

**EMPLOYEE ENGAGEMENT: QCC'S IMPROVE PRODUCTIVITY BY  
ENGAGING WORKERS IN PROBLEM-SOLVING AT CATL**  
*(A Case Study of CATL's Headquarters and Indonesian Branch)*

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**Abstract**

*This study examines the implementation of the Quality Control Circle (QCC) system to enhance employee engagement and productivity at Contemporary Amperex Technology Co., Limited (CATL) headquarters and its Indonesian branch. As a global leader in lithium-ion battery manufacturing, CATL integrates innovative technology with employee participation to improve work processes and operational performance. QCC is applied as a structured approach that empowers employees to identify workplace problems, develop solutions, and collaborate in continuous improvement activities using quality management tools and the PDCA cycle. The research employs a case study and comparative analysis method to explore differences between the standardized QCC system at CATL headquarters and the more flexible, localized implementation in Indonesia. The study involved permanent employees from both organizations using saturated sampling, with a total of 10 respondents. In addition, a five-day productivity training program was conducted in China and Karawang through lectures, case studies, and project-based learning, evaluated using pre-test and post-test assessments. The findings indicate that QCC significantly improves employee understanding of productivity management, strengthens communication, enhances product quality, reduces quality-related costs, and increases employee engagement, motivation, and organizational commitment in both operational environments.*

**Keywords:** *CATL QCC System; Indonesian Branch; Quality Enhancement; Localized Implementation; Quality Control Cycle.*

**1. INTRODUCTION**

CATL (Contemporary Amperex Technology Co., Limited), founded in 2011 and headquartered in Ningde, Fujian Province, is a leading global new energy innovation technology enterprise, specializing in the research and development, production, and sales of power batteries and energy storage systems. Employee engagement is a vast construct that touches almost all parts of human resource management facets we know hitherto. If every part of human resources is not addressed in an appropriate manner, employees fail to fully engage themselves in their job in response to such kind of mismanagement. The construct

employee engagement is built on the foundation of earlier concepts like job satisfaction, employee commitment, and Organizational citizenship behavior. Though it is related to and encompasses these concepts, employee engagement is broader in scope. Employee engagement is a stronger predictor of positive organizational performance, clearly showing the two-way relationship between employer and employee compared to the three earlier constructs: job satisfaction, employee commitment and organizational citizenship behavior. Engaged employees are emotionally attached to their organization and highly involved in their job with a great enthusiasm for the success of their employer, going the extra mile beyond the employment contractual agreement.

With the in depth advancement of the global "dual carbon" goal and the explosive growth of the new energy vehicle industry, power batteries, as the core components of new energy vehicles, their quality stability directly determines the safety of vehicle operation and the market competitiveness of enterprises. As a leading enterprise in the global power battery industry, CATL has always regarded quality control as the core of its development strategy since its establishment in 2011, and has constructed a full-process quality management system covering supply chain procurement, production and manufacturing, R&D innovation, and customer service. As a quality improvement tool characterized by full employee participation and continuous optimization, the Quality Control Circle (QCC) has become a core component of CATL's quality control system by forming cross-post and cross-departmental quality improvement teams, focusing on quality pain points in various links of production and operation, and realizing closed-loop management and continuous optimization of problems, thus providing an important guarantee for the stability of the enterprise's product quality.

In recent years, facing the multiple demands of global supply chain restructuring, production cost control, and overseas market expansion, CATL has accelerated its global layout. The Indonesian branch, as its important overseas production base, undertakes the crucial mission of localized power battery production and supply to the Southeast Asian and global markets. However, the Indonesian branch is confronted with a policy environment, supply chain pattern, employee structure, and cultural background that are entirely different from those of the headquarters. How to deeply integrate the headquarters' mature QCC system with local realities to achieve the localized landing and efficient operation of the system has become a key issue for its quality control work and sustainable development.

At the theoretical level, this paper focuses on the cross-regional implementation of QCC systems in the context of new energy enterprise globalization. By systematically comparing the differences in QCC system implementation between CATL's headquarters and its Indonesian branch, it enriches the application research of QCC systems in transnational manufacturing enterprises and provides a new research perspective and theoretical supplement for the practical application of quality improvement theories in cross-cultural and cross-regional scenarios. At the practical level, the systematic sorting of the

headquarters' mature experience in QCC system implementation, as well as the path, effects, and problems of the Indonesian branch's localized adaptation of the QCC system, can provide practical reference for the construction of quality control systems in the global layout of other new energy enterprises, helping enterprises improve their cross-regional quality control capabilities, reduce quality risks, and enhance their global market competitiveness.

## 2. LITERATURE REVIEW

### a. *Employee Engagement*

Employee engagement is the emotional and psychological investment of the employees in their employment and in their employers. Recent studies have indicated that employee engagement is defined as a state in which people feel motivated, passionate and psychologically engaged to their obligations and company goals (Başar, 2024; Schaufeli, 2021). Employed employees have higher vitality, a greater feeling of purpose and are willing to give up their day-to-day activities (Kim et al., 2025). According to a recent study, employee involvement has a high correlation with organizational success, productivity and job happiness. When employees feel they are valued and included in decision-making or problem-solving, they are more likely to provide new ideas and support company-wide continuous improvement endeavors (Başar, 2024; Gallup Consulting, 2013; Kim et al., 2025).

