

Selected hse kpi and descriptions construction essay



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Depending on the scale of measurement or where in the process the indicators are being used, many of implemented measurements could be understand both leading and lagging indicators. One Lagging indicator for Division Scale could be understood a leading indicator for upper scale such as Organization Scale or Industry Scale. In this research indicators are classified based on its subject as the measurement carried out at different organizational level.

In this context and within finest scale, indicators of group six are lagging indicator. Group one to five can be as leading indicators and group seven is combination of group of six adjusted by business progress. Both lagging and leading indicators can be found in group eight; however all of them arranged based on its environmental impacts.

Group 1:

HSE Meeting Group is framework showing the HSE performances which result from important Health, safety and Environmental meetings to manage the HSE conditions. This group is not covered training and following indicators are considered in that:

Table 4. 1: Selected HSE KPI and Descriptions, Group 1

Toolbox

Number of toolboxes

Number of toolbox meetings has been held in operations. ToolBox is a common name of meeting in many industries and refers to a brief meeting at the start of the day (15minutes) gives everyone clarity about what needs to

be done safely, What are the safety precautions in devices, operations, work sequences and arrangements? The meeting has to be held by operation supervisors or team leader with attendance of all workers. They do a primary review of changes rather than the plan. Workers have to say any HSE problems in narration to his/her leaders, however these problems can report as unsafe condition.

Advantages: Control all last changes in operation and reminding safety precautions and practices.

Disadvantages: This meeting in routine operation may become boring and just carried out as a formal functions. Toolboxes may be arranged based on safety plan.

Committee

% of recorded Meeting

Percentage of held HSE meeting against plan. Appointed committee by Occupational Safety & Health Authority in factories which gathered monthly to compile OSH requirements lead to reduce workplace injuries & illnesses. This committee may gather on monthly bases to discuss on the incidents and any corrective actions need to be taken. As this just requested by Occupational health and safety regulation body in countries not by environmental department. The meeting just concentrated on safety and health.

Advantages: Enforcing by regulation authorities and the power assigned to this group may bring more execution power to remove unsafe conditions.
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Disadvantages: As this meeting enforced by regulators, it may considered as an internal spy in companies however it could be setup more positively inside the company.

Incident Investigation

Number of investigations;

% of Investigation per incidents;

Number of incident investigated against reported. Meetings held by company to identify root causes and casual factors conducting the incidents or near misses and record corrective action for follow up to prevent reoccurrence. The investigation could be very useful if they handled on the right procedures. As the number of accident may be limited companies may do investigation on their near misses as well.

Advantages: Understanding the underlying reasons or hidden risk lead company to prevent from happening similar incidents.

Disadvantages: The methodology may different from company to others so the number does not necessary means to quality of inspections.

HSE Planning

Number of Meetings

Number of JSA or risk assessment meeting through HSE Department.

Number of registered HSE meeting in company including weekly meeting with contractors for hazard identification and risk management or

unscheduled planning meetings requested by project such as Job Safety analysis (JSA),

Post JSA, HAZOP, HAZID, Pre-start up or Pre-commissioning.

Advantages: This is completely technical meeting which analysis risks of specific operation in collaboration all executive representatives.

Disadvantages: It is technical and couldn't be held in absents of HSE experts.

Management Review

Number of Meeting

Number of HSE meeting by top manager. Formal, recorded meeting under the Chairmanship of the Facilities Manager that take place at regular intervals to discuss the functioning of the HSE management system and review of past performances and targets.

Advantages: As this meeting chaired with top management so it brings higher commitments to different business function to meet the set goals.

Disadvantage: This meeting couldn't be held frequently and almost hold once per year. So it couldn't be help for improving HSE commitment in limited time scale.

