The Framework of Quality Culture Maturity in Indonesian Construction Company to Reduce the Construction Failure Rate

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Abstract. A construction company is a business that offers services for construction and/or construction works. In a duration from July 2017 to July 2019, 23 accidents have occurred that are related with infrastructure projects conducted by highly qualified national construction companies that are certified for ISO quality standard, among which are several national strategic projects. These events cause physical and material losses that affect the level of confidence towards the quality of the work results. These events can occur because the application of ISO is not followed by the development of a good quality culture, and there is no ownership of quality culture maturity. For this reason, the objective of this research is then to identify the variables of quality culture maturity in construction companies so that it can be used to measure maturity level of quality culture, and to obtain a strategy to increase the said maturity level quality culture in construction companies, in an effort to reduce the amount of potential construction failures.

Keywords: construction, infrastructure, project, failure

1. Introduction

A construction service is the service for construction consultation and/or construction works [1]. From this definition, it can be said that a construction company is a business that provides construction consultation services and/or construction works services. But what is meant by construction company in this research is a company that provides construction works services not consultant or planning services.

Compared to other sectors of industry, the construction industry is viewed as the industry with poor emphasis on quality. There have been numerous amounts of critics that have been given for poor workmanship. It is not only the end products but also the process, the workers, materials, etc. that are under great pressure to be improved in terms of quality [2].
Figure 1. Number of Construction Failures Committed by State-Owned Construction Companies from July 2017 to July 2019 as Reported by National News Websites.

The impact of the numerous occurrences of construction failures, other than material, physical, and health-related losses, is that the government is forced to put these infrastructure development projects, whose work involves large and heavy equipment on elevated structures, on temporary suspension. This is followed with a thorough evaluation on the design, standard operation procedure (SOP), work method, human resources, and equipment, including increasing supervision over the whole project [3].

The majority of cases of construction failures occur during the execution and monitoring of project management process phase [4]. Most of these cases happen due to the lack of integrity/professionalism from the construction workers, the use of poor materials and procedures, the lack of inspection conducted by authorities, poor investigation of incidents, and lack of punishment for professional mistakes [5]. The skill of the workers is not the main problem, but their carelessness is [6]. According to Henry (2006); Cronemyr, Bäckström, & Rönnbäck, 2017; Gryna et al., (2007), Dellana & Hauser (1999), and Mahmood & Mohammed (2008), to reach the individual level, this problem must be addressed by implementing quality culture in the organization of construction companies [7].

Cultural adjustments often fail because they are usually focused on changing artefacts, without changing the fundamental assumption that defines perception, thought process, feelings, and behavior. In the process of changing quality culture, the maturity level approach is required as a road map or framework that prioritizes action and tools for evaluation, and as the common language and vision [8].

For this reason, there emerges a necessity for evaluation and thorough study with aims to identify the variables that are used to measure the maturity level of quality culture in construction companies in Indonesia, so that there may be a better understanding on the current conditions in those companies, and thus allow for better and more accurate strategizing for the improvement of quality culture maturity level in construction companies, all in the effort of reducing the amount of construction failures.

2. Theoretical Study

2.1. Quality Culture in Construction Companies

Construction works are the entirety or a portion of the activities that involve the building, operation, maintenance, demolishing, and rebuilding of a structure [1]. In Indonesia, the executor of a construction project is called a contractor [9].

Culture itself is the collective programming of the mind that differentiates a member of a group or category from another [10]. The more detailed and more widely accepted definition of culture is a pattern of fundamental assumptions that are created, discovered, or developed by a certain group whose means is to learn to resolve problems involving external adaptation and internal integration, which has been
successful enough to be considered valid, and hence is taught to new members of the group as the correct way to understand, think, and feel things related with that specified problem [11]. According to Kamus Besar Bahasa Indonesia (KBBI), the definition of quality is the measure of how good or bad a thing; content; level or degree (cleverness, intelligence, etc.) is. Quality can be defined as a basic tool for conducting comparisons of objects or services. The word quality contains many definitions, but fundamentally, it is the innate traits that an object has that allows for the fulfilling of a necessity, whether explicitly stated or not. Quality Culture in a construction organization is a major deciding factor in the successful implementation of Quality Management System (QMS). Regarding with its relations with company organization, there are numerous definitions of culture, each with a little variation with the other, the variation of which relates to their individual concerned focus of study [12].