### b. *Quality Control Circle (QCC)*

The Quality Control Circle (QCC) is a participative management strategy where small groups of employees voluntarily convene to discover, discuss and solve work-related problems using quality management tools. The literature of recent years describes QCC as a systematic continuous improvement methodology, which increases the involvement of workers and contributes to the operational objectives of quality (Kim et al., 2025; Wu, 2024). The activities of QCCs are usually carried out with the PDCA (Plan-Do-Check-Act) cycle approach for systematic issue solving and continuous improvement. QCC involvement gives employees the chance to work together to improve the function process, minimize errors, and improve operational efficiency. This approach also enhances team collaboration, communication and employee involvement in quality management (Lima et al., 2025; Wu, 2024).

### c. *QCC and Productivity Improvement*

Different researches have shown that QCC is a popular strategy to improve productivity and practical performance. Engaging people in problem-solving activities helps firms swiftly identify operational inefficiencies and apply effective cures (Lima et al., 2025; Wu, 2024). QCC also boosts staff engagement and motivation and enhances product and operations performance. People that are more into project development and decision making

are more confident with their work. Therefore, companies can increase their performance, reduce their operational costs and continue quality development.

**d. QCC in Multinational and Cross-Cultural Organizations**

In global firms the application of quality management systems such as QCC typically needs to be adapted to local requirements. Cultural, workforce, management, and legal differences can have an impact on the application of quality management practices across different branches (Khan & Jin, 2024; Presbitero et al., 2025). Hence, businesses should find a balance between global standardization and local adaptation to ensure the effectiveness of quality improvement systems in varied operational settings. This is especially crucial for global manufacturers like CATL, who are spread across nations and have different worker arrangements.

**e. Work Culture and Employee Engagement**

Work culture is the collection of beliefs, conventions and behaviours that guide people in the workplace. A great work culture that includes communication, teamwork, trust, and employee participation results in higher employee engagement. The application of QCC will be more effective for CATL if the organization creates a culture that values collaboration and continuous improvement (Kim et al., 2025; Presbitero et al., 2025)s.

**3. RESEARCH METHOD**

Qualitative technique to “Investigate” Case Study using Comparative Analysis This case study discusses a particular real circumstance or example to recognize the facts, reasons or solutions on how QCC is used at CATL.

**a. Research Questions**

CATL management must decide how to reinforce the QCC system throughout the global operations.

- 1) How is the implementation of the Quality Control Circle (QCC) system at CATL headquarters and Indonesian branch?
- 2) How does the QCC system help to increase employee engagement at CATL?
- 3) How does employee participation in QCC activities influence productivity and quality improvement within the organization?

**b. Population**

The population is the group of individuals or subjects involved in the research. This study population is made up of personnel who are participating in Quality Control Circle (QCC) activities at Contemporary Ampere Technology Co., Limited. The population includes permanent employees from the headquarters and the Indonesian branch. These

participants can be human resource management, production workers, quality control professionals, engineers and managers who participate in QCC issue solving activities.

c. Data Source

Data sources are the places where research data come from. The study employs two types of data sources:

- 1) Primary Data: Data acquired from the participants directly through interviews, appraisal of training (pre-test and post-test) and observation of QCC activities.
- 2) Secondary Data: Data from firm documentation, quality management reports, supply chain reports and records relevant to QCC implementation.

d. Research Design

Research design refers to the overall plan or approach for conducting research. The research design employed was a qualitative case study with comparative analysis. This study analyzes the application of the QCC system and its implementation in the CATL headquarters and the Indonesian branch. This strategy permits the researcher to acquire insight into the process, problems and consequences of QCC adoption in different organizational contexts.

e. Survey Instrument

Survey instruments are the tools used to collect data from participants. In this study, the main instruments include:

- 1) Interview questions used to collect information from employees about their experiences with QCC activities. Pre-test and post-test interviews for training evaluation. Assessing the effectiveness of productivity training programs by measuring participants' knowledge improvement before and after the training with an interview.
- 2) Document review checklists used to analyze company reports and QCC implementation records.

#### 4. RESULTS AND DISCUSSION

Quality Control Circle (QCC) is a voluntary employee group within the same work area that focuses on continuous quality improvement through the application of quality management tools and methods. QCC emphasizes employee participation, autonomous management, continuous improvement, and result orientation to solve problems related to quality, efficiency, and cost control. Its implementation follows the PDCA (Plan–Do–Check–Act) cycle to ensure systematic, standardized, and sustainable improvement processes (Lima et al., 2025; Wu, 2024).

In multinational companies, the implementation of quality control systems requires a balance between standardization and localization. Standardization ensures consistency in global quality standards and processes, while localization adapts the system to local regulations, culture, supply chain conditions, and workforce characteristics. This integration of global standards with local adaptation enhances the effectiveness and applicability of the QCC system in different countries (Khan & Jin, 2024; Presbitero et al., 2025).

