KPIs for measuring and monitoring performance of OSH management systems

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Healthy Workplaces Campaign Partner Event

Workshop 4: Harmonisation of OSH KPI reporting

Brussels, 22-23 March 2017
Outline

- Project origins and rationale
- Research objectives and methodology
- KPIs for measuring OSH management performance
- Software tool supporting the implementation of KPIs
- Conclusions on harmonisation of OSH KPIs
Project origins

- The project was carried out as a result of the first SAF€RA joint call for research project proposals on theme “Human and organizational factors including the value of industrial safety”

- SAF€RA consortium originated as an FP7 ERA-NET project: *Coordination of European Research on Industrial Safety towards Smart and Sustainable Growth*, funded in 2012-2015 by the European Commission (see: www.safera.eu)

- KPI-OSH project duration: 1 May 2014 - 31 March 2017
# Project consortium and funding

<table>
<thead>
<tr>
<th>Partner organization</th>
<th>Country</th>
<th>Project teams</th>
<th>Funding</th>
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Rationale for the project

Low effectiveness of OSH management systems:

- After 25 years of world-wide proliferation of OSH MSs no conclusive and sound evidence has been obtained that such systems are effective in terms of preventing and reducing the number of occupational accidents and diseases

- Systematic analysis of OSH MS performance literature (Robson et al., 2007):
  - no sufficient evidence confirming good performance of OSH MSs
  - OSH MSs are to be neither recommended nor objected to

- The study of European Trade Union Institute (2011):
  - OSH MS certificate confirms compliance with procedures, but does not guarantee good OSH results
  - In practice enterprises with a certified OSH MS in place do not provide better working conditions as compared to other enterprises
Project goals

- Developing an easy-to-use method to support managers in measuring operational performance of OSH MS
- Focus on the small number of leading performance indicators
- Developing a software tool to facilitate implementation of KPIs in enterprises
Leading vs. lagging indicators

Examples of lagging (outcome) indicators:

- LTIR - Lost Time Injury Rate = (# of Lost-Time Injuries * 200,000) / # hours worked
- LTIFR - Lost Time Injury Frequency Rate = (# of Lost-Time Injuries * 1,000,000) / # hours worked
- TRIR - Total Recordable Injury Rate = (# of Recordable Injuries * 200,000) / # hours worked
- SR - Severity Rate = Total # of lost workdays / Total # of recordable incidents
- DART - Days Away from work, days of Restricted work, and/or days of Job Transfer

Examples of leading operational performance indicators:

- Number of jobs for which risk assessment has been carried out or updated (e.g. per month)
- Number of risk assessments completed or reviewed in a given time period
- % of workers completing OSH refresher training courses (e.g. quarterly)
- % of safety checks on machines and installations, as compared to the plan (e.g. monthly)
Research objectives

- To develop a relatively small set of leading KPIs (ca. 20-30) assigned to individual components of the OSH MS

- To validate a method for prioritization of indicators applied for measuring OSH MS operational performance

  - The KPIs should be able to measure the operational rather than structural performance of OSH MS on a daily basis

  - The tool should allow the managers to implement their own sets of KPIs, which would be better tailored to specific conditions of their enterprises
Elaborating KPIs

Indicators’ aggregation vs. selection

- Two possible approaches to develop a small set of KPIs:
  
  - Aggregation: $KPI_i = (w_1 \cdot PPI_{i1} + w_2 \cdot PPI_{i2} + ... + w_n \cdot PPI_{in}) / n$
  
  - Selecting the best:
    
    $PPI_i = \{PPI_{i1}, PPI_{i2}, PPI_{i3}, ..., PPI_{in}\}$
    
    $KPI_i \in PPI_i \quad KPI_i = \text{Best}(PPI_i)$
KPI selection process

373 PPIs derived from literature sources

120 PPIs

Assigning PPIs to 23 OSH MS components (based on the ISO DIS 45001 model) and elimination of redundant items

60 PPIs

Elimination of indicators which are non-realistic, too complex, over-fancied (partners and enterprises)

27 KPIs

Analytic Hierarchy Process

ISO 45001 model
Selected examples of literature sources analysed

- **Scientific publications:**

- **Practical guidelines:**
Which criteria for the selection of best indicators?


