

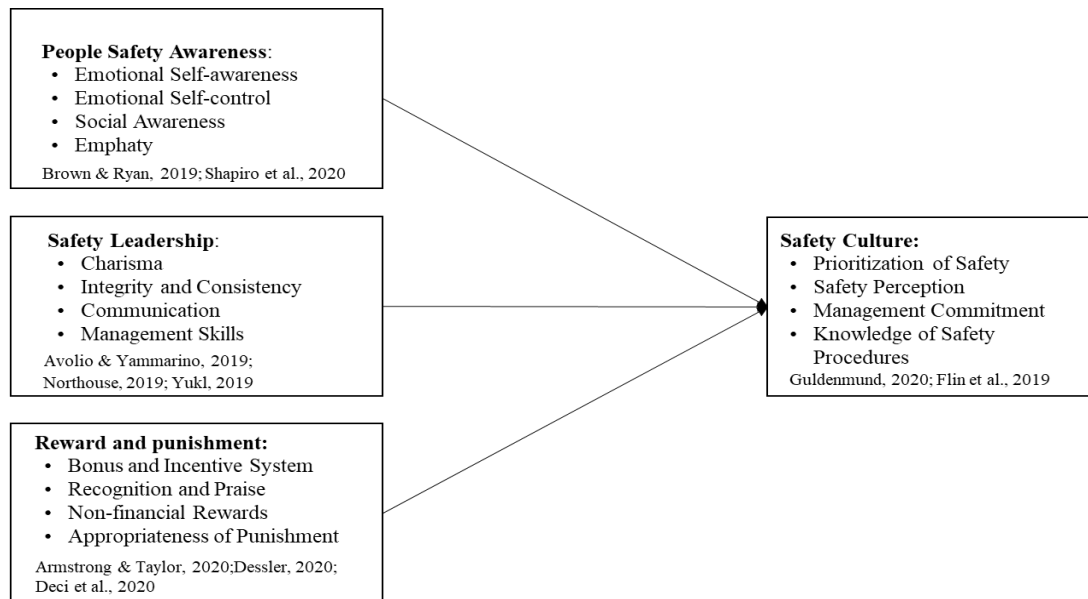


Figure 4. Research Model

Source: (Smith and Johnson, 2023); (Lee and Choi, 2022); (Jones et al., 2017).



3.1 Research model

This section explores the systematic exploration of hypotheses based on prior research and literature-based questions using research methods. The relationships between the variables and components of the research model are depicted in Figure 8.

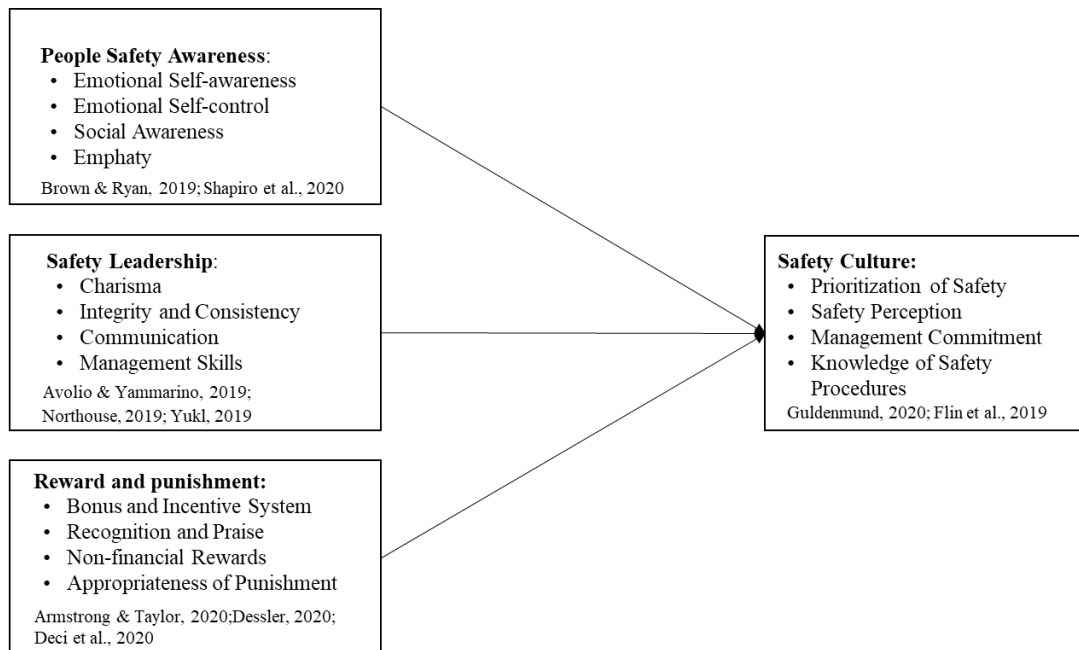


Figure 4. Research Model

Source: (Smith and Johnson, 2023); (Lee and Choi, 2022); (Jones et al., 2017).

3.2 Research design

A research design is a methodical blueprint that delineates the organisation and processes that are fundamental to the execution of research. It offers a structured framework that enables researchers to methodically gather the necessary data in order to tackle research inquiries. Generally speaking, the study design may also serve as a succinct synopsis of the entire research methodology (Birks & Malhotra, 2017).