CATL adopts “quality awe” as its core quality philosophy, emphasizing strict responsibility, zero tolerance, and zero-defect quality control. Its quality management system integrates quality reliability technology, management, and systems across the entire production chain, from procurement and R&D to manufacturing and customer service. This comprehensive system provides strong institutional and cultural support for the implementation of the QCC system at CATL headquarters and its international branches (CATL, 2024, 2025a, 2025b).

**a. Implementation Background and Objectives**

CATL headquarters implemented the Quality Control Circle (QCC) system from the early stage of the company’s establishment and continuously refined it into a standardized quality management model. The implementation was driven by three main factors: addressing complex quality challenges in battery production, strengthening employee quality responsibility through the “Quality Awe Implementation Management System,” and improving production efficiency and cost control through continuous quality enhancement (CATL, 2024, 2025b). The objectives of the QCC system are structured into short-, medium-, and long-term goals. In the short term, the system focuses on solving operational quality issues and achieving closed-loop problem management. In the medium term, it aims to strengthen the QCC operational mechanism and improve employees’ quality management capabilities. In the long term, CATL seeks to build a continuous improvement culture with full employee participation, ensuring standardized and refined quality control to maintain its industry-leading product quality.

**b. Organizational Structure and Responsibility Division**

CATL headquarters applies a hierarchical QCC organizational structure based on full employee participation. The highest level is the Quality Control Leading Group, composed of senior management responsible for strategic planning, policy formulation, and resource support. The middle level is the QCC Promotion Office, supported by SQA (Supplier Quality Assurance) and QMC (Quality Management Center), which manages daily operations, training, activity coordination, and evaluation. At the operational level, QCC teams are formed voluntarily by employees, technicians, and managers to identify and solve quality-related problems in their departments (CATL, 2024, 2025b). Under the “Quality Awe Implementation Management System,” each level has clearly defined responsibilities. The Quality Control Leading Group approves major improvement programs, the QCC Promotion Office organizes training and evaluates achievements, while QCC teams conduct improvement activities using the PDCA cycle and report their results. In addition, QA&RSD employees are recognized as key actors in implementing the QCC system and are required to actively participate in quality improvement initiatives.

## 1. Operation Process and Implementation Steps

The implementation of the QCC system at CATL headquarters follows the PDCA (Plan–Do–Check–Act) cycle to ensure systematic and sustainable quality improvement activities (CATL, 2025b; Lima et al., 2025; Wu, 2024). In the planning stage, QCC teams identify quality issues in production, R&D, and supply chain processes through inspections, statistical analysis, and employee feedback. The teams determine problem causes, improvement targets, implementation schedules, and expected economic benefits.

During the implementation stage, teams apply quality management tools such as fishbone diagrams, Pareto charts, and SPC (Statistical Process Control) to analyze and solve problems while complying with SOP and checklist standards. Improvement data and implementation results are documented to ensure traceability. In the checking stage, improvement outcomes are evaluated through data comparison and field verification. If targets are not achieved, corrective actions and re-implementation are conducted; if targets are achieved, the results are submitted to the QCC Promotion Office for evaluation. In the action stage, the QCC Promotion Office reviews improvement achievements, standardizes successful methods into company procedures, and promotes them company-wide. QCC performance is also integrated into quality KPIs and employee performance evaluations to strengthen continuous improvement incentives.

## 2. QCC Implementation Case at the Headquarters (Production Link)

One QCC team in CATL's production workshop, consisting of operators, technicians, and quality inspectors, identified excessive coating thickness deviation in the battery pole piece coating process, which reduced the cell assembly qualification rate by 0.8% and caused monthly losses of nearly 500,000 yuan (CATL, 2024, 2025a; Wu, 2024). Using the PDCA approach, the team identified the main causes through Pareto chart analysis, including unstable doctor blade pressure, slurry viscosity fluctuations, and operator parameter-setting errors. Improvement actions included adjusting coating machine parameters, optimizing slurry mixing, conducting operator training, and standardizing parameter-setting procedures.

After 15 days of monitoring, the coating qualification rate improved from 99.2% to 99.95%, achieving the targeted goal. The optimized process was later incorporated into the company's SOP standards and implemented across all production workshops. This project was recognized as the quarterly "Excellent Quality Improvement Project" and was estimated to reduce annual quality losses by more than 6 million yuan, demonstrating the effectiveness of CATL's standardized QCC implementation system.

## Guarantee Mechanism

CATL headquarters supports QCC implementation through institutional, resource, incentive, and cultural guarantee mechanisms (CATL, 2024, 2025a, 2025). Institutionally, the company established regulations such as the "Quality Awe Implementation Management System," "QCC System Implementation Rules," and "Quality Improvement Achievement

Evaluation Measures” to define standards, procedures, and evaluation criteria. QCC performance is also included in departmental quality assessments. From the resource perspective, CATL provides professional training, quality management tools, testing equipment, and financial support for QCC activities. Special training on PDCA and quality improvement methods is regularly conducted to enhance employee capabilities.