In the Regulation of the Minister of Public Works and Housing Number 2 of 2017 concerning the Standard for Quality Management, it is regulated that one of the requirements for contractors to enter a project tender is that they “Have a Quality Management Certificate, an Environmental Management Certificate, and an Occupational Health and Safety Certificate; (only required for construction works that are Complex/High Risk and/or intended for Large Business Qualification)”. In line with the Regulation of the Minister of Public Works and Housing Number 2 of 2017, according to the LPJK Regulation No. 12/LPJK of 2009 regarding the re-registration of construction company certificates in 2010, every Class 7 (the highest class in the qualification of construction companies in Indonesia) construction company must own an ISO 9001 certificate that has not expired in order to fulfil the requirements to conduct construction works [12].

The implementation of quality culture in construction companies in Indonesia has not been fully executed [11]. There is a tendency that the approach that companies take regarding quality management are more emphasized towards the technical aspects such as quality assurance and measurement & analysis [11]. Moreover, the currently existing quality culture has not been implemented in an integrated manner. This is seen from the way the workers evaluate all aspects of the research (strategic planning, customer focuses, top management, measurement and analysis, empowerment, quality improvement, quality assurance, and recognition) more poorly than the management does [11].

### 2.2. Failure in Construction

Failure in construction is the occurrence where the results of construction work are not in accordance with the working specifications that have been agreed on in the construction work contract, whether in part or in whole, as the result of an error from the service user or service provider [9]. However, another source states that the failure in construction can be defined as all failures that occurred during construction, which can be in the form of a collapse or distress of the structural system in such way that is unable to safely fulfil the expected objective [13].

According to Thornton (1985), failure in construction can be classified into three categories, which are related with safety, function, and ancillary, while its causes can be divided into five major areas [13]:

- Design deficiencies;
- Construction deficiencies;
- Material deficiencies;
- Administrative deficiencies;
- Maintenance deficiencies.

The causes of many structural failures are the impacts from many variations of human error, which are generally caused by [13]:

- Lack of knowledge
- Tardiness in communicating received knowledge
- Neglect towards newly received knowledge
- Misunderstanding of the received knowledge
- General neglect
- Error in procedure.

The impact of having construction failure is having to rework the item of the construction who failure that causes overtime, additional cost for resources, additional time needed, and the reduction of the scope or quality of work. The consequence from all of this is the reduction in profit gained, the loss of reputation and market share, the increase of management turnover and teamwork, decreasing
productivity, higher costs, and other consequences from stakeholders due to delays and lateness affecting other stages of the project [13].

2.3. Maturity Level of Quality Culture

Quality culture is a system for organization values that creates an environment that is conducive for the sustainable development and improvement of quality. Quality culture itself consists of the philosophy, belief, attitude, norms, traditions, procedures, and hopes that improve quality [14]. Quality culture is the pattern of habits, beliefs, and behavior concerning quality [15]. Another source states that quality culture is the pattern of values, beliefs, and hopes that are embedded and developed in members of an organization concerning their work with aims to create high quality products and services [16].

A good implementation of quality culture in a company should solve issues concerning quality in the construction industry and allows for the fulfilling of customer needs. This is because to increase business revenue, orientation, and higher customer satisfaction, better employee involvement, teamwork, and employee management is needed [2].

The definition of maturity level of a company is the state of completion, perfection, or readiness in work fulfilment. Maturity can be used to measure the effectivity, skill, and competence in managing activities and company programs [17]. Maturity in a company is the achievement of maximum development for the company in perfect conditions with aims to fulfil a company goal. The measure of maturity is usually subjective because the company and their employees often only execute their operational requirements [18].