Group 2:

The main attribute of indicators at this group are concentrated on management system. Management systems have the general elements inherently regardless if they integrated or not in practice. These elements

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generally are leadership and commitment, planning, implementation, document control, purchase control, review and monitoring of performance, continuous improvement and consultation, (Cooke, July 2011). The management system is a tool that company employed to maintain its objectives through designated model. So documentations, process, people, behavior, connections and other components in management system are structural elements while the way they interact, integrate or keep in contact will follow base on internal model.

Different HSE models may implement in companies electively while the effectiveness of the selected models are not completely clear for the managers. Most manager in organization believe that having the management systems are important for their reputation externally but they are not sure how effective is the management systems for their work operation. They just follow the market tendency and they add it as one project to their businesses without attention to the models engaged.

So companies may engage different indicators to help them to measure the overall performance of their systems. But having management system does not necessity means having high Health, safety and environmental performance. In fact management system is just a tool to help company to improve its performance.

Indicators considered in this group are:

Table 4. 2: Selected HSE KPI and Descriptions, Group 2

Work procedures

of written HSE items/ procedures

% Written procedures complete; Written documents cover for routine or critical operations to ensure that all HSE barriers are in places without risks to the health of employees or environment including who may be affected.

Advantages: The suitable and effective procedures based on best practices, help employee from deviation from safe practices.

Disadvantages: Preparation of HSE procedures are not easy task and needs great past experiences to define suitable procedures based on practices.

Frequency of HSE team inspections

HSE Inspection

hour inspected per 1000 Manhours worked

Ratio of Scheduled inspections hour completed to 1000 man hours worked by work area/dept. HSE officers do HSE inspections to insure that all HSE measures are in place in site and to evaluate any reported unsafe conditions , to control Unsafe act, to monitor changes in operation and compliance with permits in work area.

Inspections by PMT

Number of Closed HSE Items by Head

Number of inspections carried out by project management team. Workplace visibility tour by middle and senior managers in the work area once per

month to observe real HSE performances & HSE culture, to review and discuss comments and questions related the project and HSE requirements.

MS Score

Internal/External audit Score

Sum of all actual criterion scores (AC)/Sum of all maximum criterion scores (MC) x 100. External/Internal HSE audit at least on semi annual basis might be carried out to assure the requested HSE Management system (MS) is in place by company or its contractors. The evaluation is conduct on MS elements and different scoring system may implemented by variety organizations.

NCR

Minors/ Majors NCR

Number of observed lapse (Minor) & total number of absence or total breakdown of a required process (Major). Number of observed lapse (Minor) & total number of absence or total breakdown of a required process (Major). The accreditation body requires that recertification audit be carried out every 3 years.

Group 3:

Training and competency are one of the basic requirements in all management system and OHS&A and Environmental system as well. The following indicators are grouped under group three:

Table 4. 3: Selected HSE KPI and Descriptions, Group 3

Training hours for HSE Matrix

%Scheduled training completed Inside/ Outside the Company

Man hours Training for specific Health, Safety and Environmental subjects internally or at external training center. To improve HSE awareness of employee regard with his/her main safe functions, different courses may assigned to him/her. This matrix will organize essential safe skills for workers such as rigging, Lifting, Welding, Cutting & others in relationship with main duty of employees. Some general courses such as basic Fire fighting, environmental concerns maybe add to all.

HSE Induction

HSE inductions

Number of personnel attended in HSE induction. HSE proceduresregulation Emergency response plans responsibilities communication and reporting are inducted to all personnel in their arrival on company's premises. The Gate Pass is issued to only those who successfully attended.

Drill

Total Number of Drills

Number of different type of drills carried out in each quarters or annually. An exercise intended to train people in practice for their duties and escape procedures. To prevent forgetting of responsibilities and proper arrangement

of different operations, different drills have to be followed in case of emergency in each organization. Fire Fighting, H2S, Evacuation, Confined space are some general requirements which must be scheduled and conducted regularly.

Group 4:

This group contains indicators used to hazard identification. The immediate causes of accidents are circumstances usually can be seen as substandard practices or sub- standard conditions. This hazard not just related to the safety aspects but also covered all substandard practices in environmental and Health as well.

