLC). Quality Engineering and Assurance (QEA) merges digital and current assets into an end-to-end ecosystem through intelligent and automated procedures. Adopting strong quality assurance (QA) procedures becomes more crucial as businesses become more complex and susceptible (Zonnenshain & Kenett, 2020). An organization's competitiveness is increased when systematic testing and validation are combined with improvement initiatives to guarantee consistently high-quality software development (Cognizant, 2024).

2.1.5 Automation Testing

Automation testing has become essential to contemporary software development, increasing the efficacy of test execution and optimizing the testing procedure across the software development life cycle (SDLC). It saves time and effort by executing test cases using tools and scripts automatically. DevOps and CI/CD methodologies are supported by automated testing, which moves



testing to earlier phases of development and allows for Quality at Speed. Automating test data preparation, environment acquisition, test case construction, and test result assessment are all included (Battina, 2019).

2.1.6 Manual Testing

Manual testing is crucial in software development because it allows testers to identify and address issues that automated tests might miss. By manually writing and executing test scripts, testers can simulate real user interactions and uncover unexpected bugs, usability issues, and edge cases. This hands-on approach is particularly valuable for exploratory testing, where creativity and intuition play a significant role. Manual testing also helps in validating visual and UI elements, ensuring that the application delivers a seamless user experience. Unlike automation testing, which executes predefined test cases without human intervention, manual testing provides flexibility to adapt and modify tests based on real-time observations and feedback. Additionally, it is essential for testing new and evolving features where automated scripts may not yet be available or applicable. Despite the growing reliance on automation, manual testing remains indispensable for ensuring comprehensive software quality and reliability.

2.1.7 Gen-AI

A cutting-edge subfield of artificial intelligence called generative AI, or Gen-AI, produces new content like writing, graphics, and music by using patterns discovered in preexisting data. In contrast to classical AI, which is primarily concerned with data categorization and prediction, Gen-AI employs deep learning techniques such as Variational Autoencoders (VAEs) and Generative Adversarial Networks (GANs) to create new forms. These neural networks are made up of a discriminator that confirms the legitimacy of the input and a generator that generates it. The generator gets better at producing realistic samples as it goes through iterations.

2.2 Research Framework

The research methodology for this study comprises of the following strategies in order to bolster PT AceInno Technologies ' business model while conducting a business analysis that focuses on the value creation proposition of the firm and its operating environment. The backbone of this framework is the Value Proposition Canvas – a strategic canvas that aids in the understanding of how PT AceInno Technologies's software testing services fit size customers' needs and wants. This canvas will be used to uncover and communicate the unique value proposition of PT AceInno Technologies so that its services will map the customer's pains and gain pre-eminent value.

SWOT and TOWS analysis will provide a detailed picture regarding the organization's internal and external strength, weaknesses, opportunities and threats for PT AceInno Technologies. SWOT Analysis will give a current state of the company and TOWS Analysis is a tool for creating strategies utilizing company's strengths and opportunities whereas utilizing threats and weaknesses. This way, the synergy of the recommendations is achieved because both the actionable and realistic strategies are taken into account in terms of resource utilization and dominant positioning.

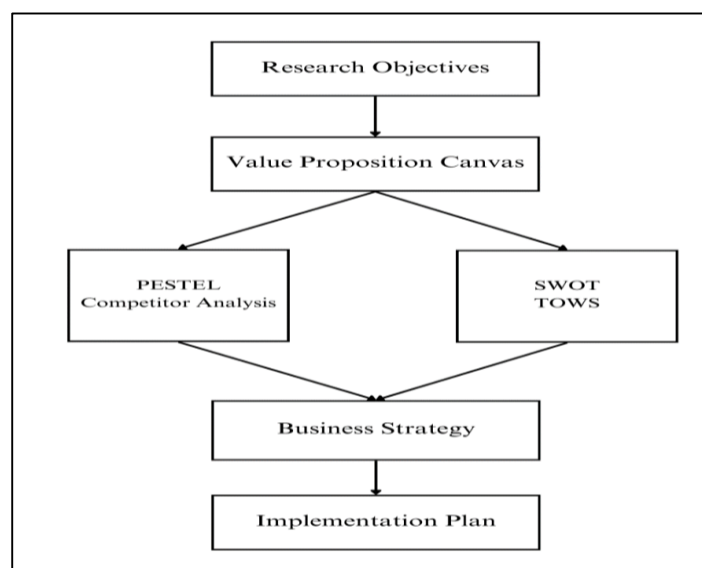


Figure 1. Conceptual Framework



RESEARCH DESIGN

3.1 Research Design

The research style used in this study is qualitative, and textual material is analyzed by theme analysis method (Kiger & Varpio, 2020). The qualitative method is chosen because it works well at gathering stakeholders' in-depth opinions, views, and attitudes about PT AceInno Technologies's possible foray into the software testing services industry. Making well-informed strategic decisions requires an in-depth awareness of the external operating environment, internal strengths and weaknesses, and diverse stakeholder views, all of which are facilitated by this method.

