International Journal of Engineering Research and Technology. ISSN 0974-3154, Volume 12, Number 10 (2019), pp. 1701-1706


# Safety Institutional Structure Model for Developing Safety Culture in Construction Industry

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**Abstract**
Improvement a safety culture in Indonesia requires synergic coordination between stakeholders. For this reason, an analysis of the existing institutional conditions is needed, identification of factors influencing the development of OHS culture, as well as the preparation of appropriate institutional schemes so that the implementation of the National OHS Vision, Mission, Policy, Strategy and Work Program which involves multiple organizations / agencies because the number of activities covering various sectors, does not run individually according to their respective interests. This study aims to find the right institutional relationship model for safety in the construction industry in Indonesia. This research methodology uses content validation and constructs that are analyzed using ISM and SSIM to determine the institutional safety model. The results of this study are the Ministry of Public Works and the Ministry of manpower must work together to determine the safety program in the construction industry
**Keywords:** Institutional; safety culture; construction industry

## I. INTRODUCTION

The construction service industry is a manufacturing or fabrication activity that is relatively small and has a scope of work consisting of buildings, bridges, roads. The scope of this work is categorized in procurement and involves various disciplines, engineering involved in the project cycle consisting of conceptual, preliminary and detailed design stages to prepare specifications, equipment and material criteria to be purchased as well as blueprints for the components to be purchased was built [1]. The scope of work in the Construction Industry broadly covers buildings (housing, offices, factories, public buildings and so on), infrastructure and means of transportation, irrigation (canals, dams and other buildings), water treatment, power centers and others. Whereas the construction work is a whole or part of a series of planning and / or implementation activities along with supervision which is a framework to realize a building or other physical form. The Construction Industry is a business that involves four main groups / four participants consisting of owners, designs consisting of engineers or architects, constructors, labor [2]

In a construction project there are three important things that must be considered namely time, cost and quality [3]. In general, the quality of construction is a basic element that must be maintained to always be in accordance with the plan. However, in reality there are often cost overruns as well as delays in implementation time [4][5]. Thus, often the expected work efficiency and effectiveness are not achieved. This results in the developer losing competitive value and market opportunities [6].

Institution as a formal organizational system was first raised [7], according to him, institution is an ideal type for all formal organizations. Max Weber defines institutions as a form of organization characterized by hierarchy, role specialization, and a high level of competence shown by officials who are trained to fill these roles. Characteristics of organizations that follow this institutional system are the division of labor and specialization, impersonal orientation, hierarchical power, rules, long careers, and efficiency. The main goal of the institutional system is to achieve optimal work efficiency. According to Weber, institutional organization can be used as an effective approach to control human work so that it reaches its target, because institutional organizations have a clear structure of power, and people who have power have influence so that they can give orders to distribute tasks to others [8]

## II. THEORITICAL STUDY

### *A. Institutional Theory*

[9] states that an institution is a set of rules, procedures, norms of individual behavior, and control of resources which simultaneously regulate one's relationships with others. Institutional development is a process of improvement that includes the structure and relationships among members in the organization to be more productive with the aim of meeting the needs of its members effectively, efficiently, and fairly. The ability of an institution to coordinate, control sources of interdependence among partisans is largely determined by the ability of these institutions to control sources of interdependence that are characteristics of commodities such as transaction costs, risks and uncertainties.

Institutional can also be interpreted as a norm / rule of regulation or organization that facilitates coordination in shaping the expectations of each that may be achieved by mutual cooperation, which includes all social, economic, cultural, and other institutions, both in the form of an organization , as well as traditions and institutions contained in society consisting of elements of public, private, and non-governmental organizations [10].

### *B. Safety Institutional*

In principle, institutions are different from organizations, where institutions are thicker with regulations and organizations are more focused on structure. Based on these definitions it can be said that institutions are rules that facilitate an institution or organization in coordinating and cooperating to achieve the desired common goal.