Following indicators are set for this group:

Table 4. 4: Selected HSE KPI and Descriptions, Group 4

Unsafe act

Number of Recorded Unsafe Act

Number of reported Unsafe act; The unsafe Act means removing or wrong practices of barriers in place for hazard controls. It may be the sole accident cause or one of several causes An unsafe act is a change from an accepted, normal, or correct procedure that usually causes an accident. It can be any conduct that causes unnecessary exposure to a job-site hazard or that makes an activity less safe than usual.

Unsafe Conditions

Recorded Unsafe Conditions

Number of lost primary barriers; It means improper maintenance or lack of any barriers needed for hazard control. It could be mechanical, physical, chemical or environmental condition, situation or state of affairs or lack of training or induction or procedures which may cause hazard or accident. The unsafe condition might be the result of any unsafe act (human failure) or accidental failure or alteration of the safe condition. Examples are, wrong design, no guard on dangerous part, no control of chemical process, no provisions of safety devices, poor light, poor ventilation, confined space, high noise etc.

Issued Permits

Number of formal written documents used to control certain type of work hazards by declaring related barriers. For routine operation permit issuance may be carried out in specific situations.

Permits are only issued when the necessary safety precautions have to been taken for specific attribute or hazards which allow control centre to know related information regard with safe operation.

Group 5:

Contractors and employee participations;

Communication and participations are two important elements in new advanced management systems. Implementing any new procedures or resilience level in organizations all depend on this context.

Following indicators are grouped:

Table 4. 5: Selected HSE KPI and Descriptions, Group 5

% Employee participation

Number of direct report from employee on HSE

Number of direct report from employee on HSE matters; The employees' awareness and effectiveness of the HSE program depends on the participation and cooperation of employees in carrying out HSE responsibilities. If the HSE atmosphere in company changes, it shows its impact on the rate of contribution directly.

HSE Award

Total amount of money

Number of peoples received awards

Total amount of money distributed or number of peoples received awards; Means taken by company to motivate the staff & supervisors by issuing/ awarding them with the tokens/ gifts monetary incentives to participate on hazard identification and more accountability/ responsibility.

Bid with HSE coverage

Pre-qualified Contract on HSE

rejected tender because of lack of HSE performance

Number of contractors pre- qualified (considering HSE score in tender selection or pending invoices till HSE confirmation). Tender should include

provision to suspend safe work if the contractor does not observe the HSE requirements described in the contract. Any compensation arising out of the contractor job will be paid by the contractor if the HSE procedures are not being in practice by contractors.

HSE organisation culture level

HSE culture level from pathological to generative level; The characteristics of organization is described at five level and typical descriptions are given for 18 ' dimensions' that can be used to identify the current level of the organization in terms of HSE.

Group 6:

Other group of indicators is related to the statistic of incidents and accidents.

This group contains a wide range of row data of incidents from non-recordable to accumulated indicators as 1- Non- injuries incidents, 2- Incidents with injuries.

Non recordable incidents:

Indicators in this section are important but as they are not evaluated by regulation bodies, they called non recordable. They are related to the statistic of incidents and accidents with no injury as follow:

Table 4. 6: Selected HSE KPI and Descriptions, Group 6. 1

Near Miss

Number of near hit events

Number of event Cases that had potential to cause injury or damage or loss but avoided because of circumstances. Incidents where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.

First Aid Case (FAC)

Number of minor injury not recorded

Number of cases of minor work injury or illness such as cleaning minor cuts & etc which no need to medical devices. This factor is not considered in TRC however it can provide an estimation of number of small injuries in work environment that have potential to more sever incidents.

Non-Injury Accident/Incidents

Non-injury Accidents/Incident Cases

Total number of event or chain of events caused damage to assets, the environment or third parties with no injury. Any unplanned event result in: damage or loss to Property, plant Materials, environment and/or a loss of business opportunity such as fire or explosion, Environmental incidents, Quality incidents, vehicle incident & so on. Again as this incidents having any injuries they not being interested by regulation bodies so considered as non recordable incidents. Companies are record this incident for themselves.