3.2 Sample

Interviews were selected as the main technique for gathering data because of its capacity to extract comprehensive and in-depth information from participants. Direct communication with respondents during an interview enables the researcher to elucidate answers and go further into particular subjects. Because the interviews will be semi-structured, some subjects will be covered while also providing room for other pertinent conversations to arise. This structure strikes a compromise between the requirement for uniformity throughout the interview process and the allowance for examining unforeseen but pertinent topics that come up throughout the discussion.

Interviews respondents as follows:

1. Endah Susanti
Country Head, Professional Services at PT AceInno Technologies, responsible for overseeing revenue growth, sales operations, customer relations, and strategic leadership.
2. Ajie Kunto Jaya
Delivery Manager, Solutions Department at PT AceInno Technologies, responsible for leading project delivery, developing testing strategies, and ensuring high-quality standards.
3. Mr. Ritwik Wadhwa
Sr. Director Regional Sales Manager at Product Company, Katalon (Partner), specializing in SaaS sales, automation, and testing tools, and managing partnerships in Southeast Asia.
4. Mr. Bayu
Lead Test Manager with over 15 years of experience in Fintech and E-Commerce, responsible for overseeing testing processes and ensuring software quality
5. Mr. Anand Kancharla
Quality Assurance Expert with over 20 years of experience in BFSI and Telecom industries, recognized for setting quality standards and ensuring regulatory compliance.
6. Mr. Siswanto
Founder and CEO of his own Quality Assurance company, leveraging deep understanding of the Indonesian market to provide comprehensive QA services.

These respondents provide a comprehensive view of the company's internal dynamics and market environment, facilitating a robust analysis of PT AceInno Technologies strategic potential.

3.3 Data Collection Method

Information is also going to be collected orally; participants will be asked to answer questions in interviews arranged with the help of the Microsoft Teams application. This method enables near maximum participation and most certainly is efficient. The application of the semi-structured interviews enables both the use of a priori identified topics and the exploration of emergent significant discussions to develop a profound comprehension about stakeholders' perceptions regarding the firm's strategies, the growth rate of the firm and the adaptability of firm to integrate alternative business models in software testing services (Sekaran & Bougie, 2018).

Interview procedure, first, preparation to scheduling interviews at respondent's time convenient, brief introduction about the study, its nature and format and seeking permission to record. To ensure that the participants offer informed consent data about the research project, its goal and the role of the participants will be expounded. Second, execution, the use of semi structured interviews to make the study highly standardized across interviews while at the same time creating room for emerging topics within the interviews. It allows the researcher to be systematic in the gathering of data while at the same time being able to examine certain



areas in detail. Last, recording, using recordings made with respondent’s permission and conducting interviews, followed by transcribing them with a view to enhancing the analysis. This process ensures that the data is captured to the highest level of accuracy to give a proper basis for the next stage, which is the thematic analysis.

3.4 Data Analysis Method

Thematic synthesis is used to characterize the individuals’ experiences and opinions about the matter under analysis contained in the obtained dataset. This method entails the following key phases, all of which are important when conducting a comprehensive analysis of the qualitative data.

First, the researcher reads the data, specifically the transcripts, many times and takes first impressions and constant themes into consideration. It also helps in making real as well as timely connections with the content and context: the so familiarizing phase. In the course of coding, information obtained is divided into meaningful units or codes that are segments valid towards the study questions thus enabling analysis (Saldaña & Omasta, 2017). After that, the researcher looks at the patterns or themes in the coded data whereby working with research codes making comparisons and associations with relationships to each other (Mwansa & Mnkandla, 2016). These are then fine-tuned concerning their similarity and dissimilarity to the data with revisions being made to ensure cohesiveness of the theme as well as their dissimilarity. After the themes are decided, they are described and labeled; information on the identification of the themes and relation to the study questions is provided. This section encompasses narrating a report of the study to enable the readers, researchers, and other interested stakeholders understand a clear and elaborate account of the phenomena under investigation by clearly describing all the themes and linking them to the research questions and objectives through the support of quotes from the data collected.

The research analysis flow chart for this study demonstrates the analytical process of the qualitative data gotten from the interviews and reports. First, there are interviews as well as questionnaires if needed and the gathered reports as primary data collection. The collected data is then qualitatively coded in order to come up with findings, meaning that they are segmented into comprehensible codes that explain information important for the research questions. Subsequently, the coded data becomes developed into concepts and these are then sorted out into categories depending on how they are related to each other. Axial coding is the final step which involves the rich and conceptual category frameworks to be made more precise to enable the identification of the relationships between the various features of the data.