The rules in this case include formal and non-formal rules that are needed and agreed upon, therefore the rules must be clear, measurable and consistent. The organization or institution involved is expected to have credible human resources and have sufficient knowledge and understanding of the existing problems.

The organization is basically a wheel, a unit of development activities and their related environment is often referred to as an institution, meaning that if the system framework in development administration can be seen as a macro approach, then the system approach in institutional development can be viewed as a micro approach in the framework of studying activities development. The definition of institution here refers to the combination of organizational goals and their relationship with the environment which is the result of interaction and adaptation, so that the institution can mean the organization which contains individual values and the social environment. Therefore, in development activities, institutions must also be linked to development goals.

Institution is defined as an organization that forms, supports and protects normative relations and patterns of certain activities and at the same time forms functions and services that are valued in an environment. Therefore institutional development is defined as all planning, structure and new instructions, or realignment of organizational direction, including:

a) Create, support and strengthen normative relationships and active patterns,
b) Establishment of functions and services that are valued by the community,
c) The creation of facilities that connect new technologies with the social environment.

In order for an institution to run and be adhered to by its members, it is necessary to have an intensive structure that contains sanctions and rewards so that the community will obey it.[9] states that institutions have three components, namely:

1) Formal rules, including the constitution, statute, law and all other government regulations. Formal rules form political systems (governance structures, individual rights), economic systems (ownership rights in conditions of scarcity of resources, contracts), and security systems (justice, police)

2) Information rules, including experience, traditional values, religion and all factors that influence the subjective forms of individual's perception of the world in which they live; 3) Enforcement mechanisms, all these institutions will not be effective if not accompanied by enforcement mechanisms. Variables that form the institutional dimensions of work safety in Indonesia are compiled, namely:

1. Program Objectives
2. Benchmarks for Assessing Each Goal
3. Main Constraints
4. Institutions Involved in Program Implementation

## III. METHODOLOGY

Variables are anything in the form of anything (attributes, characteristics, symptoms or values of people, objects, or activities) that have certain variations and are determined by researchers to be studied so that information is obtained about it and conclusions can be drawn [11]. In this study there are 2 (two) types of variables, namely:

**a. Independent Variable**

The independent variable is a variable that influences or is the cause of change or the emergence of a dependent variable [11]. The independent variable is called the X variable. In this study the independent variable (X) is an influential factor in building a K3 culture.

**b. Dependent Variable**

Dependent variable is a variable that is affected or which is due to the presence of an independent variable. The dependent variable or Y variable in this study is safety culture.

From the literature study and references in the previous chapter, we found several variables which will be used for this research instrument. Following is a table that explains the variables used in this study:

