Knowledge base integration management system quality, safety and environmental to improve organizational performance in construction company

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Abstract. Development in Indonesia showed high progress in the economics but had low progress for social; institutional; and in environmental sectors. Furthermore, Indonesian Construction Company still inhibited by low competitiveness; along Safety system management application; safety record and bad occupational health. Based on Indication in above, it’s necessary to apply an integrated management system between Quality, Safety and Environmental for manage the projects construction. The Implementation of an integrated management system, it’s necessary to improve with knowledge base Integration Management System; due to accelerated targets achievement of integration and to learned cause of the failure of integration aspect. Therefore, this research aims to validated Knowledge Base Integration Management System of Quality, Safety and Environmental to improve organization’s performance on Construction Service Company. This research was conducted with case studies and expert validation for the integration model, objectives and risk relationships.

1. Introduction
The construction is one kind of sector that helps increase Indonesia’s economic growth. In 2018, the economic growth of 5.06%, the business of construction sector contributed 0.72% [1]. Because of this, the construction industry has provided a significant increase for national economic development. However, research for development in Indonesia between 2007 - 2012 showed high progress in the economic but low progress in the social and institutional and a decrease in the environmental. This shows that the sustainable development index in Indonesia only indicates sustainable development in the short term, not in the long term, development also raises problems in the form of a decrease in social resources, ie regions with more advanced development tend to have lower social capital. This also happened in the construction’s sector in Indonesia [2]. Amount of burden on the economic sector from project construction in developing countries have a big impact on the community, environment and other social devices. So, it is necessary to continuous integration on project construction’s management in thus countries [3]. Implement a parallel system that requires duplicates for documentation, running procedures, accessing, managing forms and other paperwork. It has proven difficult to install a separated management system that is equipped with quality, environment, and occupational health and safety, and to ensure their alignment with organizational strategies [4].

Based on the above phenomenon, it is necessary to apply an integrated management system between Quality, safety and Environmental in managing of construction projects. To optimize it, the system also supports the knowledge management system [5]. Therefore, there is a need to develop a Knowledge Base Integration Management System Quality, Safety and Environmental information system in Construction Services Companies to Improve Organizational Performance.
2. Literature Review

Process integration is a concept / methodology for combining several parts of a process or entire process to reduce the consumption of resources or harmful emissions to the environment [6]. The integration process consisting of process management, the process of creating value, and supporting processes have developments that are compatible with sustainable management processes that focus on risk management [7]. Process management integration was the integrating all activities in all aspects so that there is no duplication of activities in one single system [8]. The integration process has an effect on increasing business results, improving better decision making, as well as improving service quality based on the balance of service levels, customer and financial needs [9]. The management process can be integrated at different levels of application of management system standards [8].

The elements of process integration in accordance with the clauses contained in the management system standard published by ISO can be found in several studies. The elements of process integration are, the scope of the management system with organizational context input (1), leadership (2), management policy integration; including organizational reference norms, definitions and terminology (3), planning (4), supporting processes (5), Operations (6), Performance evaluation (7) and improvement (8) [5].

The management system integration process is inseparable from risk. These risks must be managed so as not to impede the objective achievements of the management system integration process. Therefore, risk management is needed to manage. Risk assessment is the main-key process of risk management [10]. The risks that can occur the process of management system integration are, (1) Lack of financial resources; (2) Lack of employee knowledge of management system integration; (3) Lack of skilled employees; (4) Lack of employee motivation; (5) Lack of awareness of the benefits of integration; (6) Feel there are other priorities that are more important than management system integration; (7) demands from different stakeholders; (8) There are cultural differences between disciplines in each management system; (9) Uncertainty about the value of integrated management systems in the market; (10) Lack of examples of specific sector implementation (in this study the construction sector); (11) Short-term orientation; and (12) A huge effort is needed to implement an integrated management system [11].

3. Research Methodology

The first is literature review, In this part to identify indicators of models, targets and risk of integration management system Quality, Safety and Environmental. After review literature, all of sub-indicators had collected should be verified by 5 (five) expert validation questionnaire. The expert is the directors, QMS Manager or Lecturer who have 10 years experiences minimum. The data that had been validated by experts is created for pattern recognition and then the knowledge base is developed.