Recordable incidents:

This group is related to the indicators that just count the number of incident cases which have different severity of injuries. Incidents with medical treatment up to the fatalities are all in this group as discussed below:

Table 4. 7: Selected HSE KPI and Descriptions, Group 6. 2

TOTAL Recordable Injury/Incident Case

TRC

TRI

Total number of incident case for Fatalities, Lost Work Day Case, Restricted Work Day Cases & Medical Treatment Cases.

Advantages: It has enough number for analyzing meaningful trend.

Disadvantages: As this factor just counting the number of incidents with the same weight, it couldn't be a good estimation of performances.

Medical Treatment Case (MTC)

MTC

Number of injured or sickness person requires treatment (more than first aid) from professional physician or qualified paramedic. Medical treatment beyond First Aid e. g. wound-closing & prescription medication & removal of foreign material that is embedded in the eye or diagnosis of cancer, chronic disease, a cracked bone or etc.

Restricted Workday Case (RWDC)

RWDC

Number of cases in which employee cannot fulfill his normal work the day following an incident but is able to undertake a temporary job. Or any work related injury other than a fatality or lost work day case which results in a person being unfit for full performance. The case does not have any days away from work, but has days of restriction. If a case either has one day away from work, or both “ restriction and absence injury” should be recorded as LWDC not RWDC.

Lost Work Day Case (LWDC)

LWDC

Number of Cases in which an employee was absent of scheduled work because of work illness or injury and does not include the day of incident and does not cover fatalities case.

Lost Time Injury(LTI)

LTI

Number of work related injury or illness which prevents person from doing any work the day after the accident. It includes cases lead to at least one day off work till death because of work illness or injury. It does not include cases with no lost days such as MTC or RWDC.

Fatality

Fatalities

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Number of workers loses their lives to work related injuries and include Cases that involve one or more people who died as a result of a work-related incident or occupational illness.

Days Away or restricted or Transferred duty, DART

DART

Combination number of Cases of LWDC & RWDC. Cases that involve Lost time, or days of restricted work activity or job transfer, or both however not include fatality cases.

Advantages: Having adequate data fluctuation for managing the performances rather than fatalities or just lost work days.

Disadvantage: In small industry still lack of adequate data for reliable analyze is exist.

Group 7:

Other group of indicators is related to the adjustment of basic statistic of incidents and accidents to the business context performances. This group contains a wide Combination of range of incidents with the time of operations or number of workers. Different organization may make this ratio per its own constants. For example in UK, the constant is 100, 000 fulltime workers which equivalent by 200 Million working hours. This constant for OGP members is half, because the companies working hours is carried out at organization scale which smaller than industrial scale. This differentiate can be seen between companies. for example BP provide some of its reports

based on 200, 000 man hours while Shell act the same as OGP and use 1, 000, 000 man hours constant.

On other side, one organization depends on type of indicator, considering different constants. For example Shell used 100, 000, 000 man Hours as its constant when analyzing its FAR while benefit of 1, 000, 000 man hours in reporting its LTIF.

Indicators in this group are:

Table 4. 8: Selected HSE KPI and Descriptions, Group 7

Days Away or restricted or Transferred duty Rate,

DART rate

Indicates number of incident caused away, restriction, or transfer cases per 200, 000 worked hours. calculate based on $(N/EH) \times (200, 000)$ where N is the number of cases , EH is the total number of hours worked by all during the year, and 200, 000 is the base for 100 employees which may change.

LTI Frequency Rate

LTIF Rate

The number of lost time injuries (fatalities + lost work day cases) per 1, 000, 000 work hours.

The constant may be changed from company to company.

This indicator just shows the frequency of LWDC & Fatality cases but not give any data regarding the weight of the incidents.