**Table 1.** Research variables

| Institutional Variables | |
|---|---|
| **X.1** | **Program Objectives** |
| X.1.1 | The realization of Occupational Safety and Health (K3) culture in Indonesia |
| X.1.2 | Improve synergic coordination among stakeholders in the K3 field |
| X.1.3 | Increasing the independence of the business world in applying K3 |
| X.1.4 | Improve workforce competency and competitiveness in the field of K3 |
| **X.2** | **Benchmarks for Assessing Each Goal** |
| X.2.1 | The commitment of employers and workers in the field of occupational safety and health increases |
| X.2.2 | The role and function of all sectors in the implementation of occupational safety and health is increasing |
| X.2.3 | The ability, understanding, attitude and behavior of the occupational safety and health culture of employers and workers increase |
| X.2.4 | The application of occupational safety and health through risk management and management of risk behaviors increases |
| X.2.5 | The application of occupational safety and health assessment systems (SMK3 Audit) in the business world is increasing |
| X.2.6 | The implementation of occupational safety and health culture in micro, small and medium enterprises (MSMEs) is increasing |
| X.2.7 | Implementation of an integrated occupational safety and health information system is increasing |
| X.2.8 | An understanding of occupational safety and health is embedded from early childhood through higher education |
| X.2.9 | The role of professional organizations, tertiary institutions, practitioners and other components of society in increasing understanding, abilities, attitudes, cultural behavior in occupational safety and health increases |
| X.2.10 | The integration of occupational safety and health in all fields of scientific discipline is increasing |
| **X.3** | **Main Constraints** |
| X.3.1 | Weak leadership |
| X.3.2 | Unclear authority |
| X.3.3 | Limited financial resources |
| X.3.4 | Performance Evaluation System which is not yet effective |
| X.3.5 | Inadequate quantity and quality of human resources |
| **X.4** | **Institutions Involved in Program Implementation** |
| X.4.1 | Ministry of Manpower |
| X.4.2 | National K3 Council (DK3N) |
| X.4.3 | Regional K3 Council (DK3W) |
| X.4.4 | K3 Service Company (PJK3) |
| X.4.5 | Jamsostek (BPJS Employment) |
| X.4.6 | Astek (Health BPJS) |
| X.4.7 | K3 Center (ex Center for Occupational Safety and Hypertension Development) |
| X.4.8 | Ministry of PUPera |
| X.4.9 | Local Government (Pemda) |
| X.4.10 | Non-Governmental Organization (NGO) |
| X.4.11 | Civitas Academic / University |
| X.4.12 | Professional Association |
| X.4.13 | Employers' Association |
| X.4.14 | Trade Unions / Trade Unions (SP / SB) |
| X.4.15 | Construction Services Development Institute (LPJK) |
| X.4.16 | Construction Services Company |
| X.4.17 | K3 Institution in the Company / Project |
| X.4.18 | Management |

Research instruments are tools or facilities used by researchers in collecting data so that work or activities become easier and the results are better, in the sense of being more accurate, complete, and systematic so that it is easier to process [12]. In research, the research instrument consists of questions related to research variables obtained from literature studies that have been validated by experts and will later be given to respondents. The quality of the data obtained is largely determined by the research instrument.

The following are research instruments that will be used in this study:

**1. Questionnaire**

Questionnaire is a collection technique that is done by giving a set of questions or written statements to respondents to answer [11].

**2. Structured interview**

Interview is a communication process of interaction between two parties, at least one of which has set a serious goal that involves the question and answer of a question [13].

**Data Collection**

Data collection is an important stage of a study. Where in this stage the process of gathering all forms of information is carried out, or a communication process that involves the transfer of data from the respondent / resource person to the researcher [14].

In this study several data are used, including primary data and secondary data. Primary data is data collected for research from the actual place of the event or its source (Sekaran, 2006), or it can also be interpreted as a data source that directly provides data to data collectors [11]. In this study, primary data were obtained from interviews with experts and experts to get responses to variables and questionnaires to be given to respondents.

Whereas secondary data is data obtained by researchers from existing sources through several intermediary media or obtained and recorded by other parties (Sekaran, 2006). In this study, secondary data used are books, journals, regulations, and thesis. There is also data collected through several stages, including:

**Literature Review**

At this stage the initial literature studies, secondary data collection, and field observations are carried out. The initial literature study was conducted to find out what influences the development of OSH culture. Secondary data was collected to find out the current national OSH policy. There was also a field observation (a visit to the National OSH Council) to get the data in this phase I. Data collected at this stage was in the form of research variables.

Delphi Survey

After obtaining the variables in this study, then further validation is done to the experts. Validation is done to experts through a survey with Delphi technique. The Delphi survey was conducted to obtain agreement or consensus in validating the research variables, namely the institutional forming elements consisting of institutional objectives, the authority that must be owned by the institution, the source of funding for the institution and finally the institutional stakeholders. The Delphi survey was also conducted to obtain agreement on the weighting / rating of these variables.