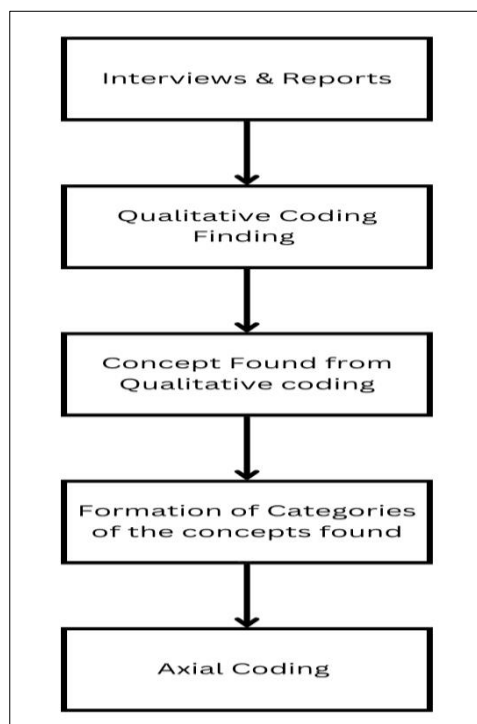


Figure 2. Research Analysis Flow



RESULT AND DISCUSSIONS

4.1 Interview Findings

4.1.1 Value Proposition Enhancement

The interview findings on value proposition enhancement highlight a strong focus on test automation as a means to increase business efficiency and reduce costs. The use of test automation tools is seen as a significant improvement over manual testing methods, with positive feedback from clients, particularly in the banking sector. The tools' ability to integrate with other systems, such as Jenkins, Jira and provide dashboards for better monitoring and productivity further strengthens their value proposition. Future advancements in redundancy features are also expected to contribute to cost efficiency and business productivity.

"Test Automation is more efficiency for the business operation and also for the cost will be decreased" – Endah Susanti (PT AceInno Technologies Country Manager)

"Test Automation adoption increased because the currently they only using the manual testing" - Ajie (PT AceInno Technologies Delivery Manager)

"Tokopedia is one of our biggest customers in Indonesia. They started with free version, saw value, and transitioned to the enterprise version. They created around 20,000 test scripts and now focus on fast execution in different environments. With us, they achieved faster test creation and execution, avoiding revenue loss during critical sales periods like Black Friday." - Ritwik (Sr. Director Sales, Katalon Product company)

"They're really happy for the Test Automation tools that we already implement the that in the bank" - Bayu (Product Company Fintech, Pintu – Head of Testing)

"Yeah, I think for the right now some of the company need for the move from the manual into automation, because based on the our experience is automation is more efficiency for the business operation and also for the cost will be decreased. for the next is more efficiency for the costing and also productivity for the business" (Ajie, PT AceInno Technologies Delivery Manager, 2024)

"We must have some value propositions for our clients. We formed our business unit called the Testing Center of Excellence (TCoE). We act as a third-party independent QA to ensure that clients confidently bring those digital launches to the market after we test them." (Endah Susanti, PT AceInno Technologies Country Manager, 2024)

"Redundancy for the next feature is more um efficiency for the costing and also productivity for the business" - Anand (Industry Specialist, Testing)

These insights underline the enhanced efficiency and cost-effectiveness brought by test automation. The transition from manual to automated testing has been well-received, with integration capabilities and comprehensive monitoring tools being key factors in their success. Future developments aimed at improving redundancy and cost management further highlight the ongoing efforts to enhance the value proposition.

4.1.2 Competitive Differentiation

Competitive differentiation is driven by the unique strengths and approaches adopted by the company. The use of consultants to tailor tools to client requirements and the ability to integrate with existing systems underscore the company's competitive edge. The company's value proposition is strengthened by the expertise of its subject matter experts and the combination of existing tools with new innovations.

"For Professional Services, we have more than 500 consultants supporting us, which we place with several clients, mostly in the banking, financial services, and insurance (BFSI) industry." – Endah Susanti (PT AceInno Technologies Country Manager)

"AI is taking over the world, including in automation testing. We use AI for autonomous testing to cover 80% of regression test cases. Enterprises now look for products with an AI roadmap. AI can eliminate repetitive manual tasks, although it's not a complete replacement." (Ritwik, Sr. Director Sales, Katalon Product company, 2024)



"I think we have expertise for right now, we based on the industry. Let's say for the banking finance and also the retail I think our company have the subject matter experience. That's why the value proposition for our company is really good and also combining with the tools that we already doing I think the we have a more strength for the in the market." - Ajie (PT AceInno Technologies Delivery Manager)

"I think we have a more strength in the market in the area of testing with our presence over 80 customers" - Ajie (PT AceInno Technologies Delivery Manager)

"We will approach using the consultant first we compare whenever the tools they need based on the the requirement" - Ajie (PT AceInno Technologies Delivery Manager)

"The value proposition for PT AceInno Technologies company is really good and also combining with the tools that we already doing" - Anand (Industry Specialist, Testing)

"We have the subject matter experience that's why the value proposition for our company is really good" - Anand (Industry Specialist, Testing)

The company's competitive advantage lies in its strategic use of consultants and the ability to meet client-specific requirements with tailored tools. The integration of new and existing tools, along with the expertise of subject matter experts, enhances the company's market strength and value proposition.