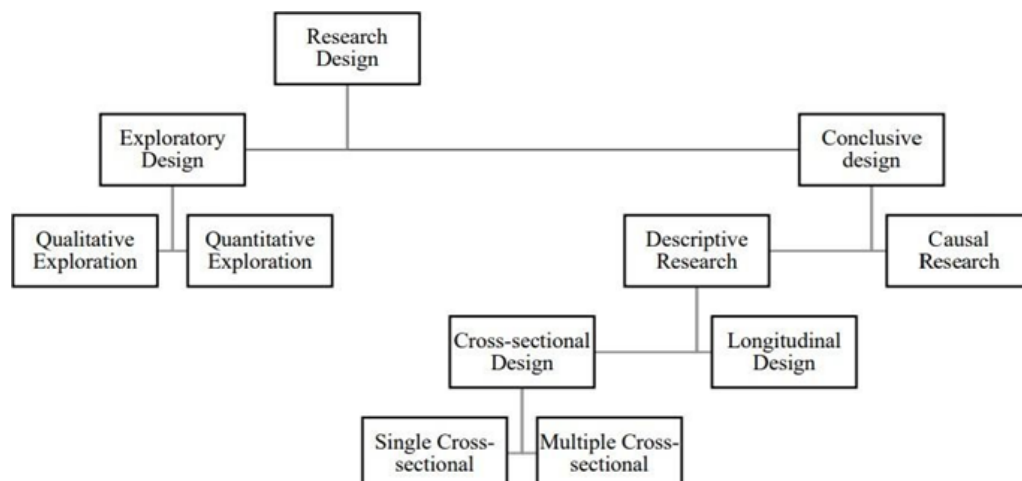


Figure 5. Research Design Framework

Source: (Malhotra& Birks, 2017)

As outlined by Malhotra and Birks (2017), the two separate parts of the research design are shown in the figure above:

1. Researchers employ exploratory research design to acquire knowledge and comprehension of the obstacles they may face.
2. Research that uses decision-making as a guiding principle and is successful in locating, assessing, and choosing the best option to overcome research roadblocks is known as a conclusive study design. Additionally, there are two research categories into which the conclusive research design can be separated:

- a. Descriptive Research

One method is to conduct a descriptive study of analysis based on the study of market characteristics to provide a comprehensive picture of a subject. Developing targeted hypotheses and carrying out a systematic design strategy are two crucial components of descriptive research. This kind of research uses a range of data sources, such as surveys, observations, and quantitative secondary data. There are two distinct categories in the classification of descriptive research:

- 1) Structure in Cross Sections

A singular instance of a specific type of descriptive study was conducted to collect data and statistics from a representative sample of the research population.

- a) A single-cross design is an information retrieval process that is run only once over a planned duration of time.
- b) A method for collecting data in which two or more participants are involved and their information is only gathered once is called the Multiple Cross Design.

- 2) Longitudinal design

A longitudinal design allows researchers to measure a sample of a population over time, allowing them to show both the initial state and the changes that take place over time. This makes it possible to show

both the initial state and the subsequent changes that take place. This research methodology can effectively track and identify any change that takes place within a given time range.

b. Causal research

The systematic process of gathering evidence of a cause and its associated effect is known as causal research. The researchers used a survey approach along with a descriptive research methodology as part of a quantitative conclusive research technique. The purpose of the survey was to gather information from the respondents about their views, responses, and dispositions regarding the subject of study. The questionnaire is distributed to respondents who fit predetermined demographic criteria. making use of a single cross-sectional design approach, Sampling was done by the researcher and information gathered during a single study period from a single participant group. Additionally, non-comparative scaling methods are investigated in this study, on a five-point Likert scale participants rate objects.

This study looks at how safety culture is affected in Indonesian mining companies by employee safety awareness, safety leadership, and reward-punishment systems. Applying a quantitative research approach, pertinent data is analyzed to accomplish this goal. In order to gather responses from those involved in mining company management, this study's survey instruments are used. Specific information pertinent to their activities is what the survey seeks to gather.

Table 3. The research background for this investigation.

Parts			Approach
Research Design of this study	Research type		Explanatory, descriptive and confirmatory
	Research philosophy		positivism
	Research paradigm		deductive
	Research strategy		online questionnaire
	Research Method	Selection	quantitative data
		Study setting	non contrived
		Unit Analysis	140 respondents each coal mining worker
		Time horizon	cross-sectional
Technique & procedures		data collection & analysis	

Source: (Malhotra & Birks, 2017)

3.3 Research context and unit analysis

Indonesian laborers engaged in mining are the subjects of the study. It has been operating for at least a year and meets the essential requirements, which came from sampling done at multiple sites. Per Adams et al. The unit of analysis in reference to the particular level of inquiry that is pertinent to the research question is (2007). An analysis of mining companies' workforce, which consists of managers and employees, is conducted between (November 25, 2023) and (August 1, 2024).