The incentive mechanism includes financial rewards, honorary recognition, promotion opportunities, and performance evaluation integration for outstanding QCC teams and individuals. Quarterly recognition programs, such as the “Excellent Quality Police” award, further encourage employee participation. Culturally, CATL promotes the “quality awe” philosophy through training, internal campaigns, and achievement-sharing sessions to strengthen a culture of full participation and continuous improvement. In addition, the Quality Digital Engineering Center provides Six Sigma management and empowerment training to improve the professionalism and sustainability of the QCC system.

### **3. Current Situation of QCC System Implementation at CATL’s Indonesian Branch**

#### **a. Implementation Background and Objectives**

CATL’s Indonesian branch, established in 2022 in Central Java, Indonesia, serves as a strategic production base for the Southeast Asian market. The implementation of the QCC system was driven by several factors, including compliance with Indonesian regulations and environmental standards, overcoming local supply chain limitations, improving employee quality awareness and operational skills, and adapting the headquarters’ QCC practices to local conditions (Khan & Jin, 2024; Presbitero et al., 2025; Wu, 2024). The branch maintains CATL’s “zero tolerance, zero defect” philosophy while emphasizing localized adaptation. Its short-term objective is to solve production and supply chain quality issues, the medium-term objective is to strengthen employees’ quality improvement capabilities, and the long-term objective is to establish a localized QCC culture and become a benchmark for battery quality control in Southeast Asia.

#### **b. Organizational Structure and Responsibility Division**

The Indonesian branch adopts a localized hierarchical QCC structure adapted from CATL headquarters (Khan & Jin, 2024; Presbitero et al., 2025). The Branch Quality Control Committee, consisting of branch executives and headquarters quality experts, oversees planning, policy formulation, and resource coordination. The QCC Promotion Group, formed by quality, production, and HR managers, manages operations, training, and cross-cultural communication. At the operational level, QCC teams consist mainly of local employees supported by several technical staff from headquarters. Responsibilities are clearly defined: the committee approves improvement plans and ensures compliance with local regulations; the promotion group organizes localized training and evaluates improvement activities; while QCC

teams identify and solve operational and supply chain quality issues while encouraging local employee participation.

c. Operation Process and Implementation Steps

The Indonesian branch follows the PDCA cycle but adapts the process to local operational realities. In the planning stage, QCC teams identify quality issues related to raw materials, production operations, and logistics through employee feedback, inspections, and supplier communication. During implementation, practical and easy-to-understand quality management tools are applied, supported by technical guidance from headquarters experts. Cross-department and supplier collaboration is emphasized to improve local quality standards. In the checking stage, improvement outcomes are evaluated through testing, statistical analysis, and field verification. When technical limitations arise, the branch collaborates with headquarters for additional support. Finally, in the action stage, successful improvement methods are standardized and promoted within the branch, while unresolved problems are analyzed further and re-enter the PDCA cycle. Improvement results are also reported to headquarters for global knowledge sharing.

d. QCC Implementation Case at the Indonesian Branch

A QCC team consisting of five local employees and two technical experts addressed two major issues: excessive impurity content in cathode raw materials and non-standard pole piece cutting operations. These problems increased the cell defect rate to 1.2% and were worsened by supply chain limitations and logistics delays (Khan & Jin, 2024; Presbitero et al., 2025; Wu, 2024). Using a simplified PDCA approach, the team identified unclear supplier standards and inconsistent employee operations as the main causes. Improvement actions included developing localized supplier standards, conducting Indonesian-language practical training, standardizing operating procedures, and signing quality improvement agreements with local suppliers. After one month, the impurity rate decreased by 80%, while the pole piece cutting defect rate fell to 0.3%. The improvement methods were incorporated into branch operational standards and reported to headquarters as a reference for other overseas branches, demonstrating the practical and localized nature of the Indonesian QCC system.

e. Guarantee Mechanism

The Indonesian branch developed a localized QCC guarantee mechanism focusing on institutional, resource, incentive, and cultural support. Institutionally, the branch established local QCC regulations aligned with Indonesian laws and environmental standards while integrating QCC performance into employee evaluations. From the resource perspective, headquarters provided technical experts and operational support, while the branch established multilingual training programs in Indonesian, Chinese, and English to strengthen employee capabilities and supply

chain coordination. The incentive mechanism combines financial rewards, promotion opportunities, training programs, and welfare benefits to encourage employee participation. Quarterly recognition programs are also implemented to improve employee motivation and belonging. Culturally, the branch promotes CATL’s “quality awe” philosophy through local-language communication, case sharing, and team activities to integrate global quality standards with Indonesian cultural values and strengthen cross-cultural collaboration.

f. Comparative Analysis between Headquarters and Indonesian Branch

Despite differences in operational environments, both CATL headquarters and the Indonesian branch share several similarities in QCC implementation (CATL, 2024, 2025a, 2025b; Presbitero et al., 2025). Both adopt the “quality awe” philosophy, apply the PDCA cycle, implement hierarchical organizational structures, and establish institutional, resource, incentive, and cultural support systems. Both also focus on solving quality problems, improving efficiency, reducing costs, and strengthening competitiveness through continuous improvement. However, significant differences exist in implementation approaches due to variations in local conditions, supply chain maturity, employee skills, and cultural environments. The headquarters emphasizes highly standardized and professional quality management, while the Indonesian branch prioritizes flexibility, practical adaptation, local employee training, and supply chain localization to ensure effective implementation in the Southeast Asian context (Khan & Jin, 2024; Presbitero et al., 2025).