4.1.3 Business Strategy Development

The development of business strategy focuses on establishing specialized units like the Testing Center of Excellence (TCoE) and leveraging advanced tools to meet client needs. The trend towards integrating new technologies and improving product principles reflects a commitment to innovation and quality. However, the higher costs associated with test automation tools compared to manual testing present a challenge.

"We must have some value propositions for our clients. We formed our business unit called the Testing Center of Excellence (TCoE). We act as a third-party independent QA to ensure that clients confidently bring those digital launches to the market after we test them." - (Es, PT AceInno Technologies Country Manager, 2024)

"Some people in here to handling some the project on the quality and then our focus is like for the Test Automation testing in here" - Siswanto (Industry Specialist, Testing)

"We compare with the tools Test Automation and then we segregate based on the requirement and then after we propose the Test Automation with the right tools then we success to implement the Test Automation tools" – Ajie (PT AceInno Technologies Delivery Manager)

"By integrating testers from the beginning and using advanced tools, we can identify gaps early, reducing defects at later stages. This not only helps the application but also saves a lot of money. Efficient testing methodologies and tools directly contribute to the overall cost efficiency of the project." - Anand (Industry Specialist, Testing)

"For the testing we can start for the beginning even from the design for the UI and I think until to sit and also we still can using the the tools to create some testing before the products is launched. I think it is very good from the beginning until the product. Even for next for the CI/CD is really good also." – Ajie (PT AceInno Technologies Delivery Manager)

Business strategy development emphasizes the creation of specialized units and the adoption of advanced testing tools to meet evolving client needs. The focus on integrating new technologies and improving product principles is essential for maintaining competitiveness. However, the cost of test automation tools remains a significant consideration in strategy development.

4.1.4 Emerging Trends and Technology Integration

Emerging trends and technology integration reveal a growing demand for performance testing and a shift from manual to automated testing. The market's acceptance of test automation varies, with some resistance noted. The challenge lies in ensuring resource availability and cost-effectiveness while keeping pace with technological advancements.



"Customers are asking for the performance testing for the Test Automation" - Siswanto (Industry Specialist, Testing)

"For right now, some of the companies need to move from the manual into a Test Automation" - Anand (Industry Specialist, Testing)

"We should approach for the new tools that will be help the customer in Testing" - Ajie (PT AceInno Technologies Delivery Manager)

"I think the challenging is more for the resource for the knowledge and also for the cost" - Ajie (PT AceInno Technologies Delivery Manager)

The integration of emerging technologies highlights the industry's shift towards automation and performance testing. While the market shows varying levels of acceptance, the primary challenges involve resource management and cost. Addressing these issues is crucial for successfully integrating new technologies and staying competitive.

4.1.5 Operational Excellence and Challenges

Operational excellence and challenges are characterized by the market dynamics and regulatory landscape. The company's strength lies in its significant presence in major banks and a large pool of QA personnel. However, navigating regulatory challenges and competition, particularly from aggressive market players like Katalon and Tricentis Tosca, requires continuous adaptation and strategic planning.

"Asian market has pros and cons to it. First, if we talk about pros, it's a highly consumer driven market where there is a lot of young people and digital transformation is on the rise." - Siswanto (Industry Specialist, Testing)

"Our strength is our presence in the top 10 big banks in Indonesia with a significant number of QA personnel. This differentiates us from competitors." – Endah Susanti (PT AceInno Technologies Country Manager)

"The pain points we've faced over these 8 years are mainly related to operations and regulations from the country, such as the Omnibus law and competition, which is always there." – Endah Susanti (PT AceInno Technologies Country Manager)

"Tricentis Tosca is promising and aggressive, partnering with ERP companies like SAP to enter the market." – Endah Susanti (PT AceInno Technologies Country Manager)

"A common challenge is that customers want phased adoption rather than implementing everything at once." - Anand (Industry Specialist, Testing)

"Thinking about how we sustain and move forward, it's not just about maintaining the business but also growing further." - Ritwik (Sr. Director Sales, Katalon Product company)

Emerging trends and technology integration reveal a growing demand for performance testing and a shift from manual to automated testing. The market's acceptance of test automation varies, with some resistance noted. The challenge lies in ensuring resource availability and cost-effectiveness while keeping pace with technological advancements.

4.2 Report Findings

4.2.1 State of Software Quality Report 2024

The State of Software Quality Report 2024 gives an insight into the existent and emerging future of software quality engineering. Assembled with information from Katalon, Deloitte, Cigniti, QualityKiosk, and Xray, the report speaks about the revolutionizing role of Artificial Intelligence (AI) in Quality Engineering (QE) and the software construction. For instance, the afore-said report indicates that generative AI models as GPT-3. anagement and Analysis 5 and GPT-4 are gradually becoming indispensable for improving quality engineering activity and development processes (Katalon, 2024).