The Delphi technique was first developed by RAND Corporation to get a consensus among US military experts on sensitive issues where these experts can "discuss" without having to face to face. The aim is to get the most reliable consensus from the opinions of a group of experts through a series of questionnaires with controlled opinion feedback [15]. The Delphi survey was conducted in 3 rounds, namely:

• Stage 1 questionnaire,

Conducted to validate the research variables in advance to a number of experts. The experts / experts invited to participate in the validation questionnaire were 7 people with a minimum of 10 year's experience in the field of K3 and had a minimum education of S1. The validation process contains expert responses to agree / disagree that variable x influences the building of K3 culture.

• Stage 2 questionnaire

After obtaining the variable x which has been validated by the expert / expert, carried out the weighting / rating of these variables. Likert scale used questionnaire stage 2 with a scale of 1 to 6. With a scale of 1 is strongly disagree until scale 6 is strongly agree. Stage 2 questionnaire has 37 respondents with respondent criteria, namely: D3 education level with at least 5 years experience, or S1 with at least 3 years experience, or S2 with at least 2 years experience. Respondents at this stage are each respondent who is in direct contact with K3 implementation activities in their respective work environments.

• Stage 3 questionnaire

After obtaining the results of the analysis of the questionnaire stage 2 and obtained a rating of each variable, the results are brought back to the respondent. Respondents were asked to consider whether the variable gets the appropriate rating. Respondents in the stage 3 questionnaire were 7 respondents with criteria of at least 10 years experience in the field of K3 and had a minimum education of S1.

The next data collection is a pair-wise comparison survey or pairwise comparison survey. This survey was conducted to develop a model using Interpretive Structural Modeling (ISM). This questionnaire was conducted to compare a number of variables (institutional stakeholders) to determine the effect of each of these stakeholders. The survey was conducted on 7 respondents with criteria of at least 10 years experience in the field of K3 and had a minimum education of S1. In this questionnaire, institutional stakeholders are no longer grouped into one group. Respondents were asked for their opinions or opinions regarding stakeholder relations. They are asked to compare one stakeholder with other stakeholders choosing the right value for them. The values provided in the symbols V, A, X, and O. Where the meanings of the letters are:

• V = If stakeholder i influences stakeholder j

• A = If stakeholder j influences stakeholder i

• X = If stakeholders i and j both influence each other

• O = If stakeholders i and j do not influence each other

## IV. RESULT AND DISCUSSION

### *a. Intepretive Structural Modelling*

As explained in the previous chapter, this study uses the Delphi survey and model development using the ISM method to answer the research question, namely: "What is the appropriate institutional structural model in building OHS culture in the construction sector?"

The purpose of using the Delphi survey is to determine what are the objectives of the program, benchmarks to assess each objective, the main constraints, and to determine who are the stakeholders involved in these institutions, which will then be developed using the ISM method to obtain a model OSH institutional. In this chapter the process and results of each stage of the Delphi survey are explained. Starting the profile of the resource persons involved in the survey, the stages of the questionnaire, and the results obtained. And pairwise comparison before being developed using the ISM method. Interpretive Structure Modeling method or ISM is used to develop the OSH Construction institutional model. ISM is a process that can help to structure and model a complex relationship. Where before being able to use ISM, input data is needed in the form of pairwise comparison for institutions / agencies involved in the implementation of national OHS policies. This section will explain the process of developing the ISM model, starting from the profile of respondents, the course of the survey, the development of structural self-interaction matrix, reachability matrix, division of levels to the development of the model.

In the previous discussion, stakeholders or institutions involved in Construction OSH institutions were successfully identified through the Delphi survey. Institutions that get high ratings are included in the pairwise comparison questionnaire. Pairwise comparison questionnaire is used to determine the hierarchy or relationship between one institution and another using Interpretive Structural Modeling (ISM). The speakers were asked for their opinions on the relationship between the institutions involved in building OHS culture by comparing the two institutions in one question. The number of questions in the questionnaire can be calculated based on the number of institutions / agencies that are included with the formula N (N-1) / 2, where N is the number of institutions. Because there are 20 stakeholders, the number of questions is 20x (20-1) / 2 = 190. And the interviewees were asked to answer 190 stakeholder relations.