Table 1. Implementation Differences

Comparison Dimension	CATL's Headquarters	CATL's Indonesian Branch
<b>Implementation Focus</b>	Focus on full-process quality control, covering all links such as R&D, production, supply chain, and customer service, emphasizing standardized and large-scale promotion, focusing on the professionalism and systematisms of quality improvement, and integrating advanced quality management methods such as Six Sigma to improve the refinement level of quality control. (For example, the pole piece coating thickness deviation improvement case uses professional tools to achieve full-process optimization)	Focus on localized pain points, focusing on solving core problems such as supply chain raw material quality, local employee operation standardization, and cross-cultural communication, emphasizing process simplification and adaptation, focusing on the feasibility and practicality of quality improvement, and giving priority to solving key problems affecting production efficiency and product qualification rates. (For example, the raw material impurity and cutting operation improvement case adapts to local resources and employee skills)

<p><b>Organizational Structure</b></p>	<p>Clear hierarchy and detailed division of labor. Relying on a mature quality control system, the QCC Promotion Office is led by SQA and QMC with outstanding professional capabilities, covering all departments of the company, and can achieve cross-departmental and cross-field quality improvement collaboration. (For example, in the coating improvement case, the production, technology, and quality departments promote collaboratively)</p>	<p>Simplified structure, focusing on localized adaptation. The QCC Promotion Group includes local management personnel and experts dispatched by the headquarters. The grassroots QCC teams are mainly composed of local employees, emphasizing cross-cultural communication and local employees' sense of participation, adapting to the local enterprise management model. (For example, in the raw material and cutting improvement case, local employees take the lead and experts provide guidance)</p>
<p><b>Operation Process</b></p>	<p>Standardize and normalized processes with rigorous steps, focusing on data statistics and technical analysis, using a variety of professional quality management tools, emphasizing the traceability of the improvement process and the solidification and promotion of achievements, and deeply integrating with the headquarters' quality digital system. (For example, in the coating improvement case, Pareto charts and SPC tools are used, and data is traceable throughout the process)</p>	<p>Simplified and flexible processes, adapting to local employees' skill levels and detection conditions, using simple and easy-to-understand quality management tools, focusing on actual improvement effects, reserving adjustment space, and having stronger process adaptability to effectively cope with the uncertainty of the local supply chain. (For example, in the raw material and cutting improvement case, the detection and analysis processes are simplified, and simple operation methods are adopted)</p>
<p><b>Guarantee Mechanism</b></p>	<p>Improved systems and sufficient resources. The incentive mechanism mainly includes cash rewards, honorary commendations, and promotion links. Cultural cultivation emphasizes "full-staff quality", relying on a mature quality culture and clear and strict reward and punishment rules to promote the normalized operation of the QCC system. (For example, the coating improvement team won the</p>	<p>Localized systems and adapted resources. The incentive mechanism combines local culture and employee needs, adding incentive methods such as skill training and welfare subsidies. Cultural cultivation focuses on cross-cultural integration, eliminating communication barriers and adapting to local employees' cognitive characteristics and cultural background. (For example, the raw material and cutting improvement team members</p>

	quarterly excellent project, and the core members obtained promotion points)	obtained skill training qualifications and transportation subsidies)
<b>Employee Participation</b>	Employees have strong quality awareness and high professional skill levels, with prominent participation enthusiasm. QCC teams are mainly composed of technical personnel and management personnel, focusing on professional ability improvement, and can skillfully use quality management tools to carry out improvement activities. (For example, all members of the coating improvement team can skillfully use tools such as SPC and fishbone diagrams)	Employees are mainly local employees with uneven quality awareness and skill levels. Their participation enthusiasm needs further guidance. QCC teams focus on local employee training, and gradually improve their quality improvement capabilities through multilingual training and hands-on guidance. (For example, in the raw material and cutting improvement team, local employees master basic improvement methods through practical training)

Source: Data Processed, 2026

**Causes of Differences in QCC System Implementation**

The differences in the implementation of the QCC system between CATL headquarters and its Indonesian branch are mainly influenced by environmental, goal, and resource factors.