The survey used for compiling the data for the report covered 3,850 quality engineering professionals drawn from software and IT, banking and financial services, insurance, and healthcare sectors. Further, the interpretation of findings incorporated 14 industry experts employing a semi-structured guideline. Core conclusions show that 74% of respondents are involved in test automation and they have some difficulties connected with short time and personnel. While at the present moment the use of AI in testing remains rather limited, there is awareness about its possibilities to produce test case data and scripts in future.



The report also stresses the need to incorporate AI in testing practices as a way of enhancing outcomes and efficiency. It also brings out the requirement for constant learning even as the industry shifts towards that of Artificial Intelligence. The CEO of Katalon is confident that integrating AI and test automation can improve the RND productivity and quantity in software development. Common tools indicated in the report in the report are Selenium, Postman, Katalon Studio, JMeter, and Appium. Finally, based on the results of the study of trends in SQA, specific recommendations are made for dealing with change, such as the fact that more significant gains in ROI are linked to increased durations of test automation.

Table 1. Number of Respondents in tate of Software Quality Report 2024

Role	Number of Respondents
QA Engineer	1400
Project Manager	700
Software Engineer	800
Senior Executives	500
Consultants	400
Others	50

4.2.2 World Quality Report 2023-24

The World Quality Report 2023–24, titled "The Future Up Close," offers an in-depth analysis of current practices and trends in quality engineering and testing. Authored by Capgemini, Sogeti, and OpenText, the report draws from surveys conducted with over 3,300 executives across 32 countries. This extensive survey sample provides a broad and detailed perspective on the state of the industry.

The report also highlights how project goals are prioritized concerning quality, speed, and cost. It reveals a slight shift from the previous year, with 36% of respondents aiming for a balance among these goals, while 34% prioritize quality. This reflects an increasing focus on quality while maintaining the importance of a balanced approach.

Sustainability in quality assurance practices is another important topic addressed in the report. Although two-thirds of respondents consider sustainability crucial, nearly half prefer to address it at a later stage. The report suggests that adherence to green standards and regulations will become increasingly significant as more governments implement green credentials.

Table 2. Number of Respondents in World Quality Report 2023-24

Role	Number of Respondents
Software Developer	1200
QA Manager	800
DevOps	500
Project Manager	400
Business Analyst	300
Others	100

4.3 Value Proposition Canvas

Gains, one of the primary gains highlighted by the reports is the enhancement of development skills. This includes the integration of advanced development practices and automation through continuous integration (CI) mechanisms, as well as proficiency in SQL, Python, and CI/CD. The application of Artificial Intelligence (AI) and Machine Learning (ML) is particularly beneficial in improving test efficiency and accuracy, especially when Agile methodologies are employed to meet customer requirements. The World Quality Report (2023-24) emphasizes the importance of establishing lightweight capability units for test process and governance, test automation, performance engineering, test data management, and test environment management. These capabilities empower agile teams to become more self-sufficient. Furthermore, the early automation of processes is crucial in



minimizing risks associated with defect detection and ensuring comprehensive testing coverage. Training in this area proves to be a valuable investment, yielding returns in workforce development, competitive edge, and fostering company creativity.

Pain, many organizations lack proactive responses to Quality Engineering (QE) trends and struggle with integrating and applying AI/ML tools effectively. Additionally, difficulties in integrating various tools and frameworks can hinder workflow efficiency in automation practices, as reported by The State of Software Quality Report (2024). There is a need for modernization within QE organizations, including the creation of professional capacity units to support organizational changes and adoption of new methodologies. The absence of efficient examination systems and quality control measures needs addressing to maintain procedural efficiency. Moreover, green IT actions and enforcement within QE are lacking, and there is a call for increased collaboration and innovation among QE teams.

The complexity of integration poses another significant challenge. Customers often rely on QE processes that involve intricate and unified integration into their systems, leading to complications when dealing with less skilled workers and regulatory issues. Technical debt management is crucial, as outdated skills and practices can lead to increased costs and inefficiencies. According to The State of Software Quality Report (2024), a holistic view of processes, people, and technology is essential to address issues impacting quality, speed, and efficiency. Focusing solely on speed can result in long-term setbacks due to technical and organizational debt. Therefore, companies must adopt sustainable practices that reduce environmental impact while closing skill gaps in IT operations.

The benefits to customers are multifaceted. Products or services that streamline workflows through automation can significantly enhance efficiency, allowing companies to focus on more strategic and creative tasks. Automation of repetitive tasks not only reduces manual labor but also enables more focus on critical aspects of product development. The integration of AI in software testing represents a transformative shift, leading to increased efficiency, accuracy, and cost-effectiveness, as highlighted by The State of Software Quality Report (2024).