2.4. Quality Culture Maturity Model

The purpose of a Quality Culture Maturity Model, often abbreviated as QMM, is as a guideline for determining the state an organization is in their process towards achieving quality culture, and as a guide towards identifying the correct path [8].

![Figure 2. Five levels of the quality maturity model](image_url)

| Level | Component | Explanation |
|-------|-----------|-------------|
| 1     | Ad hoc    | Implementation of quality culture is nonexistent, or even chaotic. |
| 2     | Repeatable| Implementation of quality culture is existent but not well defined or well structured. |
| 3     | Defined   | Implementation of quality culture is existent and well defined, but not routinely done. |
| 4     | Managed   | Implementation of quality culture is defined and routinely done. However, it has not been regularly evaluated or even if it has, the results of the evaluation have not been followed up with improvements. |
| 5     | Continuous| Implementation of quality culture is defined, routinely done, regularly evaluated, and continuously improved. |
3. Research Methodology
The methods and research strategies that are used for this research are archive analysis, survey, and case study. The product of this research is the identification of all variables that are used to measure the maturity level of quality culture implementation in construction companies.

![Figure 3. Research stages](image)

4. Discussion
There are 5 dimensions of maturity: a perspective on information management, project as a strategy, work process and its deliverables, organization culture, and data standard [19].

The quality culture maturity model is needed to develop quality culture in a company because it will help organizations in assessing their current level of quality culture and identifying the actions needed to increase their maturity level [20].

Based on literature study [8][10][18][20][21][22][23][24] and as well as validation from experts, 5 variables can be identified that can be used to illustrate the implementation of culture in a construction company. These five identified variables and sub-variables are:

- Leadership.
- Management & Communication
- Attitude
- Participation & Empowerment
- Investment in Human Resources.

4.1. Leadership
What is meant with the leadership variable by Blanton (1991); Robinson (1996); Scholtes and Hacquebord (1988); Senge (1990); Tribus and Tsude(1987) here is that in working in a system and process with a group of people who work together, leadership is needed to develop the organization’s mission and purpose, crucial for sustainable development [21].

| No. | Sub-Variable                        | Explanation                                                                 |
|-----|-------------------------------------|-----------------------------------------------------------------------------|
| 1   | Vision and value setting            | Results from quality improvement become company vision and values and are well articulated. |
| 2   | Trust                              | Trust and openness towards management.                                       |
| 3   | Inspiration and motivation         | Motivation given by upper-level management for activities relating with quality improvement. |
| 4   | Concise decision making            | There is a need for clear decision-making procedure in order to identify the processes that need to be improved in terms of quality culture information integration. |
| 5   | Leadership commitment              | Leaders should have commitment and consistency towards the chosen quality approach by investing in promotions for quality culture improvement. |
| 6   | Setting expectations/ common language | Leaders and employees work together in setting clear and measurable expectations. |
4.2. Management & Communication

The Management & Communication factor is a factor that deals with the managerial aspects of an organization and the communication that is to be implemented. This factor is closely related with the failure in the implementation of quality management system, which can be caused by an unclear objective, unrealistic team expectation, unsupportive management officers, and lack of strategy in its implementation [22].

The aspects that are included in the management & communication factor, according to Dawson (1995) are effective communication between project managers regarding related projects, the analysis and implementation of evaluation from previous projects, open supportive communication on all levels, and the training and development of all project management resources [22].