### *b. SSIM*

The first step of ISM is to analyze contextual relationships. At this stage the contextual relationship is "influencing". The indication is whether an institution influences other institutions in implementing OSH policies. Based on this, a Structural Self-Interaction Matrix or SSIM was developed. In the paired comparison questionnaire, the interviewees were asked to identify the contextual relationship between the two institutions / stakeholders, Oi and Oj. In identifying relationships, there are four symbols that can be used, namely: V: stakeholder i moves stakeholder j A: stakeholder j moves stakeholder i X: stakeholder i and j move each other O: stakeholder i and j don't move each other. After the results are obtained, the Delphi technique is used to produce consensus among the speakers. The calculation uses the mode value in each question, if the mode value reaches 67%, then agreement between respondents is considered to have been reached. And the 190 results of the comparison have a mode result above 67%. Based on these results, SSIM was developed as in Table 1.

**Table 1.** Structural Self-Interaction Matrix

| | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 | S18 | S19 | S20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | | O | O | O | V | V | X | O | V | V | O | X | X | X | X | X | X | X | X | O |
| S2 | | | V | O | A | O | A | O | O | X | O | A | O | O | O | O | O | O | O | O |
| S3 | | | | A | A | O | A | O | O | O | O | A | O | O | O | O | O | O | O | O |
| S4 | | | | | V | O | A | O | O | O | O | O | O | O | O | O | O | O | O | O |
| S5 | | | | | | O | A | O | O | V | O | A | X | X | O | O | X | O | O | O |
| S6 | | | | | | | O | V | X | V | X | O | X | X | X | X | X | X | X | X |
| S7 | | | | | | | | O | O | V | X | X | X | X | X | X | X | X | O | O |
| S8 | | | | | | | | | O | X | X | A | X | X | O | O | X | X | X | X |
| S9 | | | | | | | | | | O | O | O | O | O | O | X | O | X | O | O |
| S10 | | | | | | | | | | | O | A | X | X | O | O | X | O | O | O |
| S11 | | | | | | | | | | | | O | O | O | X | O | O | X | O | O |
| S12 | | | | | | | | | | | | | X | X | O | O | X | X | X | X |
| S13 | | | | | | | | | | | | | | O | O | O | X | O | O | O |
| S14 | | | | | | | | | | | | | | | O | O | O | O | X | O |
| S15 | | | | | | | | | | | | | | | | X | O | X | O | O |
| S16 | | | | | | | | | | | | | | | | | O | X | O | O |
| S17 | | | | | | | | | | | | | | | | | | O | O | O |
| S18 | | | | | | | | | | | | | | | | | | | O | O |
| S19 | | | | | | | | | | | | | | | | | | | | O |
| S20 | | | | | | | | | | | | | | | | | | | | |

The table above shows the opinions or opinions of the respondents regarding the comparison between the two stakeholders. This shows the existence and natural relationship between the 20 stakeholders. Examples of the relationships of each category are as follows:

- The relationship between stakeholder 1 and 5 (row 1 column 5) is V, which means stakeholder 1 (Ministry of Manpower) can move stakeholder 5 (Construction Services Company) in the K3 Institution of Construction.
- The relationship between stakeholder 2 and 12 (row 2 column 12) is A, which means stakeholder 12 (Local Government can mobilize stakeholder 2 (K3 Institution in the Company / Project) in the K3 Institution of Construction.
- The relationship between stakeholder 1 and 12 (row 1 column 12) is X, which means stakeholder 1 (Ministry of Manpower) can move with stakeholder 12 (Regional Government in Construction K3 institutions.
- The relationship between stakeholder 11 and 13 (row 11 column 13) is O, which means stakeholder 11 (Professional Association) does not move with stakeholder 13 BPJS Employment in K3 Construction institutions.