LWD Severity Rate

Average days lost with each Lost Work Day Case. Mathematical calculation that describes the number of days lost experienced compared to the number of incidents experienced and lead to lost work day without considering fatalities.

TRIR: Total Recordable Injury Rate

TRIR/ TRC Rate

The ratio of all recordable injuries including fatalities, LWD cases, and Medical treatment Cases per 1 million worked hours.

Fatality Accident Frequency Rate

FAR, FAFR

The number of fatalities per 100 million man hours worked. This indicator may call Recordable Fatality Rate by some companies. Constant is different in companies. This indicator just compares the rate of fatalities with other industrial groups, however because of rare frequency in one company it couldn't be helpful for decision making by managers.

Fatality Incident Frequency Rate,

FIR, FIFR

The number of fatalities accident per 100 million man hours worked. Rate of fatal incident per 100, 000 workers (UK),

100, 000, 000 Man hour (OGP)

This indicator just shows the frequency of incident cases that result at least one fatality and does not prepare information about number of fatalities.

Process safety event rate

PSER, PSIR

The number of incidents of unplanned or uncontrolled LOPC (Lost of primary containment) of any material including non-toxic and non-flammable materials per one million worked hours that happens in direct contact with process operation in premises of company. In process industry, incidents result to either lost time injury, Fire with direct damage more than 25000\$ to assets, Chemical release and environmental impact beyond limited threshold per 1 million worked hours.

A process must have been directly involved in the damage caused. For this purpose, the term “ process” is used broadly to include the equipment and technology needed for chemical, petrochemical and refining production, including reactors, tanks, piping, boilers, cooling towers, refrigeration systems, etc. An incident with no direct chemical or process involvement, e. g., an office building fire, even if the office building is on a plant site, is not reportable (CCPS, 2011).

Advantages: It considers different impacts from direct damages, lost time and injuries to environmental impacts.

Disadvantages: Although the impact considered in cumulative way, but all impacts consider in same weight. More over it does not cover any other incidents which not connected directly to the process, so it couldn't be used by other industries.

Process Safety Incident Severity Rate (PSISR)

Ratio of Total severity scores for all process safety incidents per 200, 000 Work Hours of total employee, contractor & subcontractor work hours. The constant may change in companies. In determining this rate, 1 point is assigned for each Level 4 incident attribute, 3 points for each Level 3 attribute, 9 points for each Level 2 attributes, and 27 points for each Level 1 attributes. Theoretically, a PSI could be assigned a minimum of 1 point (i. e., the incident meets the attributes of a Level 4 incident in only one category) or a maximum of 108 points (i. e., the incident meets the attributes of a Level 1 incident in each of the four categories).

Advantages: Consider the weight of severity level of each incident for total process safety besides considering four dimensions in measuring the consequence of each process incidents.

Disadvantages: Just consider some process cases.

THP; Total Hazard Potential Rate

Total HazPoC (Hazard Potential Cases) indicating overall potential of hazard of unsafe act/unsafe condition (identified with/without incidents) per 100 Sq. meter per week. It can show the HazPoC related to the safety, Health, Environment separately or totally.

Advantages: It demonstrates total hazard potential of company or its project that generated from requested barriers. By adding any new assets or finishing a project this rate will change weekly. However it will propose based on the boundary of occupied land and time.

Disadvantage: It needs powerful software and network connections. This indicator is new and under trial .

MHP; Mitigated Hazard Potential

The total amount of Hazard potential which mitigated by barriers in practice. (Secured HazPoC). This indicator just demonstrates the HSE performance of company on weekly bases in implementation of safe work practices per Total HazPoC identified.

Advantages: All barriers implemented or removed have direct impact on the HSE performance of company based on changes on risk of related hazard of that barrier. So any department can understand its performance on removing or maintenance of own barriers.

Disadvantage: Same as TPH

Group 8:

All environmental subjects that may consider impact on work environment are short listed in this group. Although there are many different environmental factors that experts minded in perspective of top managers just one important element is considered.