3.4 Data collection

3.4.1 Sampling

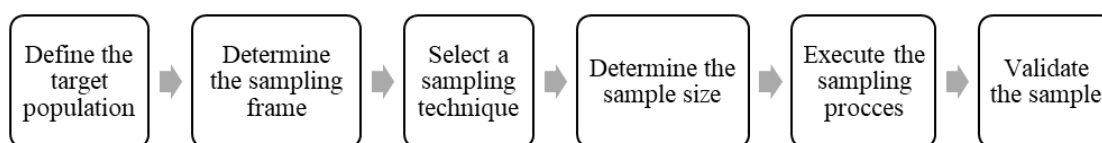


Figure 7. Sampling design process

Source: (Malhotra & Birks, 2017)

The entities that comprise the target population share similar characteristics. Elements are tangible items that hold the precise data the researcher requires. Malhotra along with others. (2017) list the following four crucial factors: elements, sample units, location, and time frame all of which are crucial for choosing the target population. All workers at an Indonesian coal mine, including the manager and owner, are included in this investigation.

The research on factors informing strong occupational safety and health culture on mining company PT. ABC Mining, the population consists of individuals affiliated with PT. ABC Mining, including management personnel, safety officers, and frontline workers. These individuals represent the workforce directly involved in the operations and safety protocols within the mining company. Given the focus on understanding the factors influencing occupational safety and health culture within PT. ABC Mining, the sample will be drawn from the population described above. The sampling criteria may include factors such as job roles (e.g., miners, supervisors, safety coordinators), tenure or experience in the mining industry, and level of involvement in safety-related activities. Due to the use of partial least squares structural equation modelling in the study, the determination of sample size involves considering the relationship between the significance level, the number of relationships between constructs, and the minimum coefficient of determination (R^2), as highlighted by Joseph F Hair Jr, Hult, Ringle, & Sarstedt (2016). Based on the estimates provided, the researchers modified the sample of 140 workers that participated in the study.

3.4.1.1 Sampling Method

Either non-probability sampling approaches or probability sampling methods are the two categories into which researchers divide sampling strategies (Malhotra et al.

(2017)). For a given study, a probability sampling strategy guarantees that every member of the population has an equal chance of being selected for sampling. By using non-probability sampling, researchers reduce the possibility of choosing particular individuals from the population to be included in a study sample. To be eligible for inclusion in the study sample, a set of criteria is determined by the researcher and must be met. Convenience sampling is a non-probability sampling technique that was used in this study. Samples were chosen for the investigation based on how easy they were to obtain and how useful they would be to the researchers. Academics utilize the method known as juridical sampling, in which a sample is chosen based on pre-established standards that match the characteristics of the individuals included in the list.

A set of requirements must be fulfilled by the participants in the assessment sample. One of these is that working in coal mining is physically demanding and frequently requires working in challenging environments, so people who fall into this age range are particularly affected. More youthful people are generally thought to have higher physical endurance and be more able to withstand the demanding conditions of coal mining. Safety must also be taken into account, and at least five years of work experience must be met. In 2015, Riduwan conducted research on a specific subset of the population that had peculiar characteristics or circumstances. Purposive sampling was selected as the research methodology by Sugiyono (2012) for the current study. Per Sugiyono (2012), purposeful sampling is a sampling strategy that entails the intentional selection of participants based on specific criteria or attributes. As per this theoretical framework, the purposive sampling method is deemed perfect for quantitative or non-generalizable studies. Convenience sampling was employed by the researchers to distribute 111 questionnaires to the participants. As stated by D. W. and Krejcie. (1970), the study's authors argue that the sample size they used was sufficient because it included more than a thousand participants. Furthermore, data processing program Smart-PLS 3, which was used in this study, fits the requirements for the selected sample size.

3.4.1.2 Sampling procedures

The quantity of items responding to the question is known as the sample size. Hair et al. (2014); Roscoe (1975); Sekaran and Bougie (2016) found that most studies have an optimal sample size of between 30 and 500, as suggested by. Hair Jr. et al. (2014:20) and Ringle, & Sarstedt (2016) argue Since the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM), the determination of sample size involves considering the relationship between the significance level, the number of relationships between constructs, and the minimum coefficient of determination (R^2), This entails utilizing Cohen's Table (Table 3.2) to determine an appropriate sample size that ensures statistical power and reliability in analyzing the relationships between variables in the structural model. By employing a robust sampling strategy, the research aims to provide insights into the key factors contributing to a strong occupational safety and health culture within PT. ABC Mining, 111 respondents in all as a result..

3.4.1.3 Measure data collection

Researchers collect information in two different ways, claim Malhotra and Birks (2017):

- 1) Primary data.

Primary data are details gathered by researchers or organizations associated with the subject of the study directly from the organization.

- 2) Secondary Data

Secondary data, or secondary information, is information that is acquired or already in existence and is used for a specific purpose (Kotler and Armstrong, 2018).

- 3) Data Sources

In addition to Science Direct, Frontiers, PubMed, Researchgate, Springer, Google Scholar, and other websites, a variety of other sources provided the data for this study.

Respondents chosen according to the researcher's designated target demographic and sample unit are given questionnaire surveys, which are used in this study to collect primary data. Later, in order to determine the accuracy and consistency of the measurements contained in the questionnaire, the researcher conducted an initial

assessment. 30 online questionnaires were distributed to the target demographic by the researchers using Google Forms. In addition, researchers use secondary data from books, articles, journals, and websites that contain scientific information to build trustworthy and corroborating study frameworks.