To address skills gaps, intensive training is vital. Enhancing technical proficiency among personnel and upgrading automation practices are crucial for easing the QE team's workload and ensuring compliance with current regulations. The World Quality Report (2023-24) notes that while industries such as insurance and banking are rapidly adopting automation and AI technologies, there is still a significant focus on improving skill levels to better manage technical debt and accelerate product development cycles.

The reports underscore the importance of integrating automation with functional assistance and providing comprehensive training. Sustainable service options have become increasingly important in the journey of companies striving for excellence in QE practices.

4.4 SWOT and TOWS

4.4.1 SWOT

Strengths

PT AceInno Technologies has created a strong Reputation and has established itself as an independent QA service provider with strong Testing Center of Excellence or TCoE. This specialization forms a strong assurance on the company's deliveries to the clients and steadies the satisfaction of the client in digital launches. The competent skills and experience of the company especially in the banking and finance as well as retail sectors give it a competitive advantage and value proposition in the market. One of the major advantages of test automation is better efficiency and cost optimization; test scripts can be run at a greater speed and without compromising the efficiency; operational expenses also decreases. Every business needs to innovate and conduct extensive research on QA, API testing for web applications, and mobile app testing for Android and iOS that makes Pt AceInno Technologies more competitive. The strong market conditions of test automation Indonesia, especially supported by major customers such as BNI, Mandiri, and Tokopedia place PT AceInno Technologies in a more suitable environment. IT professionals who adoption of test automation when adopting DevOps indicated that this improves efficiency, speeds up the testing activities that assure a quick time-to-market, which is important for gaining a competitive advantage and obtain high-quality applications. From objective viewpoints, test automation saves time, improves quality and shortens the release times and will provide the ROI which place PT AceInno Technologies as a supplier of effective and competitive testing services. The shift from the classical waterfall models to agile models has made it faster and easier to test and to release products, which increases the flexibility of the models. PT AceInno Technologies



also has a good customer portfolio of more than 80 customers and has a team of 200 QA consultants – therefore, sustainability and quality.

Weaknesses

PT AceInno Technologies must deal with problems concerning the customers' desire for quicker delivery and the automation of testing in QA, issues that can cause prolongation of the testing processes and, therefore, influence total product release schedules. TCoE is a must to have a center for independent testing and for focusing on the testing needs of customers, but the required test automation maturity in the market is not always there; some clients are comfortable sticking with manual testing. Such a conservative approach is dictated by the changes in instruments and customers' demands toward effectiveness. Resource and knowledge issues are some of the critical barriers associated with test automation testing, which implies training and capital investment on Quality Assurance tools and gadgets. Vendor partnerships for scaling up, while advantageous, comes with the challenge of relying on the outside source for supplies and services, exposing the firm or company to risks concerning the credibility of suppliers for supplies and the consistency of the products or services delivered to the firm or company. Due to inadequate provisions towards testing, there will be sheer congestion and flow hindrances, which can call for advancements in the resource management. Some of the factors that constitute additional barriers to utilization of test automation includes training of manual testers as well as incorporating other technologies into the application. Business customers' decision to adopt test automation tools in phases instead of an outright adoption leads to the addition of some challenges to the adoption process and slows it down. This is due to misconceptions and resistance from the stakeholders who believe that test automation will fully replace manual testing hence; education and change management becomes necessary so that stakeholders understand various strategic advantages of test automation necessary for its success.

Opportunities

Supportive government policies and initiatives aimed at driving digital transformation present significant opportunities for PT AceInno Technologies. These initiatives can increase demand for QA services, providing a favorable business environment. Despite competition from large companies like IBM and Accenture, PT AceInno Technologies's focus on independent QA services allows it to leverage its specialized market position and attract clients seeking dedicated QA expertise. Growing market acceptance of test automation presents substantial potential for PT AceInno Technologies to expand its test automation services as customer needs evolve for greater efficiency and accuracy. Collaborating with vendors to create additional test cases due to limited internal resources allows for scalability and efficient handling of larger and more complex testing requirements. The Asian market, particularly Indonesia, offers significant potential due to its consumer-driven nature and ongoing digital transformation, creating a robust environment for test automation and rapid product delivery. The critical role of testing in DevOps environments, with the need for early and frequent testing, creates opportunities for PT AceInno Technologies to enhance its service offerings and meet growing industry demands. Continuous advancements in AI and other emerging technologies present opportunities for PT AceInno Technologies to innovate and improve QA practices, staying ahead of competitors.