4. Results

From previous studies and developments during expert validation, there are 46 dominant risks that must be managed with the right strategy. The proposed strategies in the form of causes, preventive actions, impacts, and corrective actions are summarized in the table below.
| Code | Risk of Integration System Management | Cause Variables | Preventive Action Variable | Impact Variable | Variable Corrective Action |
|------|--------------------------------------|-----------------|---------------------------|-----------------|---------------------------|
| X1.3.1.1 | The complexity and differences between management systems | there are differences in understanding between management systems | improve related socialization and training | The identification of external and internal organizational issues is inaccurate | Conducting a review re-Related |
| X1.3.1.2 | lack of inflationary considerations | lack of awareness to consider inflation in identifying issues | consider economic factors | The identification of external and internal organizational issues is inaccurate | Conducting a review re-Related |
| X1.3.1.3 | Organizations in construction companies do not set job descriptions and standards / requirements that are integrated into 3 systems | lack of competence of the source of the power of human | wear source power of human beings who are competent to define the job description and standards / requirements are integrated to the third system | Implementation of an optimal integrated management system | Assign Job Description appropriate scope of system management scope that is used |
| X1.3.1.4 | Weak partner selection | limited partner availability | Pre-qualify partners | The implementation of an integrated management system is not optimal | Choosing a partner just who is considered more powerful |
| X1.3.1.5 | Organizations in construction companies have not yet guaranteed that the Work Breakdown Structure (WBS) has taken into account quality, safety, health and environmental aspects | Lack of competence of the source of the power of human | Preparing WBS that have considered aspects of quality, K3, and environment | WBS is not composed with consideration of the three aspects of the | Conducting a review re-Related |
| X1.3.1.6 | Companies are less able to produce | The process is not controlled | Compile SOP related | The organizational performance goal | Conducting a review re-Related |
| Code          | Risk of Integration System | Cause Variables                                      | Preventive Action Variable | Impact Variable | Variable Corrective Action |
|--------------|---------------------------|------------------------------------------------------|----------------------------|-----------------|---------------------------|
| X1.3.1.7     | Organizations in construction companies have not been able to identify and analyze important issues related to risk and opportunity related to the quality of safety and the environment | Lack of competence of the source of the power of human | Improve socialization and related training | Risk organization is not in accordance with the process of the three systems of management of the | Doing identification reset |
| X1.3.1.8     | Organizations in construction companies have not been able to determine risk control related to the quality of safety, security, occupational health and the environment | Lack of competence of the source of the power of human | Improve socialization and related training | Risks be not controlled by either | Conducting a review re-Related |
| X1.3.1.9     | Organization in the company of construction has not been able to identify and analyze issues of importance related to Risk and Opportunity product friendly environment and save resource power energy | Lack of competence of the source of the power of human | Improve socialization and related training | The company produces products that are not environmentally friendly | Doing identification reset |
| X1.3.1.10    | Organizations in construction companies have not been able to realize the confidence of workers in the company | lack of corporate events that support consolidation between workers in the company | Doing events companies are routinelly | The identification of external and internal organization issues is inaccurate | Involve workers in the company's HSE program |
| X1.3.1.11    | The company's priority orientation is inaccurate | Understanding the scope of the different | Conduct related socialization | Identify the need and expectation of companies are not accurate | Conducting a review re-Related |
| X1.3.2.1     | The demands of stakeholder’s interests are different | Standard contracts are different for each stakeholder intere | Creating standards and policies raw | Insurers are liable towards third system was not ap | Conducting a review re-Related |
| Code | Risk of Integration System | Cause Variables | Preventive Action Variable | Impact Variable | Variable Corrective Action |
|------|-----------------------------|-----------------|----------------------------|-----------------|---------------------------|
| X1.3.2.2 | An understanding of the duties and responsibilities are related to the person in charge SMMK3L still low | Lack of socialization understanding of the duties and responsibilities | Improve socialization and related training | Insurers are liable not understand and related duties and responsibilities responsibilities | Replacing the person in charge who is more aware and more competent |
| X1.3.2.3 | Lack of commitment to the level of top management to contribute to the improvement of the comfort of the place of work and process innovation | The comfort of the workplace and the innovation process are considered not yet important | Conduct related socialization | The person in charge is less productive in carrying out their duties and responsibilities | Improving the comfort of the place of work |
| X1.3.2.4 | Lack of commitment to craftsmanship quality high and stakeholder interests that support the delivery of the performance of the organization | Lack of awareness of the importance of high-quality workmanship | Making agreements related to mockup standards | The quality of work that is produced does not conform with planning | Doing benchmark, visualization examples related workmanship quality high |
| X1.3.2.5 | The lack of unity of view of the whole employees who already work in the bottom of the standard previously | Lack of socialization about the importance of unity of views | do related socialization | the views of the workers are not equal or not equal | do socialization reset |
| X1.3.2.6 | The integrated management system has not been established as a goal of the company | lack of corporate management commitment | Conduct related socialization | The process of system management overlap overlap that causes the process is too long | Incorporating an integrated management system as the goal of the company |
| X1.3.3.3.1 | The company does not have the QMS, QMS, and SMK3 certificates | Lack of corporate management commitment | Conduct related socialization | Reference to the integration of management systems is not accurate | Conduct certification |
| X1.3.3.2 | Development of ISO 2015 norms or standards, 8 Clauses in HLS and components are not | Lack of socialization is related to understanding the development of norms or standards | Conduct related socialization | Reference to the integration of management systems is not accurate | Carry out ISO certification for workers |
| Code | Risk of Integration System | Cause Variables | Preventive Action Variable | Impact Variable | Variable Corrective Action |
|------|---------------------------|----------------|---------------------------|----------------|---------------------------|
| X1.3.4.1 | Lack of planning-oriented term long | Limited funds | Develop programs run length which efficiently and in accordance with the funds that exist | The company's program is not directed | Arrange long-term programs according to stages and abilities |
| X1.3.4.2 | The demands of stakeholder’s interests are different | Levels of needs and interests and different | follow the direction of stakeholder interests are primary (in case it is SOE) | difficult to get a varied project with the scope of the different | create a standard alternative in accordance with stakeholder interests are different |
| X1.3.4.3 | Risk identification and treatment have not been integrated | Risks each process is compartmentalized-box | Integrate risk identification | organizational performance goals are not achieved | conduct a review the related |
| X1.3.4.4 | The procedure of risk identification and handling is not yet clear | Planning procedures are not ready yet | Compile SOP related | identification and handling of risks not working | agreed diagram flow identification of risks that simple before doing the manufacturin g procedure |
| X1.3.5.1 | lack of source power that is competent | limited funds and have not been programmed with either | draw up a program run length which efficiently and in accordance with the funds that exist | organizational performance goals are not achieved | make the program fulfillment source of power that is competent in the term short |
| X1.3.5.2 | lack of source power of financial | program preparation is not yet ripe | Setting up the program to the needs of the source of power financially with detailed | The organizational performance goal was not achieved | Make planning needs of source power financially term short and priorities |
| Code       | Risk of Integration System | Cause Variables                                                                                       | Preventive Action Variable | Impact Variable                                      | Variable Corrective Action |
|------------|----------------------------|-------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------|-----------------------------|
| X1.3.5.3   | lack of source power human beings who have competence in the field of system management | the source of the power of man less to get the training and certification | Increased program of training and certification for the source of the power of man to determine the competence and the criteria of competence | The criteria of competence that made not accurate | Creating a program ful fillment source of power that is competent in the term short |
| X1.3.5.4   | Organizations in company construction job description that accommodates the requirements of quality, health work, and the environment that can improve the performance of the organization | lack of awareness regarding these requirements | Job description details are made more fully related to this matter | The criteria of competence that made not accurate | Socialization understanding of the job description to accommodate the three requirements of the |