The data collection method for this study is as follows:

1) Questionnaires

In order to gather research data, mining companies in Indonesia that employed people were surveyed by sending out a series of questionnaire-style requests. An opinion was indicated on a Likert scale in the study questionnaire by a rating of 1. "Strongly agree" is indicated on a scale of 1 to 5, with 5 representing "strongly agree" with the statement. Sugiyono (2012) used a Likert scale with five possible responses to determine the relationship between the variables.

2) Documentation

Data collection about the subjects and variables studied is referred to as documentation. In addition, a documentary analysis of relevant organizational documents such as security policies, incident reports and training materials is conducted to complement the quantitative and qualitative results. By triangulating data from these various sources, this study aims to provide a comprehensive understanding of the factors that shape a strong occupational safety and health culture in PT. ABC mining.

3.4.1.4 Research Sample

The sample size is defined as the bare minimum of respondents who are willing to fill out the survey. Suggests implementing multiple regression analysis (Hair et al., (2018). A minimum of two independent variables must be included in this study. The table presented in this study is a Cohen's sample size recommendation table, which is used to determine the appropriate sample size for Partial Least Squares Structural Equation Modeling (PLS-SEM) to achieve 80% statistical power. The table lists the maximum number of arrows pointing to a construct, compared to different significance levels (1%, 5%, and 10%) and different minimum R^2 values.

In this context, we have selected a sample size of 111 based on the following criteria:

1) Significance Level (10%)

We chose a significance level of 10%, which is commonly used in exploratory research where a slightly higher probability of Type I error (false positive) is acceptable.

2) Maximum Number of Arrows Pointing at a Construct (4)

The maximum number of arrows pointing to a construct in our model is 4. This represents the complexity of the model and indicates the number of independent variables or indicators that influence the dependent variable.

3) Minimum R² Value (0.50)

We aim for a minimum R² value of 0.50, meaning that 50% of the variance in the dependent variable is explained by the independent variables in the model. This level of explained variance is considered moderately high and desirable in social science research.

According to Cohen's table, the recommended sample size for a 10% significance level, a maximum of 4 arrows pointing to a construct, and a minimum R² value of 0.50 is 111. This ensures that our study has sufficient statistical power to detect significant effects and relationships within our PLS-SEM model.

Table 4. Cohen's Table

Exhibit 1.7 Sample Size Recommendation in PLS-SEM for a Statistical Power of 80%												
Maximum Number of Arrows Pointing at a Construct	Significance Level											
	1%				5%				10%			
	Minimum R ²				Minimum R ²				Minimum R ²			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75
2	158	75	47	38	110	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	191	91	58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	147	70	45	36	120	58	37	30
6	217	103	66	53	157	75	48	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	181	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

Source: Cohen, J. A power primer. *Psychological Bulletin*, 112, 155–159.

A minimum sample size of 111 respondents is required for this study, as determined by the formula above.

3.4.1.5 Research instruments

Table 5 explains the development of the questionnaire. It consisted of five divided sections, and for each item the most appropriate questionnaire from the previous study was selected. Additionally, an even number of items in the response scale can result in groupings that are easier to understand and discuss. Therefore, in developing the questionnaire used by Lim et al. only a few previous studies were used as a reference. (2016), Brown and Ryan (2019), Shapiro et al. (2020), Avolio & Yammarino (2019), Northouse (2019), Yukl (2019), Deci et al. (2020), Armstrong and Taylor, (2020), Dessler (2020).

Table 5. Questionnaire development

Section	Variable	No item	Source
A	Demographic	3	Lim et al. (2016)
B	People safety awareness	4	Brown & Ryan (2019), Shapiro et al. (2020)
C	Safety leadership	4	Avolio & Yammarino (2019), Northouse (2019), Yukl (2019)
D	Reward and punishment	4	Deci et al. (2020), Armstrong and Taylor, (2020), Dessler (2020)
E	Safety culture	4	Guldenmund (2020), Flin et al. (2019)

Source: Extract from some resources, 2024

This study examines one dependent variable of safety culture and three independent variables, namely people's safety awareness, safety leadership and reward punishment. The research employed a total of sixteen indicators, which were developed from a questionnaire in Table 5 and further elaborated upon in Table 6 below, as well as from validated measures in prior studies.

Table 6. Variable and Instruments

Variable	Definition	Indicators	Scale	Code	Questionnaires	Source
Safety People Awareness	The level of understanding and awareness of an individual's social and physical environment.	Emotional Self-awareness	Likert	X1.1	I understand my own emotions in various situations.	Brown & Ryan, 2019
		Emotional Self-control	Likert	X1.2	I can control my emotional reactions when under pressure.	Brown & Ryan, 2019
		Social Awareness	Likert	X1.3	I am aware of how my actions affect others in the workplace.	Brown & Ryan, 2019
		Emphaty	Likert	X1.4	I feel empathy towards the feelings of my colleagues.	Shapiro et al., 2020

Variable	Definition	Indicators	Scale	Code	Questionnaires	Source
Safety Leadership	The process of influencing and guiding individuals or groups towards achieving specific goals.	Charisma	Likert	X2.1	My leader has charisma that makes them respected and followed.	Avolio & Yammarino , 2019
		Integrity and Consistency	Likert	X2.2	My leader always acts with integrity and consistency.	Northouse, 2019
		Communication	Likert	X2.3	My leader can communicate vision and information clearly and effectively.	Yukl, 2019
		Management Skills	Likert	X2.4	My leader has good management skills in organizing the team.	Avolio & Yammarino , 2019