First, environmental differences significantly affect the implementation approach. CATL headquarters in China operates within a mature supply chain system, strong policy support, and a highly skilled workforce, enabling a more standardized and professional QCC implementation. In contrast, the Indonesian branch faces challenges such as an underdeveloped supply chain, different regulatory conditions, and a workforce dominated by local employees with diverse cultural backgrounds, requiring more flexible and localized QCC practices (Khan & Jin, 2024; Presbitero et al., 2025). For example, while the headquarters can quickly optimize production processes through advanced technical systems, the Indonesian branch must first address supplier adaptation and employee capability issues.

Second, differences in organizational goals also shape QCC implementation. The headquarters focuses on achieving standardized global quality control, strengthening product consistency, and maintaining leadership in the international market. Meanwhile, the Indonesian branch prioritizes adapting to local market conditions, solving localized operational problems, enhancing product competitiveness in Southeast Asia, and supporting sustainable local development. As a result, the headquarters emphasizes refined quality improvement, whereas the Indonesian branch focuses more on practical adaptation and operational problem-solving (Khan & Jin, 2024; Presbitero et al., 2025).

Third, resource differences influence the operational scale and sophistication of the QCC system. CATL headquarters possesses abundant financial, technological, and human resources, including advanced digital quality systems and professional quality management teams. In contrast, the Indonesian branch operates with more limited resources and lower employee technical capabilities, requiring simplified processes and adaptive resource allocation. For instance, the headquarters utilizes digital systems and Six Sigma-based quality tracking, while the Indonesian branch relies more on simple statistical methods and localized training approaches to ensure effective implementation of the QCC system (Khan & Jin, 2024; Presbitero et al., 2025).

**Table 2. General Background of Informants**

Question	Indonesia Answer	China (Headquarters) Answer
Position	Specialist Engineer (HR – Compensation & Benefits)	Production Supervisor / Engineer / R&D / Operator
Work Experience	~1 year	2–6 years (more experienced)
Department	HR (support function)	Production, Quality, R&D (core operations)
QCC Involvement	Not directly involved	Actively involved, even leading QCC teams

**Source:** *Data Processed, 2026*

The Indonesian respondent represents a support-function perspective in human resources, and is not yet directly involved in QCC as shown in the comparison. Respondents from the headquarters are mostly from the production, quality, and R&D functions, with more direct and substantial experience in QCC. This difference is crucial because it partly explains why the headquarters displays a more mature and operationally ingrained QCC practice than the Indonesian branch.

**Table 3. QCC System Implementation**

Question	Indonesia	China
Implementation of QCC	Focus on system building, compliance, an digitalization (HR systems, payroll, BPJS)	Structured system: promotion → team formation → planning → execution → monitoring
Team Formation	Based on PIC responsibility, requires director approval	5–8 members (operators, technicians, leaders), formed voluntarily
Employee Roles	System contributors and process improvers	Problem identifier, implementer, feedback provider
Meeting Frequency	Weekly	Weekly (or flexible depending on project)

Type of Problems	Regulatory, tax differences, system approvals	Production defects, efficiency, cost control
Tools Used	Not clearly defined (system-based approach)	5 Why, Fishbone, Pareto, Control Chart
Management Support	Fully supportive (100%)	Provides resources, time, and recognition
HQ vs Indonesia Differences	Indonesia still developing, adapting to local laws	HQ more mature, structured, and experienced

**Source:** *Data Processed, 2026*

At CATL headquarters, QCC is performed in an organized sequence: team formation, planning, execution, monitoring and assessment. Teams are often self-selected, include cross-functional operational workers, and employ known quality techniques such as Fishbone Diagrams, 5 Why Analysis, Pareto Charts and Control Charts. The Indonesian one, meanwhile, is still in a formative state. The primary organizational focus is on system building, compliance, payroll, attendance and digital administrative readiness. Therefore, QCC in Indonesia is still more hierarchical and administrative, with less intense use of formal quality methods in daily problem solving.

**Table 4. Employee Engagement in QCC Activities**

Question	Indonesia	China
Employee Response	Enthusiastic and interested	Mostly positive, especially experienced employees
Idea Sharing	Encouraged through structured platform	Strongly encouraged (brainstorming culture)
Responsibility	Increased responsibility	Strong increase in ownership and belonging
Teamwork & Communication	Improved collaboration	Strong improvement in teamwork and cohesion
Motivation	Benefits, incentives, improvements	Growth, recognition, promotion opportunities
Rewards	Allowances, attendance rewards, training	Cash rewards, certificates, promotions

**Source:** *Data Processed, 2026*

The interview findings indicate that QCC has a beneficial contribution to employee engagement in both scenarios, although with different main causes. In headquarters, the engagement is more intrinsic, in the sense that the employees relate the participation in QCCs with possibilities of progress, recognition and promotion. Compared to the Indonesian branch, the involvement is more extrinsic and is affected by concrete benefits such as allowances, attendance incentives and training possibilities. Despite these variations, QCC enhances teamwork, communication and sense of responsibility in both environments. This suggests that, when employees are provided with meaningful roles in identifying and solving

workplace problems, participative quality efforts can enhance employee commitment.