Threats

The continually evolving technology landscape poses a threat of technological obsolescence, requiring PT AceInno Technologies to stay abreast of new trends and advancements through continuous investment in innovation and training. Ensuring compliance with various local regulations, particularly in the high-demand digital banking sector, is critical to avoid legal penalties and reputational damage. Intense competition from industry giants like IBM and Accenture, who dominate the global IT services market, threatens PT AceInno Technologies's market share. The higher initial costs of test automation tools compared to manual testing tools can be a financial burden, potentially limiting adoption among some clients. Customers' preference for phased adoption rather than full-scale implementation of test automation tools introduces complexities and slows the overall adoption process. Economic conditions and infrastructure readiness in adopting test automation technologies, particularly in developing markets, can impact the pace and success of implementations. Enterprise readiness and willingness to invest are critical for the successful adoption of test automation testing, with varying levels of infrastructure readiness across different markets posing threats to widespread adoption. Addressing skill gaps in manual testers and ensuring they are upskilled to handle test automation is essential to avoid hindering the successful implementation and scaling of test automation practices.



Table 3. SWOT Analysis

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Specialized Expertise in QA Services 2. Specialized Expertise and Competitive Advantages 3. Efficiency and Cost Reduction through Test Automation 4. Innovation and Research in QA 5. Proactive Stance on Test Automation in Indonesia 6. Quantitative Benefits of Test Automation 7. Adoption of Agile Methodologies 8. Strong Customer Base and Experienced Workforce 	<ol style="list-style-type: none"> 1. Extended QA timelines 2. Specialized QA Services 3. Market Acceptance of Test Automation 4. Resource and Knowledge Challenges in Test Automation 5. Dependence on Vendor Collaboration 6. Lack of Investment in Testing 7. Skill Gaps and Integration Complexities 8. Reluctance to Phased Adoption 9. Adoption Challenges and Misconceptions
Opportunities	Threats
<ol style="list-style-type: none"> 1. Government Policies and Initiatives 2. Leveraging Market Position 3. Growing Market Acceptance of Test Automation 4. Collaboration with Vendors for Testing Needs 5. Potential in the Asian Market 6. Demand for DevOps Integration 7. Emerging Technologies in QA 	<ol style="list-style-type: none"> 1. Technological Obsolescence 2. Regulatory Non-Compliance 3. High Test Automation Costs 4. Complexities in Phased Adoption 5. Economic and Infrastructure Challenges 6. Enterprise Readiness 7. Resource and Skill Gaps

4.4.2 TOWS

Strength – Opportunity

PT AceInno Technologies is well-positioned to leverage its strengths in specialized QA expertise and robust Testing Center of Excellence (TCoE) to capitalize on the current opportunities in the market. By aligning its high-quality independent QA services with supportive government policies aimed at driving digital transformation, PT AceInno Technologies can increase demand and enhance client satisfaction. The company can further develop its Test Automation services to address the growing acceptance in the banking, finance, and retail sectors. Collaboration with vendors to create additional test cases can drive efficiency and cost reduction, supporting scalability and handling complex requirements. Additionally, PT AceInno Technologies’s focus on innovation, including API and mobile application testing, can help tap into the highly consumer-driven Asian market. By proactively integrating Test Automation in Indonesia’s DevOps environments, PT AceInno Technologies can meet the rising demand for efficient and frequent testing, ensuring competitive advantage and improving software quality. Utilizing the quantitative benefits of Test Automation will also allow PT AceInno Technologies to embrace emerging technologies like AI, keeping them ahead of competitors.

Strength – Threat

To counteract external threats, PT AceInno Technologies can leverage its specialized QA expertise to navigate regulatory challenges and comply with stringent local regulations, ensuring business continuity and client satisfaction. By differentiating itself from larger competitors like IBM and Accenture with its niche focus in banking, finance, and retail, PT AceInno Technologies can attract clients looking for specialized QA services. The efficiency gains from Test Automation can help address the high demand for skilled talent and streamline QA processes to meet client needs for faster project completion. Demonstrating successful Test Automation implementations can mitigate market skepticism and encourage investment in testing, countering resistance to new technologies. Agile methodologies can enhance flexibility, allowing PT AceInno Technologies to adapt to changing market dynamics and maintain a competitive edge. By showcasing their specialized expertise and ensuring compliance with regulations, PT AceInno Technologies can build client trust and navigate complex market dynamics effectively.

Weakness – Opportunity

Addressing weaknesses through strategic opportunities involves leveraging government policies to reduce extended QA timelines by securing funding and resources for streamlined processes. Enhancing market acceptance of Test Automation by showcasing the benefits through specialized QA services can bridge knowledge gaps and increase client adoption. Collaborations



with vendors can mitigate resource and knowledge challenges, facilitating better implementation of Test Automation. By emphasizing the role of testing in DevOps, PT AceInno Technologies can secure increased investment and support from stakeholders, addressing the need for greater resource allocation. Customized solutions can also help tackle reluctance to phased adoption, supporting gradual implementation strategies to overcome client discomfort.