Variable	Definition	Indicators	Scale	Code	Questionnaires	Source
Reward & Punishment	An approach used in management to motivate individual behavior within the organization.	Bonus and Incentive System	Likert	X3.1	I feel the bonus and incentive system at my workplace is fair and motivating.	Deci et al., 2020
		Recognition and Praise	Likert	X3.2	Recognition and praise at my workplace are given fairly.	Armstrong & Taylor, 2020
		Non-financial Rewards	Likert	X3.3	I feel non-financial rewards at my workplace are sufficiently motivating.	Armstrong & Taylor, 2020
		Appropriateness of Punishment	Likert	X3.4	The punishment given at my workplace is appropriate to the mistakes made.	Dessler, 2020

Variable	Definition	Indicators	Scale	Code	Questionnaires	Source
Safety Culture	A set of values, attitudes, perceptions, competencies, and patterns of behavior of individuals and groups in ensuring workplace safety.	Prioritization of Safety	Likert	Y1	My workplace always prioritizes safety in every activity.	Guldenmund , 2020
		Safety Perception	Likert	Y2	I feel safe working in my current work environment.	Guldenmund , 2020
		Management Commitment	Likert	Y3	Management at my workplace shows a strong commitment to safety.	Flin et al., 2019
		Knowledge of Safety Procedures	Likert	Y4	I have sufficient knowledge of safety procedures at work.	Flin et al., 2019

Source: Extract from some resources, 2024

3.4.2 Variable

3.4.2.1 Dependent variable

Endogenous variables are those that are determined by the equations being used in an investigation model. The components of the model that have the power to affect other variables are called endogenous variables. These things are frequently referred to as independent variables even though they are dependent variables in and of themselves (Hair, Hult, C. M. and Sarstedt (2017). Haar & Co. (2014) used a circular diagram with arrows pointing in the direction of the endogenous variables. Endogenous variables are those elements of a model that can influence other variables. Safety culture is one of the factors looked at in this study.

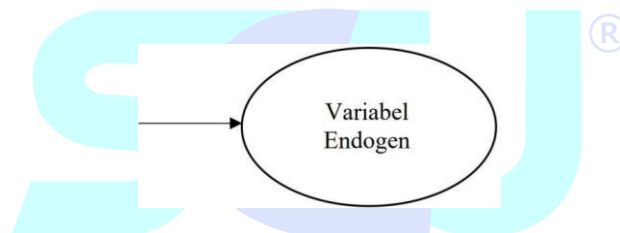


Figure 8. Variable endogen

Source: (Hair, Hult, C. M and Sarstedt, 2017)

3.4.2.2 Independent variable

The equations of the study model have no effect on or influence on exogenous variables. This variable affects other variables without being affected by their consequences. The term "independent variable" is also frequently used to describe it (Hair, Black, Babin, and Anderson, 2014). The Greek letter sigma in mathematics indicates the existence of outside variables. There are no arrows pointing inward and only outward on circles that represent exogenous variables. According to Malhotra and Birks (2017), the exogenous variables examined in this study were people's safety awareness, safety leadership, and reward-punishment policies.

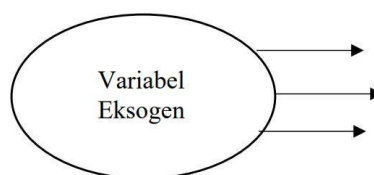


Figure 9. Variable exogenous

Source: (Hair, Hult, C. M and Sarstedt, 2017)

3.4.2.3 Control variable

Information on gender, age, professional hierarchy, educational background, and employer type are all included in the demographic responses. A person's behavior can be influenced by a variety of independent variables, according to research by Setiawan et al. display. 2017; Herrera et al.; Fregidou-Malama and Hyder (2023). Lok & Crawford (2004), as of 2012. The main objective of this study is not to evaluate or regulate these factors. Measureable variables include tenure employer type, gender, and age. There may be differences in the intended outcomes of different actions.

3.5 Data processing procedure

3.5.1 Data preparation

Surveys are conducted using established metrics from earlier research. Respondents' opinions regarding these measures can be gathered via Google Forms applications. When evaluating students' work in a pre-test, experts have shown accuracy, clarity, and recognition in their translations from English to Indonesian, as Surgawi et al. have ascertained. (2017). The questions used in this study were taken from English-language research. Determining the accuracy, coherence, and general consensus of each participant's question is the researcher's objective. The survey will be translated into Bahasa and English for this study. Grimm (2010) recommended carrying out a pretest using a representative sample of thirty individuals. Grimm (2010) recommends using a smaller sample size of precisely 30 people to conduct a pre-assessment in a less formal and more relaxed manner. Nonetheless, the study uses a total of thirty samples. Rewrite or eliminate unreliable survey questions. To get their opinions on the research, the researcher interviews subjects who are not directly involved in the study.