### X1.3.6. Operational Components / Clauses

| Code       | Risk of Integration System | Cause Variables                                                                                       | Preventive Action Variable | Impact Variable                                      | Variable Corrective Action |
|------------|----------------------------|-------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------|-----------------------------|
| X1.3.6.1   | Organizations in enterprises construction not clarify the requirements of quality, health and safety work, the environment for the design, purchase of products and services | Not to assume that the K3 quality requirements, and the environment is important to be prepared | Make the requirements are clear about the quality, K3 and environment | Requirements not met | Taking the benchmark of the requirements of the good and true |
| X1.3.6.2   | Organizations in construction companies have not been able to monitor the agents that are in construction | The unavailability of methods for monitoring agents | Compile SOP related | The action identified was not implemented | Conduct an audit for evaluation |
| X1.3.6.3   | Lack of resources the power of man that competent | The source of the power of man less to get the training and certification | Improve training programs and related certifications | The process of emergency is not handled with the appropriate | Improving competencies power source power human |

### X1.3.7. Components / Performance Evaluation Clause

| Code       | Risk of Integration System | Cause Variables                                                                                       | Preventive Action Variable | Impact Variable                                      | Variable Corrective Action |
|------------|----------------------------|-------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------|-----------------------------|
| X1.3.7.1   | Lack of auditors who have the competence | the source of the power of man less to get the | Enhancing training programs and related certification | The audit process is not running with either | Conduct an audit by combining sensor |
Perceive the relationship between information systems and the integration of the Quality, Safety and Environmental management system processes described above in previous studies, it is expected that with the development of a knowledge base Integration Management System Quality, Safety and Environmental organizational problem of it can be solved and performance can be improved and more efficient so that the objectives of the study where to improve the performance of the construction service company organization.

6. Conclusion
From this study it can be concluded (1) there are 8 clauses that can be integrated in the quality, safety and environmental system management process integrate, (2) there are 46 dominant risks that must be managed with the right strategy. The proposed strategy is in the form of causes, preventive actions, impacts, and corrective actions. By developing a process integration model, targets and risk relationships in the quality, safety and environmental system management process integration in a knowledge base website, it is hoped that the performance improvement of construction service company organizations can be achieved.

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is hoped that in future research a more integrated Quality, Safety and Environmental process inteegrase system can be developed, as the online-based decision-making system is not only limited to the knowledge base.

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