Literature on the selection of performance indicators


- SMART (Specific, Measurable, Achievable, Relevant, Time-bound)
# Criteria for KPI selection

<table>
<thead>
<tr>
<th><strong>Comprehended</strong></th>
<th>Clearly defined to be easily understood and communicated by/to all persons participating in and/or supervising the process (communication power)</th>
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<tr>
<td><strong>Objective</strong></td>
<td>Based on objective sources of data  &lt;br&gt; It is impossible to manipulate its value without introducing real changes to OSH management processes</td>
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<tr>
<td><strong>Relevant</strong></td>
<td>Representative for monitoring operational performance of a given OSH MS component  &lt;br&gt; Providing information relevant for corrective/preventive action (potential for the improvement)</td>
</tr>
<tr>
<td><strong>Measurable</strong></td>
<td>Data easy to be collected, measured and calculated  &lt;br&gt; Sensitive to small changes of the working environment  &lt;br&gt; Capable to measure process dynamics</td>
</tr>
<tr>
<td><strong>Cost efficient</strong></td>
<td>Arrangements and resources necessary for the measurement are available  &lt;br&gt; Benefits for OSH exceed the costs of measurements</td>
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Analytic Hierarchy Process – AHP (Saaty, 1970)

The AHP is implemented in four stages:

1. **Decomposition of a decision problem** by constructing a hierarchical model of criteria and decision variants (performance indicators - PPI$_{ij}$)

2. **Pairwise comparison of the selection criteria**, and generating the vector of weights for individual criteria

3. **Pairwise comparison of PPI$_{ij}$ indicators** in relation to the criteria

4. **Prioritization** – creating a vector of PPI$_{ij}$ preferences

![Diagram of AHP process]

**Comprehended Goal:**
Selection of KPI for the i-th OSH MS component

**Objectives:**
- Relevant
- Measurable
- Cost efficient
Ranking criteria by pairwise comparisons

AHP comparisons were supported by MakElRational tool (makeitrational.com)
Example results of PPI prioritization process

Hazard identification

Diversified weights of criteria (40% + 4 x 15%)

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<tr>
<th>OSH MS component</th>
<th>Recommended KPIs</th>
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<td>3. Hazard identification</td>
<td>% of hazards with control measures applied (against the total no. of identified hazards) (7)</td>
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Equal weights (5 x 20%)
List of selected KPIs 1/3

Leadership and worker participation:
- Audits reports reviewed
- Perception of leadership by workers
- Workers positively evaluating leadership
- Job descriptions complying with OSH

Planning:
- Hazards under control
- Hazard investigations reviewed
- Risk assessments completed or reviewed
- Risk control measures implemented
- OSH objectives achieved
List of selected KPIs 2/3

Support:
• Permits to work complying with OSH
• Workers trained according to plan
• OSH training plan accomplished
• Effectiveness of OSH training
• Near-misses reported by workers
• Managers’ OSH-related meetings with workers
• Workers involved in OSH improvements

Operations:
• Cost equipment failures
• Preventive maintenance activities performed
• Purchase specifications with reference to OSH
• OSH related meetings with contractors
• Workers trained in emergency response
List of selected KPIs 3/3

Performance evaluation:
- Monitoring activities completed
- Non-conformities identified during audits
- Internal audits completed
- OSH management system issues reviewed

Improvement
- Corrective/preventive actions completed
- Measurement activities with positive results
KPI description sheet example

<table>
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<tr>
<th>5. HC HazCntrl</th>
<th>[2] KPI name: Percentage of hazards with control measures applied (against the total number of new hazards identified in a given reporting period)</th>
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<tr>
<td>$X_i$ - No. of newly identified hazards$^1$ in $i$-th unit, in respect to which appropriate control measures have been implemented according to schedule$^2$ within a given reporting period;</td>
<td>$HC_i = \frac{X_i}{Y_i} \times 100%$</td>
</tr>
<tr>
<td>$Y_i$ - Total no. of newly identified hazards in $i$-th unit, in respect to which appropriate control measures should have been implemented within a given reporting period;</td>
<td>$HC = \left( \sum_{i=1}^{N} HC_i \right) / N$</td>
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<td>$N$ - No. of units conducting hazard identification and collecting data on newly identified hazards.</td>
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<td>$^1$Hazards identified at new workstations, in new processes/machines, or hazards identified as new ones at existing workstations/processes. The number of newly identified hazard may refer to hazards identified prior or within a reporting period.</td>
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<tr>
<td>$^2$The length of the period required for planning and the implementation of control measures after the identification of a hazard can be specified (e.g. no. of days) or unlimited.</td>
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[8] Source of data: Internal reports or records resulting from risk assessment/management processes, which include the identification of hazards in individual units of the enterprise (maintained by heads of the units and/or by the safety manager/OSH department).