3.5.2 Data screening and cleansing

To find any missing information in the gathered questionnaire, data verification is utilized. Using a Google Form that needs relevant fields filled out can help address missing data when creating a questionnaire. In order to guarantee uniformity in the analysis of data, researchers need to reverse the answers to questions that were reverse coded during the measurement procedure. Outlier respondents are removed from the data as part of the filtering process. Multivariate outliers can be found using the Mahalanobis distance (Dashdondov et al. in 2023). Outlier data points are regarded as such and can be eliminated if their probability of occurrence is less than 0.001.

3.5.3 Validity Test

Validity is the degree to which the data collected from the research subject corresponds with the researchers' capacity to accurately report its accuracy, according to Sugiyono (2016: 267). According to Mohajan (2018), when there is a statistically significant correlation between the aggregate score and the scores of individual statement items at a given alpha level, the measuring instrument is deemed legitimate. When a correlation is not statistically significant, it indicates that the measuring tool is not reliable and should not be used. The measurement tool is deemed invalid, and its use is deemed unnecessary. The level of confidence in proving a causal relationship is assessed by validity tests. The statement evaluates the degree to which the research design permits the establishment of a causal relationship between independent and dependent variables (Sekaran and Bougie, 2016). Validity and reliability testing, screening, and data preparation are done as part of the pre-test sample (Adam, 2018). Researchers move the pre-test data into SPSS after administering tests in Excel. Data will be gathered in the first survey for planning purposes. Screening of the data is the next step. The required actions include verifying whether any data is missing, guaranteeing the accuracy of the data, and assessing results on a range of scales from one to five and from lowest to highest. In the end, an examination will be carried out to ascertain the precision and reliability of the data. Assessing and measuring a person's performance on a particular subject is the aim of a validity test. Comprehensive assessments of the presumptions and methods related to test results are also included in the validity test. At this point, the SPSS software will be used to confirm the construct validity of the questionnaire. Factor analysis was used by the researcher to evaluate the investigation's validity. The

validity dimensions and evaluation criteria for data accuracy, as indicated in Table 7, are displayed in the table below.

Table 7. Validity measure

No	Validity measure	Required value
1	A quantitative method for assessing the reliability of an analytical model in a research study is the sampling adequacy measure known as Kaiser Meyer-Olkin (KMO).	a. A KMO score greater than 0.5 indicates a satisfactory factor analysis. b. An evaluation of KMO. less than five points indicates insufficiency in factor analysis.
2	One statistical test to find out if there is an association between variables in a given population is the Barlett test of sphericity. One of the components' variables has a perfect positive correlation ($r = 1$). or no correlation at all ($r = 0$), according to the correlation matrix.	a. A substantial correlation between the variables is indicated by an expected value of significant worth less than 0.05. b. With a significance level higher than 0 point05, A negligible correlation exists between the factors and the indicator, which is the anticipated value.

3	A predictive test called the anti-image matrix test is used to ascertain whether one variable has error in relation to another.	Evaluating the diagonal anti-image correlation's Measure of Sampling Adequacy (MSA) results. The MSA value ranges from 0 to 1, and a value of 1 indicates that the variable can be correctly predicted on other variables. a. As the variable's MSA value is greater than 0.50, analysis and prediction can still be done with it. b. Indicators with an MSA value of 0.50 must be removed in order to recalculate factor analysis, as the variable is deemed unsuitable for study when the MSA value is less than 0.50.
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Data extraction from the original source and spreadsheet format conversion are the first steps. The data is then processed in advance of screening. Data screening comprises determining how reliable the variables are. When the pre-test questionnaire is distributed and the necessary amount of responses is received, the results will indicate the exact number of participants needed for follow-up testing. The preliminary evaluation will yield the following findings:

Table 8. The Bartlett's Test of Sphericity and Kaiser Meyer Olkin (KMO)

No	Variable	Code coding	KMO	Bartlett's test	Result
1	Safety People Awareness	X1	0.717	<0.001	Valid
2	Safety Leadership	X2	0.778	<0.001	Valid
3	Reward & Punishment	X3	0.739	<0.001	Valid
4	Safety Culture	Y	0.673	<0.001	Valid

Source: Researcher, SPSS Output, 2024

Sugiyono (2016: 267) defines validity as the degree to which the data collected from the research subject is consistent with the researchers' capacity to accurately report its accuracy. According to Mohajan (2018), if the values of each individual statement item exhibit a significant correlation with the overall value at a particular alpha level, the measurement tool is deemed legitimate. It is not necessary to use the measuring device if the correlation is not statistically significant, as this suggests that it is defective. It is believed that the measuring device is faulty and that using it is superfluous. Validity tests assess the degree of confidence in establishing a causal relationship. According to Sekaran and Bougie (2016), the assessment of the statement pertains to the extent that the research design aids in the establishment of a causal relationship between independent factors and dependent variables. The procedures of data preparation, screening, and validity and reliability testing are all included in the pre-test sample (Adam, 2018). The researchers import the pre-test data into SPSS after running the tests in Excel. Data collection for preliminary purposes is done through the initial survey.