Weakness – Threat

To address the internal weaknesses and external threats, PT AceInno Technologies should align QA processes with government policies to streamline operations and meet customer demands effectively. The company should leverage its specialized expertise to stand out in a competitive market, offsetting the high costs of Test Automation tools through strategic vendor partnerships. Developing tailored client strategies for phased adoption can help manage complexities and slowdowns, ensuring smoother transitions. Strategic planning and risk assessment will be crucial in navigating economic and infrastructure challenges, ensuring successful Test Automation implementations. Investing in robust training programs will close resource and skill gaps, equipping the workforce to handle Test Automation tasks and minimizing implementation risks.

4.5 Solution

The analysis utilizing SWOT and TOWS provides a comprehensive understanding of PT AceInno Technologies's current strategy and market positioning. The SWOT analysis reveals significant strengths such as high customer satisfaction, a solid market presence, and advanced Test Automation capabilities. However, it also identifies areas for improvement, such as project time constraints and potential enhancements in the Test Automation process. Opportunities for growth include leveraging AI technology and exploring new product offerings, while threats encompass short technology cycles and competitive pressures. The TOWS analysis builds upon these insights by recommending strategies to capitalize on strengths and opportunities while addressing weaknesses and mitigating threats. The macro business environment analysis offers additional context by examining technological, governmental, and economic factors impacting the company's operations.

4.6 Implementation Plan

The implementation plan focuses on advancing PT AceInno Technologies through strategic actions aligned with its value proposition. Emphasizing continuous technological advancement, particularly in AI and Test Automation, is crucial for maintaining a competitive edge. Integrating AI-augmented capabilities and enhancing test data management will improve service quality and align with evolving client needs. The plan includes expanding into new markets, diversifying revenue streams, and fostering long-term client relationships. Key tactical actions involve conducting market research to identify differentiation opportunities, refining the value proposition with AI integration, and implementing advanced project management systems to streamline workflows and reduce manual workloads. Additionally, investing in professional services, talent management, and continuous employee training will support operational excellence and innovation. The strategy also includes establishing PT AceInno Technologies as a Center of Innovation and Excellence (TCoE) in QA, ensuring competitive differentiation and sustainable growth in the IT software testing industry.

Table 4. Six Strategies

No	Strategy	Key Points	Actions	Budget (in Million Rupiah)
1	Differentiation and Market Analysis	Detailed competitor and customer feedback analysis	1. Engage in detailed competitor analysis and gather customer feedback 2. Develop a unique value proposition with AI Integration	IDR 2,000.00-
2	AI and Machine Learning Integration in QA	Research market performance and customer needs	1. Implement tailored marketing campaigns for different segments 2. Offer customized QA solutions to overcome weaknesses and threats	IDR 1,500.00-
3	Operational Excellence and	Invest in Test Automation tools	1. Implement advanced project management system to streamline workflows	IDR 1,700.00-



	Test Automation	to reduce manual workloads	2. Use Weaknesses-Opportunities (WO) strategy to mitigate weaknesses	
4	Professional Services and Talent Management	Create a professional services package	1. Include consulting, implementation, and support in the package 2. Ensure continuous and effective QA service delivery to maximize opportunities	IDR 2,800.00-
5	Continuous Learning and Development	Regular training for employees	1. Conduct regular training sessions 2. Enhance employees' technological skills and capabilities	IDR 50.00-
6	Comprehensive Market Leadership and Growth Strategy	Ensure competitive differentiation and growth	1. Maintain leadership in the IT software testing industry 2. Consolidate existing markets and explore new segments 3. Conduct follow-up performance reviews to formulate future strategies	IDR 1,800,000.00-

CONCLUSION

The research underscores that PT AceInno Technologies can significantly enhance its market positioning and revenue by focusing on value differentiation and strategic innovation in IT software testing. By leveraging its strengths in quality assurance and AI-augmented services, PT AceInno Technologies can carve out a unique market niche, distinguished from competitors. The development of a new business strategy will facilitate expansion into new markets and the introduction of innovative services, ensuring sustained growth. Emphasizing continuous improvement through advanced Test Automation and project management will address operational challenges and keep the company at the forefront of the industry. Additionally, strategic investments in emerging trends and high-quality tools will solidify PT AceInno Technologies’s leadership in the QA sector, enabling the company to navigate industry fluctuations and achieve its strategic goals.

For practical implementation, QA teams should be equipped with ongoing training programs focused on cutting-edge Test Automation and AI-embedded frameworks to boost efficiency and effectiveness. Project managers should prioritize tasks that offer high impact and balance manual and automated testing based on project needs. For senior management and HR, allocating budgets for training and advanced Test Automation tools is crucial. Implementing regular reviews and root cause analysis will streamline operations and maintain high quality. HR should focus on recruiting and retaining talent with Test Automation expertise and encourage cross-training to build a resilient and adaptable workforce. Future research should explore the effectiveness of AI-enabled QA tools through empirical studies, examining their impact on quality assurance processes and company performance, while also addressing the challenges faced by professionals using advanced Test Automation tools to enhance industry adoption and efficacy.

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