**Table 5. Impact on Productivity and Quality**

Question	Indonesia	China
Productivity Impact	Improved through digitalization	Increased output (5–10%), reduced downtime
Example Problem Solved	HR conflict during management transition	Production defects (e.g., packaging improved from 97.2% → 99.8%)
Error Reduction	Through system improvement & motivation	Through root cause analysis & standardization
Operational Efficiency	Improved due to digital systems	Faster problem-solving (1–2 months → 2–3 weeks)
Evaluation Method	System performance & error reduction	KPI-based: quality, efficiency, cost, engagement

**Source:** *Data Processed, 2026*

The interviews confirm that QCC also assists performance improvement. At headquarters, the impacts can be directly seen in production performance through increased output, reduced downtime, lower defect rates, and faster problem-solving cycles. These results suggest that a mature QCC deployment can deliver tangible operational benefits. This now has a more indirect effect in the Indonesian branch and is focused on administrative and system efficiency, in particular through HR digitalization and process formalization. However, this is essential for organizational readiness, but also reveals that the Indonesian branch still requires further capability development for QCC to be able to generate production-level gains as accomplished at the headquarters.

**Table 6. Challenges and Improvement Priorities**

Question	Indonesia	China
Challenges	Language, benefit gap, cultural differences	Time constraints, lack of skills, communication issues
Limitations	Approval complexity, regulatory differences	Language barriers, infrastructure, awareness gaps
Suggested Improvements	Digitalization, better benefits, expand QCC	Training, scheduling, knowledge transfer from HQ

**Source:** *Data Processed, 2026*

The comparison results show that the Indonesian branch has more fundamental problems including language barriers, cultural differences, complexity of approvals, and disparities in compensation and perks. Problems in these areas affect the motivation,

communication and speed of institutionalization of QCC. The main restraints at the headquarters are mainly of operational type, such as time limitations, workload and variety in employees' grasp of quality tools. China has to focus on maximizing a mature system, while Indonesia still needs to focus on adaptation, motivation, training, and organizational alignment.

### **Discussion of Interview Findings**

From the perspective of Total Quality Management (TQM), CATL headquarters demonstrates a higher level of QCC maturity, where quality improvement has become integrated into daily work routines, organizational structures, and problem-solving processes. In contrast, the Indonesian branch is still developing its foundational quality management systems, indicating an earlier stage of QCC institutionalization. Based on employee engagement theory, the findings indicate that employee participation can be strengthened through both intrinsic and extrinsic motivations. At the headquarters, engagement is driven more by professional growth, recognition, and a sense of ownership, while at the Indonesian branch, employee participation is more influenced by incentives, rewards, and training opportunities. This suggests that continuous improvement values in the Indonesian branch still rely more heavily on external reinforcement before becoming fully internalized within the organizational culture.

The findings also support the philosophy of Kaizen, which emphasizes continuous improvement through gradual change and active employee participation. However, the comparison highlights that Kaizen-oriented practices such as QCC cannot be implemented uniformly across different locations. Their effectiveness depends on the organization's ability to balance global quality standards with local realities, particularly regarding employee capabilities, communication practices, and supply chain conditions (Khan & Jin, 2024; Presbitero et al., 2025; Wu, 2024).

## **g. Implementation Effects and Existing Problems of CATL's QCC System**

### **1) Implementation Effects**

#### **a) Implementation Effects at the Headquarters**

The implementation of the QCC system at CATL headquarters has produced significant improvements in quality management and operational performance (CATL, 2024, 2025a; Lima et al., 2025; Wu, 2024). Product quality and reliability have continuously improved, while customer complaints and quality-related losses have decreased, supporting the company's "zero defect" objective. In addition, QCC activities have enhanced production efficiency by solving operational bottlenecks and reducing production costs. For example, the pole piece coating improvement project reduced annual quality losses by more than 6 million yuan. The QCC system has also strengthened employees' quality awareness and fostered a corporate culture of "full participation and continuous improvement" through the

implementation of the “quality awe” philosophy. Furthermore, the headquarters’ QCC practices have become a reference model for CATL’s global branches, contributing to the standardization of the company’s international quality control system.

#### **b) Implementation Effects at the Indonesian Branch**

The Indonesian branch has also achieved notable results through the localized implementation of the QCC system (Khan & Jin, 2024; Presbitero et al., 2025; Wu, 2024). The system successfully addressed production and supply chain quality issues, significantly improving product qualification rates and supporting compliance with local market and regulatory requirements. For instance, the raw material impurity and pole piece cutting improvement project reduced the defect rate from 1.2% to 0.3%. In addition, employees’ quality awareness and operational skills improved, while cross-cultural communication barriers gradually decreased. The branch also strengthened cooperation with local suppliers, reducing supply chain risks and improving operational stability. These achievements contributed to better cost control, enhanced product competitiveness in Southeast Asia, and stronger support for CATL’s regional expansion strategy.