Table 3. The management & communication sub-variable

| No. | Sub-Variable                     | Explanation                                                                 |
|-----|----------------------------------|-----------------------------------------------------------------------------|
| 1   | Knowledge management             | Knowledge management maturity is a guide or measure of the company's position in the managing of knowledge. |
| 2   | Process management               | The company is directly involved with the direction of the project management and have a policy that illustrates standardization, measurement, control, and continuous improvement for the project management process. |
| 3   | Vertical alignment               | There is an alignment of attitudes, values and behaviors which greatly influence the quality culture. |
| 4   | Horizontal alignment             | The company encourages the entire team to work together as a mutually supportive system. |
| 5   | Optimization                     | Maturity in a project organisation relates to how effective and efficient the project organization is in achieving their project objectives. |
| 6   | Strategic plan generation        | A strategic plan that comes from the environment that has been made into an implemented system. |
| 7   | Progress monitoring              | There is a system that manages progress monitoring that is regularly done throughout the company, and corrective actions are always taken. |
| 8   | Performance measurement          | There is a measurement for performance, and its implementation has gone well and have been regularly evaluated. |
| 9   | Documentation                    | The company organization have a documentation that is integrated with all divisions. |
| 10  | Communication flow               | The company have a complete communication system for reporting, feedback, verification, and the spreading of best practice and lesson learned, with a variety of communication model options and the information is always consistent and not ambiguous. |
| 11  | Consistency                      | The company executes quality management consistently. |
| 12  | Compliance                       | The company has met the established quality standards but is always alert to the possibility of defects or failures that will occur. |
| 13  | Proactive / preventive           | The company takes preventive measures against quality defects/failures that are integrated with risk management. |
| 14  | Root cause analysis/corrective action | The company establishes analytical procedures to find out the root causes of problems and the formulation of corrective actions that are always evaluated and developed. |
No.  Sub-Variab le  Explanation
15  Staff structure is appropriate The company has an organizational structure that makes it easy to carry out work procedures and communicates with other teams and can adapt to any changing situation.
16  Feedback from Customer The company has a feedback system to get responses from both internal and external client satisfaction.

4.3. Attitude
One of the definitions of an organization’s attitude is ‘a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner’ (Rokeach 1972: 112) [10].

In the implementation of quality management, it is recommended that the management alters the organization into being more flexible, agile, adaptable, responsive, and to add more value [22].

Table 4. The Attitude sub-variable.

| No. | Sub-Variable | Explanation |
|-----|--------------|-------------|
| 1   | Attitude to risk | The views or reactions towards risk at work. |
| 2   | Attitude to quality | The attitude and effort to satisfy clients by fulfilling the agreed level of quality. |
| 3   | Attitude to quality improvement | Attitudes and efforts of the company and all employees in improving product quality and how the position of these attitudes and efforts within the company. |
| 4   | Attitude to change | The views or reactions (if needed) towards a change at work. |
| 5   | Perception of drivers for change | The company and their employee’s attitude and effort in improving product quality, and the position of the attitude and the effort in the company. |
| 6   | Type of quality improvement initiatives | The change that is implemented on quality and directly affects the company, especially the company’s targets and objectives. |
| 7   | Perception of responsibility for quality | An understanding of who is responsible for the quality of the work results. |
| 8   | Attitude to mistakes | Companies view employee mistakes as opportunities to learn and be accepted as inevitable when trying new things. |
| 9   | Fairness/justice (focus on the process) | The company establishes and continuously develops clear procedures to identify defects and mistakes in order to be fair in determining who is responsible and the penalties. |
| 10  | Functional excellence/capability | The company develops personnel’s consistency and fights against personal satisfaction as to strive for continuous improvement and consistently not feeling complacent. |
| 11  | Customer service/definition of Quality | The company has quality service standards, namely ensuring client satisfaction by anticipating all their needs and making agreed upon service level agreements with clients. |

4.4. Participation & Empowerment
An individual employee’s study will gain them knowledge and insight, but the results do not always benefit the company. This can be seen from the attitudes and the impacts of the learning. Opposite from this, an emphasis on team learning and knowledge sharing will benefit the company by emphasizing collaborative learning that exceeds an individual’s potency [23].
Moreover, in a workplace, the term ‘empowerment’ has two meanings: the process where management strengthens employees; and the process where an employee takes over authority. The QMM describes a culture of quality as doing the right thing; learning; suited to the business environment, and explicitly and appropriately aiming to improve quality.