[9] Colour policy:

| Red: $HC < 70\%$ |
| Yellow: $70\% \leq HC \leq 90\%$ |
| Green: $HC > 90\%$ |

[10] The method of the KPI implementation in the enterprise:

- Reviewing procedures, reports and other OSH MS documents related to hazard identification, risk assessment and implementation of control measures aimed at elimination/reduction of risks;
- Identification of units/positions which are responsible for conducting and documenting results of hazard identification and risk management procedures;
- Modification of respective procedures to ensure ongoing identification and regular reporting a number and types of newly identified hazards to a responsible OSH unit.
Software tool supporting the implementation of KPIs

A standalone MS Excel macro-based application:

- supports the implementation and monitoring of KPIs in companies
- provides managers with a concise picture of OSH MS performance

Main features and functionalities:

- easily customisable and user-friendly
- selecting preferred KPIs (out of predefined 27 KPIs)
- tailoring KPIs to specific conditions in an enterprise
- creating and using additional KPIs (if needed)
- calculating KPIs for respective reporting periods
- reports displaying selected KPI diagrams generated in MS Word
KPI-OSH Tool user interface (example screenshots)

Starting page of the Tool

Selecting KPIs to be used (out of predefined 27 KPIs)

KPI input configuration
KPI-OSH Tool user interface (example screenshots)
Examples of KPI diagrams

Global KPI trend for selected periods

Values of sub-KPIs for individual departments
Testing and validation of the KPI-OSH Tool

- Pilot implementation of beta version in 3 enterprises in Poland
- Methodology for evaluating the usability of the tool elaborated by FIOH
- Evaluation included meetings and interviews with safety managers
- Data collection and analysis

Next steps:

- Drafting recommendations for improving the Tool
- Developing a new improved version 2.0 and its User Manual
- Promoting the Tool via project website, OSHwiki and social media
Downloading the Tool

Project website: www.oshkpitool.eu
Measuring operational performance of OSH management systems

Introduction

Companies implementing an OSH management system based on international or national reference documents, such as the ILO-OSH 2001 Guidelines of the International Labour Organisation (ILO) or the upcoming standard ISO-45001 (ISO), should continuously monitor their OSH performance and evaluate the effectiveness of their OSH management systems. The effectiveness of the OSH management systems should be evaluated not only on the basis of outcome (lagging) indicators, such as the rate of work-related incidents, injuries and ill health, but also on frequent measurement of selected leading indicators, which are able to provide an up-to-date and concise picture of operational performance of OSH management processes. Examples of such leading indicators include: progress on meeting OSH policy commitments and respective objectives, percentage of workstations subject to periodic risk assessment; the effectiveness of operational controls and emergency exercises; proactive and reactive actions affecting the organization’s OSH performance; the level of employees’ and managers’ competence in the area of OSH management, etc.

In today’s companies a large volume of data relevant to OSH management processes is generated and stored in databases, paper documents and on mobile devices. Data is retrieved and processed by many employees and managers in various organizational departments where various OSH management activities are being performed.
Conclusions on harmonization of OSH KPIs

- Focus on leading rather than lagging indicators
- KPIs should be useful for managers in improving OSH management
- Better a small set of KPIs than many performance metrics
- A clearly defined set of criteria for the selection of KPIs, for example: Comprehended, Relevant, Objective, Measurable, and Cost-efficient
- Defining KPIs unambiguously (calculation formulas, descriptions of parameters, sources of data, demonstration and reporting etc.)
- Implementation of KPIs supported by the user-friendly software tool
Thank you very much for your attention.

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