After SSIM is developed, the next step is to convert it into an achievement matrix, or known as the reachability matrix, by replacing V, A, X, O using values of values 1 and 0 per case. The rules for substituting between values 1 and 0 are as follows:

- If the relationship (i, j) in SSIM is V, then (i, j) in the achievement matrix is 1 and (j, i) becomes 0.
- If the relationship (i, j) in SSIM is A, then (i, j) in the achievement matrix is 0 and (j, i) becomes 1.
- If the relationship (i, j) in SSIM is X, then (i, j) in the achievement matrix is 1 and (j, i) becomes 1.
- If the relationship (i, j) in SSIM is O, then (i, j) in the achievement matrix is 0 and (j, i) becomes 0.

- So by looking at the previous SSIM results, a change to the achievement matrix can be made, with an example as follows:
- The relationship between stakeholder 1 and 5 is V. The matrix (1, 5) is 1 and matrix (5, 1) is 0.
- The relationship between stakeholder 2 and 12 is A. Then matrix (2, 12) is 0 and matrix (11, 1) is 1.
- The relationship between stakeholders 1 with 12 is X. Then the matrix (1, 12) is 1 and matrix (12, 1) is 1.
- The relationship between stakeholders 11 and 13 is O. Then matrix (11, 13) is 0 and matrix (13, 12) is 0.

**Table 2.** Reachability Matrix

| | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 | S18 | S19 | S20 | DP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 14 |
| S2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| S3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| S4 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| S5 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 7 |
| S6 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |
| S7 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 15 |
| S8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 9 |
| S9 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 |
| S10 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 6 |
| S11 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 6 |
| S12 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 13 |
| S13 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 9 |
| S14 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 9 |
| S15 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 7 |
| S16 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 7 |
| S17 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 9 |
| S18 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 10 |
| S19 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 6 |
| S20 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| D | 10 | 6 | 6 | 2 | 8 | 12 | 10 | 11 | 5 | 11 | 6 | 8 | 9 | 9 | 7 | 7 | 9 | 10 | 6 | 3 | |

In Table 2, also obtained driving power (DP) or "driving force", and dependencies (D) or dependency of each stakeholder. Driving power shows the number of these stakeholders moving the other stakeholders, while dependencies indicate the number of these stakeholders driven by other stakeholders.