Table 9. Pre-Test Anti-Image Matrices

1) People safety awareness variable, Code Coding: X1

- Indicator Code Coding X1.1: Emotional Self-awareness
- Indicator Code Coding X1.2: Emotional Self-control
- Indicator Code Coding X1.3: Social Awareness
- Indicator Code Coding X1.4: Empathy

Anti-image Matrices					
		X11	X12	X13	X14
Anti-image Covariance	X11	.662	.016	-.114	-.102
	X12	.016	.452	-.217	.045
	X13	-.114	-.217	.266	-.186
	X14	-.102	.045	-.186	.469
Anti-image Correlation	X11	.869 ^a	.028	-.272	-.183
	X12	.028	.694 ^a	-.627	.099
	X13	-.272	-.627	.647 ^a	-.528
	X14	-.183	.099	-.528	.755 ^a

a. Measures of Sampling Adequacy(MSA)

2) Safety Leadership variable, Code Coding: X2

- Indicator Code Coding X2.1: Charisma

- Indicator Code Coding X2.2: Integrity and Consistency
- Indicator Code Coding X2.3: Communication
- Indicator Code Coding X2.4: Management Skills

Anti-image Matrices

		X31	X32	X33	X34
Anti-image Covariance	X31	.500	-.040	-.265	-.089
	X32	-.040	.504	-.039	-.269
	X33	-.265	-.039	.503	-.087
	X34	-.089	-.269	-.087	.440
Anti-image Correlation	X31	.749 ^a	-.079	-.528	-.190
	X32	-.079	.729 ^a	-.077	-.570
	X33	-.528	-.077	.749 ^a	-.185
	X34	-.190	-.570	-.185	.729 ^a

a. Measures of Sampling Adequacy(MSA)

3) Safety Leadership variable, Code Coding: X3

- Indicator Code Coding X3.1: Bonus and Incentive System
- Indicator Code Coding X3.2: Recognition and Praise
- Indicator Code Coding X3.3: Non-financial Rewards
- Indicator Code Coding X3.4: Appropriateness of Punishment

Anti-image Matrices

		X21	X22	X23	X24
Anti-image Covariance	X21	.563	-.184	-.081	-.008
	X22	-.184	.336	-.054	-.193
	X23	-.081	-.054	.555	-.163
	X24	-.008	-.193	-.163	.370
Anti-image Correlation	X21	.823 ^a	-.423	-.144	-.018
	X22	-.423	.730 ^a	-.126	-.548
	X23	-.144	-.126	.856 ^a	-.359
	X24	-.018	-.548	-.359	.746 ^a

a. Measures of Sampling Adequacy(MSA)

4) Safety Leadership variable, Code Coding: Y

- Indicator Code Coding Y1: Prioritization of Safety
- Indicator Code Coding Y2: Safety Perception
- Indicator Code Coding Y3: Management Commitment
- Indicator Code Coding Y4: Knowledge of Safety Procedures

Anti-image Matrices					
		Y1	Y2	Y3	Y4
Anti-image Covariance	Y1	.761	-.238	-.206	-.121
	Y2	-.238	.799	.005	-.198
	Y3	-.206	.005	.863	-.152
	Y4	-.121	-.198	-.152	.820
Anti-image Correlation	Y1	.660 ^a	-.306	-.254	-.153
	Y2	-.306	.653 ^a	.006	-.245
	Y3	-.254	.006	.676 ^a	-.181
	Y4	-.153	-.245	-.181	.709 ^a

a. Measures of Sampling Adequacy(MSA)

Source: Researcher, SPSS Output, 2024

3.5.4 Reliability test

The measurements used in the study to assess each concept are evaluated for consistency and reliability using the reliability test. Construct reliability (CR) analysis is used to evaluate a structural equation model's (SEM) dependability (Hair et al. 2017,). According to Sekaran and Bougie (2016), Cronbach's alpha is commonly used in reliability testing for nonstructural equation modeling (SEM) techniques. A technique called construct reliability makes use of determine the extent of error variation associated with a construct using factor loading analysis. Reliability is a strategy used by researchers to evaluate the relationship between answers to questions about a particular idea or variable. As per J. G. Hair and others. carried out research. 2017 stipulates that a CR value of at least 0.70 is necessary to demonstrate acceptable internal consistency. Cronbach's alpha reliability values are categorized as poor by Sekaran and Bougie (2016), as satisfactory by those between 0 and 80, and as exceptional by those above 80. There are duplicate characters within a single construct if the Cronbach alpha score is higher than 0 points 95.

Table 10. Cronbach's alpha coefficient size and reliability assessment

Alpha coefficient range	Reliability assessment
<0.6	Poor
0.6 - < 0.7	Acceptable for exploratory research
0.7 - < 0.8	Good
0.8 - < 0.9	Excellent
0.9 - < 0.95	Somewhat high
> 0.95	too high

Source: Hair et al. (2014)

Table 11. Cronbach's alpha pretest

Variables	No of Item	Cronbach Alpha
Safety People Awareness	4	0,845
Safety Leadership	4	0,799
Reward & Punishment	4	0,818
Safety Culture	4	0,783

Source: Researcher, SPSS Output, 2024

A Cronbach alpha value of a questionnaire is deemed valid if it is greater than 0.6, and excellent and reliable if it is greater than 0.8. Every variable in this study has a correlation coefficient greater than 0.06, according to the Cronbach's alpha coefficient, which assesses the different constructs shown in Table 11. The reliability of the research instrument is unequivocally confirmed by this result. This outcome demonstrates the accuracy of the researcher's questionnaire statements.