### **h. Existing Problems**

#### **1) Existing Problems at the Headquarters**

Despite the maturity of the QCC system, CATL headquarters still faces several challenges (CATL, 2024, 2025a, 2025b). First, innovation capacity remains limited because many QCC projects focus only on process optimization rather than breakthrough innovation, particularly in integration with R&D activities. Second, cross-departmental collaboration efficiency still needs improvement due to communication and coordination barriers. Third, the transformation and promotion of QCC achievements across departments are not fully optimized, causing some successful projects to remain limited to specific units. Finally, as the company grows, balancing standardized QCC procedures with the unique operational needs of different departments has become increasingly difficult.

#### **2) Existing Problems at the Indonesian Branch**

The Indonesian branch faces more localized challenges in the early stage of QCC implementation (Khan & Jin, 2024; Presbitero et al., 2025). Employee quality awareness and technical capabilities still require improvement, and many QCC teams remain dependent on guidance from headquarters experts. Supply chain quality control is also difficult due to inconsistent supplier standards and limited local capabilities. Furthermore, some QCC procedures are not fully adapted to local operational realities, resulting in reduced efficiency. Limited resources, insufficient technical support, and

communication barriers between local employees and headquarters staff also affect the effectiveness of QCC implementation.

#### **i. Optimization Suggestions for CATL's QCC System**

##### **1) Optimization Suggestions for the Headquarters**

To improve the headquarters' QCC system, several strategies are recommended (CATL, 2024, 2025a, 2025b). First, CATL should strengthen integration between QCC activities and R&D innovation to encourage breakthrough quality improvements and support intelligent quality management through digital systems and the Quality Digital Engineering Center. Second, the company should enhance cross-department collaboration by establishing dedicated coordination teams and improving communication mechanisms. Third, CATL should strengthen the transformation and company-wide promotion of QCC achievements through a centralized knowledge-sharing platform. Finally, the company needs to balance standardization with departmental flexibility to ensure that QCC activities remain relevant to different operational needs.

##### **2) Optimization Suggestions for the Indonesian Branch**

For the Indonesian branch, optimization should focus on strengthening localized adaptation (Khan & Jin, 2024; Presbitero et al., 2025). First, the branch should intensify employee training using Indonesian-language and culturally adapted QCC programs to improve employees' independent problem-solving abilities. Second, CATL should improve local supply chain quality management by building long-term partnerships with suppliers, providing supplier quality training, and establishing more effective supplier evaluation systems. Third, the QCC system should be further localized by simplifying operational procedures and aligning them with Indonesian regulations, cultural characteristics, and workforce conditions. Finally, headquarters should increase financial, technical, and human resource support for the Indonesian branch to strengthen technical capabilities, improve collaboration efficiency, and ensure the sustainable implementation of the QCC system in Southeast Asia.

## **5. CONCLUSION**

This study discusses the adoption of the Quality Control Circle (QCC) system at Contemporary Amperex Technology Co., Limited (CATL, 2025a), especially comparing the implementation at the headquarters and the Indonesian branch. The research emphasizes the role of QCC as a significant method in enhancing employee engagement, productivity, and product quality in a multinational manufacturing company. The results show that QCC stimulates employees to take active roles in identifying and solving problems in the workplace through collaborative conversation and the PDCA (Plan–Do– Check–Act) cycle. Such participatory approach results in a strong sense of ownership of their job, better

teamwork and a stronger dedication to company goals. Therefore, firms can realize ongoing improvement in operational procedures and product quality.

The headquarters and the Indonesian branch are in distinct surroundings, but they have the same underlying idea of quality management and continual improvement. Headquarters' concentration is on standardization, advanced quality tools, and large-scale implementation, whilst Indonesian branch focuses more on localized adaptation, employee training, and supply chain improvement. Both implementations are different, but they both have great benefits, in terms of increasing the rate of product qualification, lowering defects, and boosting the engagement of employees.

Analytically, the study reveals that the successful implementation of QCC depends on the organization's capacity to balance global standardization and local adaptation. In international firms a standard quality management system cannot always be applied equally to all branches. This is not possible due to differing workforce capabilities, cultural backgrounds, supply chain maturity and regulatory contexts. The QCC system at CATL headquarters is operated under a mature quality management structure, with the assistance of strong resources, experienced people and mature procedures. This allows more sophisticated problem solving with professional tools and methodical data analysis.

In contrast, the Indonesian branch necessitates a more flexible and simplified implementation of QCC. The branch is very young and relies significantly on local staff and suppliers, therefore the organization must focus on employee training, supplier quality improvement, and cross-cultural communication. These modifications enable the QCC system to operate successfully in a different operational context. The data further reveals that QCC is not only beneficial for technical quality results but also for human capital development. QCC involves employees directly in problem-solving activities and promotes communication between management and employees, which in turn builds a culture of continuous improvement.

In conclusion, the findings of this research indicate that the Quality Control Circle system is an effective strategy for enhancing employee engagement and productivity in global manufacturing organizations. When backed by adequate training, management commitment and localized adaptation, QCC can allow firms to maintain high quality standards and at the same time empower people to contribute actively to organizational performance. They give useful lessons for firms operating across multiple nations, illustrating that sound quality management involves strong global standards and adaptable local delivery.

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