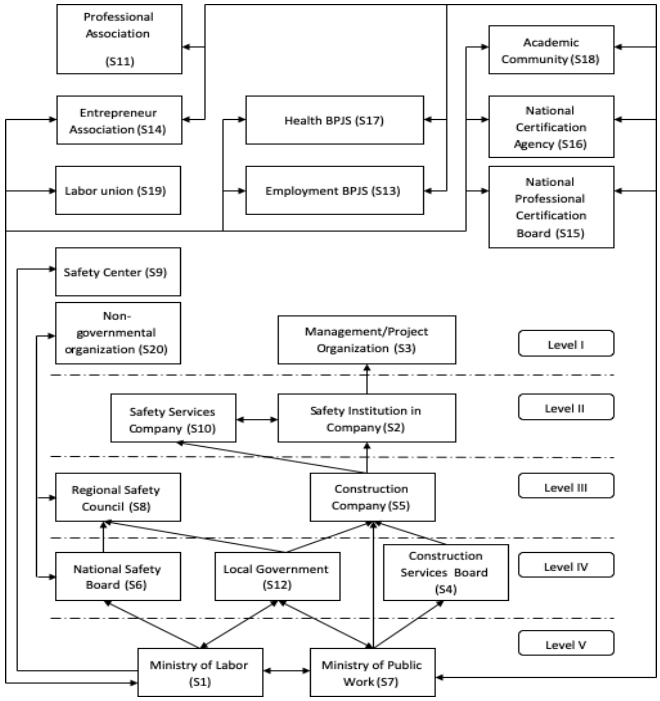


**Figure 1.** Institutional Safety Model in Construction

From the figure 1, it is seen that the results of the institutional stakeholder level partition have been developed into a structural model for OSH Construction. The Ministry of Manpower (S1) and the Ministry of public work (S7) are at level V; DK3N (S6), Local Government (S12) and LPJK (S4) at level IV; DK3W (S8), and Construction Services Company (S5) are at level III; PJK3 (S10) and K3 Institution in the Company / Project (S2) are in level II; while the remaining stakeholders are at level I. The Ministry of Manpower (S1) and the Ministry of public work (S7) can be described as the basis of hierarchy. The two stakeholders coordinate with the Regional Government (S12) to move S5 (Construction Services Company) and S8 (DK3W). Construction Services Companies will mobilize S2 (OSH Institution in Companies / Projects) and S10 (PJK3). The OSH Institution in the Company / Project (S2) will move the next stakeholder, S3 (Project Management / Organization). Besides directly moving S5 (Construction Services Company), the Ministry of public work (S7) can also move these stakeholders through S4 (LPJK). While the Ministry of Manpower (S1) will move S6 (DK3N) which will then move S8 (DK3W).

### *c. Driving Power – Dependence Diagram*

The next analysis is to investigate the driving power and dependencies of each stakeholder. Stakeholders are divided into 4 clusters based on their driving power and dependence values. Dependence is described as a horizontal line in the graph while driving power as a vertical line.

Quadrant I shows the first cluster of stakeholders. This is an "autonomous stakeholder" with low driving power and dependence. Stakeholders in this quadrant are almost disconnected from the system. Quadrant II shows the second cluster or known "dependent stakeholders" with low driving power but high dependence. Quadrant III contains a third cluster of stakeholders or so-called "stakeholder linkage" with high driving power and dependence. Quadrant IV contains stakeholders from the fourth cluster or so-called "independent stakeholders" with high driving power but low dependence.

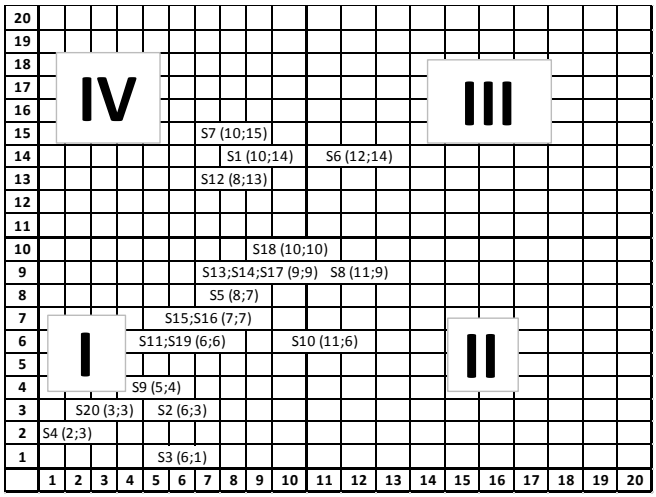


**Figure 2.** Driving Power (DP) – Dependence Diagram

## V. CONCLUSION

1. The realization of Occupational Safety and Health Culture (OSH) is the most important program goal of the OSH institution
2. An understanding of occupational safety and health that is embedded from an early age to tertiary education is the most important benchmark for assessing each objective of the OSH institution
3. Inadequate OSH HR competency is the most important obstacle of OSH institutions
4. The Ministry of Manpower is the most important institution involved in the implementation of programs from OSH institutions
5. Ministry of Manpower, Ministry of Public Work, and Regional Government, all three has the biggest Driving Power in moving other stakeholders

## ACKNOWLEDGEMENT

The research was funded by the PDUPT scheme for Fiscal Year 2019 No: NKB-1675/UN2.R3.1/HKP.05.00/2019 with funding source: Budget Implementation Schedule (DIPA) Kemenristekdikti No : 1/E1/KP.PTNBH/2019 and No : 234/PKS/R/UI/2019, March 29th 2019

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