3.6 Confirmatory factor analysis

Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) are the methods used by the researcher to analyze the data. Because it enables the analysis of multiple variables to assess their interdependence, this tactic is known as a multivariate statistical method. It makes it possible to examine factors that might be difficult to measure by incorporating a wide range of variables (J. F. Hair and others. 2017).

3.6.1 Ethical consideration

The objective of this research to address ethical concerns by giving participants the information that is requested in the letter that goes with the questionnaire. Furthermore, Fleming and Zegwaard (2018) stressed how crucial it is to make sure that the questions and objectives of the research are exactly aligned. Furthermore, they gave careful attention to handling ethical issues, such as conflicts of interest, anonymity, confidentiality, and avoiding doubt during the course of the study. It is entirely voluntary to participate in this study, and participants are not compelled to disclose their identity. We successfully handled ethical issues by examining conflicts of interest and confidentiality.

3.7 Questionnaire development

Use of the proper indicators is crucial for accurate measurement and to prevent confusion about the variables being studied when quantifying any variable in research. The responses of study participants were rated by researchers using a 5-point Likert scale. "Strongly agree" is indicated on a scale of 1 to 5, with 5 representing "strongly agree" with the statement.

3.7.1 Operationalization variable

The variables used in this study have the following operational definitions, which are taken from the literature review:

Table 12. Operationalization variable of this study

Variable	Definition	Indicators	Scale	Code	Questionnaires	Source
Safety People Awareness	The level of understanding and awareness of an individual's social and physical environment.	Emotional Self-awareness	Likert	X1.1	I understand my own emotions in various situations.	Brown & Ryan, 2019
		Emotional Self-control	Likert	X1.2	I can control my emotional reactions when under pressure.	Brown & Ryan, 2019
		Social Awareness	Likert	X1.3	I am aware of how my actions affect others in the workplace.	Brown & Ryan, 2019
		Emphaty	Likert	X1.4	I feel empathy towards the	Shapiro et al., 2020

					feelings of my colleagues.	
Safety Leadership (X2)	The process of influencing and guiding individuals or groups towards achieving specific goals.	Charisma	Likert	X2.1	My leader has charisma that makes them respected and followed.	Avolio & Yammarino , 2019
		Integrity and Consistency	Likert	X2.2	My leader always acts with integrity and consistency.	Northouse, 2019
		Communication	Likert	X2.3	My leader can communicate vision and information clearly and effectively.	Yukl, 2019
		Management Skills	Likert	X2.4	My leader has good management skills in organizing the team.	Avolio & Yammarino , 2019
Reward & Punishment (X3)	An approach used in management to motivate individual behavior within the organization.	Bonus and Incentive System	Likert	X3.1	I feel the bonus and incentive system at my workplace is fair and motivating.	Deci et al., 2020
		Recognition and Praise	Likert	X3.2	Recognition and praise at my workplace are given fairly.	Armstrong & Taylor, 2020
		Non-financial Rewards	Likert	X3.3	I feel non-financial rewards at my workplace are sufficiently motivating.	Armstrong & Taylor, 2020
		Appropriateness of Punishment	Likert	X3.4	The punishment given at my workplace is appropriate to the mistakes made.	Dessler, 2020

Safety Culture (Y)	A set of values, attitudes, perceptions, competencies, and patterns of behavior of individuals and groups in ensuring workplace safety.	Prioritization of Safety	Likert	Y1	My workplace always prioritizes safety in every activity.	Guldenmund, 2020
		Safety Perception	Likert	Y2	I feel safe working in my current work environment.	Guldenmund, 2020
		Management Commitment	Likert	Y3	Management at my workplace shows a strong commitment to safety.	Flin et al., 2019
		Knowledge of Safety Procedures	Likert	Y4	I have sufficient knowledge of safety procedures at work.	Flin et al., 2019

Source: Mix literature, 2024

3.8 Data Coding

Table 10 contains a summary of the data coding that was employed in this study. The codes represent variables, dimensions, indicators, and constructs that are either operational or observed.

Table 13. Data coding of this study

Variables		Indicators of variable	
Variables	Coding	Indicators	Coding
Safety culture	Y	Prioritization of Safety	Y1
		Safety Perception	Y2
		Management Commitment	Y3
		Knowledge of Safety Procedures	Y4
People safety awareness	X1	Emotional Self-awareness	X1.1
		Emotional Self-control	X1.2
		Social Awareness	X1.3
		Emphaty	X1.4
	X2	Charisma	X2.1

Safety leadership		Integrity and Consistency	X2.2
		Communication	X2.3
		Management Skills	X2.4
Reward and punishment	X3	Bonus and Incentive System	X3.1
		Recognition and Praise	X3.2
		Non-financial Rewards	X3.3
		Appropriateness of Punishment	X3.4

Source: Extract from some resources, 2024

3.9 Data analysis method

SmartPLS version 3 and the Software Statistical Package for the Social Sciences (SPSS) version 29 were used to statistically analyze the data in this study. Multiple linear regression analysis is the methodology employed in this study. A computer and SPSS are needed for the data processing strategy. An array of multiplication tables represents the findings from the data analysis. Use this action to lower the error rate.