**Table 5.** The participation & empowerment sub-variable.

| No. | Sub-Variable                | Explanation                                                                                                                                 |
|-----|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Staff empowerment           | Employees are encouraged to make decisions with consultations and approval from the management.                                             |
| 2   | Nature and level of learning that occurs (Learning) | The attitude and degree of learning of all the employees are evaluated, monitored, and regularly renewed.                                 |
| 3   | Staff encouragement to innovate | All staff at all levels are encouraged to innovate.                                                                                       |
| 4   | Contribution                | Employees are encouraged to contribute to the company's goals by being given direction in order to understand their position in achieving company goals. |
| 5   | Teamwork                    | The company encourages the forming of high-performing teams that consistently fulfils or even exceeds the performance and quality objectives. |

4.5. *Investment in Human Resources.*

The significance of intellectual asset can be seen in the act that as the intellectual economy grows, more organizations begin to need to invest in activities that produce intellectual products, where the production of new knowledge is a vital difference [24].

What is meant by the investment in human resources is having intellectual asset as employees’ skill and knowledge in implementing quality culture.

**Table 6.** The investment in human resources sub-variable.

| No. | Sub-Variable       | Explanation                                                                                                                                 |
|-----|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Attitude to staff  | Having staffs as company assets that are committed to executing the systems in the company.                                                |
| 2   | Training provision | The program is given to staffs that allows them to improve themselves in terms of skills and more specified tasks.                         |
| 3   | Development of staff | The process of empowerment and development of staffs in the company to realize work continuity.                                        |
| 4   | Recognition of staff | The awarding of staffs who completes their tasks structurally as well as those who improve well.                                         |
| 5   | Punishment of staff | The punishing of staffs who does their tasks in a manner that is non-compliant to the agreed quality culture.                           |

5. **Conclusion**

It is conclusive that a quality management system already exists in Indonesia. However, with the multitude of construction failures happening, the issue of quality of construction works in Indonesia is not on whether the quality management system is existent, but rather on the implementation of said system in construction companies.

For this reason, to measure the maturity level of the implementation of quality culture in construction companies, there needs to be a maturity variable that illustrates the implementation of the quality culture. According to literature study and expert validation on this research, there appears to be five variables
for maturity level that can be used to measure the implementation of quality culture in construction companies. The variables and sub-variables are as follows:

- **Leadership**
  - Vision and value setting
  - Trust
  - Inspiration and motivation
  - Concise decision making
  - Leadership commitment
  - Setting expectations/ common language

- **Management & Communication**
  - Knowledge Management
  - Process Management
  - Vertical Alignment
  - Horizontal Alignment
  - Optimization
  - Strategic plan generation
  - Progress monitoring
  - Performance measurement
  - Documentation
  - Communication flow
  - Consistency
  - Compliance
  - Proactive / preventive
  - Root cause analysis/corrective action
  - Staff structure is appropriate
  - Feedback from Customer

- **Participation & Empowerment**
  - Staff empowerment
  - Nature and level of learning that occurs (Learning)
  - Staff encouragement to innovate
  - Contribution
  - Teamwork

- **Attitude**
  - Attitude to risk
  - Attitude to quality
  - Attitude to quality improvement
  - Attitude to change
  - Perception of drivers for change
  - Type of quality improvement initiatives
  - Perception of responsibility for quality
  - Attitude to mistakes
  - Fairness/ justice (focus on the process)
  - Functional excellence/ capability
  - Customer service/definition of Quality

- **Investment in Human Resources**
  - Attitude to staff
  - Training provision
  - Development of staff
  - Recognition of staff
  - Punishment of staff

6. **Recommendation**

After obtaining the variables for maturity level of the implementation of quality culture, there needs to be a research that aims to measure the current level of maturity on the implementation of quality culture in construction companies.

This further research will allow for better strategies in improving the companies’ maturity levels to ideal conditions, as well as to reduce the amount of construction failure occurrences.

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