It has been notice that HSE department may have to control many factors more than these indicators, but we want to understand which one may be desired by CEO to being controlled as a business performances.

This group consists of following indicators:

Table 4. 9: Selected HSE KPI and Descriptions, Group 9

Energy Intensity

Ratio of energy consumption to gross domestic product or other industry output. Energy consumption ratio per gross domestic product or other industry output such as Sales, freight ton-miles, GDP as economic output may be considered in different organization.

Waste discharge Load

Total wastewater Load discharged in population equivalent (BOD). To measure this indicator both quantity and pollution concentration have to be considered. In Oil company may BOD rate is replaced with Oil Load discharge.

Recycled, Reused and Recovered Materials

Tones of Hazardous/ Non Hazardous waste recycled, reused, recovered from waste stream. Measuring this indicators required company measure the amount of waste generation and then recording its recycling to produce this rate. The amount of recycling waste per generated waste multiple 1000, indicate the rate of recycling per 1000 tone total waste generation.

Social Contribution Expenses

Million \$ on social responsibilities or number of local people trained or fostered. Contribution on Local community conferences, volunteer service centres, Training, Employment, Health Care & etc in nearby society are samples of contributions.

Direct GHG Emission

Total quantity of GHGs released to atmosphere at a specific time in Co2 equivalent. Total quantity of GHGs released to atmosphere covering emission of different gases such as CH₄, CO₂, NO_x, CFCs, HCFCs & etc however it is not cover all air pollution.

4. 2 HSE KPI Specification:

Study findings indicate a statistically significant relationship between culture and gross earnings. Gilbert (1978) maintains that when the five dimensions (information, resources, incentives, knowledge, and capacity) are aligned and operating interdependently, workers are intrinsically motivated to perform. Later in 2001, It is theorized that the link between culture and financial performance is mediated by worker motivation. Strong cultures help

organizations perform because they create a strong sense of motivation in workers. (Kotter & Heskett, cited in Flamholtz).

Recently (Piers, 2009) in his study mentioned 6 main elements as essential dimensions of organizational culture in organization. These specifications are:

Commitment

Behaviour

Awareness

Adaptability

Information

Justness

In Our research, If we are looking for an indicator cause the organizational culture to improve, the chosen indicator have to had the same characteristics inherently which can demonstrate the same aspect of organization.

Commitment: reflects the extent to which every level of the organization has a positive attitude towards safety and recognizes the importance of safety. Top management should be genuinely committed to keeping a high level of safety and give employees motivation and means to do so as well.

Behaviour reflects the extent to which every level of the organization behaves such as to maintain and improve the level of safety. From the management side, the importance of safety should be recognized and everything needed to maintain and enhance safety records should be put in place.

Awareness reflects the extent to which employees and management are aware of the risks for themselves and for others implied by the organization's operations. Employees and management should be constantly maintaining a high degree of vigilance with respect to safety issues.

Adaptability reflects the extent to which employees and management are willing to learn from past experiences and are able to take whatever action is necessary in order to enhance the level of safety within the organization.

Information reflects the extent to which information is distributed to the right people in the organization. Employees should be encouraged to report safety concerns. Work related information has to be communicated in the right way to the right people in order to avoid miscommunication that could lead to hazardous situations.

Justness reflects the extent to which safe behaviour and reporting of safety issues are encouraged or even rewarded and unsafe behaviour is discouraged.

He divided each attribute to detail specifications which demonstrate in following table. The highlighted items in this table are important items that considered while the questionnaire was designed. Management perspective

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and participating of different management level are important elements that improve the reliability of collected data.

Table 4. 10: Positive attribution lead to culture improvement

Characteristic

Specific attribute

Commitment

– Management concern

- Perception of importance of safety

- Prioritization of safety

- Safety procedures and requirements

- Personal involvement and responsibility for safety

Behaviour

- Employee behaviour w