Guidelines for investigation of logistics incidents and identifying root causes

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Scope & Objective of the guideline

• Learning from accidents is key to avoid same type of accidents occurring again.

• Good learning is only possible if the root causes have been identified!

- Provide guidance on how to carry out an **off-site incident investigation**
- Identify the **root causes**
- Identify the **corrective actions** to prevent re-occurrence
Incident investigation

An incident investigation is a process conducted for the purpose of incident prevention which includes the gathering and analysis of information, drawing of conclusions, including determination of causes and, when appropriate, making of safety recommendations.
Root cause analysis (RCA)

A Root Cause Analysis (RCA) is a method that allows identification of the true causes of incidents, with the aim of preventing these root causes from occurring and being repeated over and over again.
The incident investigation process

“To address this mistake we need to utilise our thorough system of root cause analysis. I will begin, if I may, by pointing out that it’s not my fault”
The different steps

1. Event
2. Investigation Team
3. Collect of the facts
4. Primary event (see list 3.1)
5. Immediate causes/ direct causes (see list 3.2)
6. Basic/root causes (see list 3.3)
7. Corrective actions (see list 4.2)
The incident investigation process

1. Setting up an effective incident investigation team
   - Team leader should be close to but not have any responsibility for the incident
   - Team members must be aligned to the business process
   - The facilitator must be trained and independent
   - Team members have to be sufficiently trained or guided through the process

Conditions
   - People involved in the incident should never be part of the team but should be interviewed as part of the investigation process
   - Corrective actions should be agreed upon with the process owners
The incident investigation process

2. **Description** of the incident
   - When, where, what happened and who was involved
   - Affected elements: products, material, type of failure, ...
   - Consequences

3. Gathering **evidence** and **facts**
   - Record only facts, not opinions
   - Interview people involved in the incident
   - Pictures, CCTV, on board camera recording
   - **IMPORTANT**: do not allocate blame during the evidence gathering!
The root cause analysis method for logistics operations

1st step: TYPE OF PRIMARY EVENT

Select the defect from the primary event list (see list 3.1) based on the evidence/facts gathered by asking the following questions:

- What was needed for that event to happen?
- Was it necessary?
- Was it sufficient?

Example
3.1.9 Leaving the road. This is the main event to be investigated
3.1.12 Roll-over. This is the consequence of the vehicle leaving the road
Identification of the immediate/direct cause(s) of the primary event (see list 3.2) and investigation of each immediate cause based on the evidence/facts asking the following questions:

- What was needed for that direct cause to happen?
- Was it necessary?
- Was it sufficient?

Example

3.2.1 Non-standard operation: the parking is normally not used for loaded vehicles
3.2.16 No warning: there is no sign or other warning that the exit should not be used to turn right
3.2.22 Human failure: the driver followed the example of drivers of empty trucks. The driver could have stopped to assess the sharp turn
3rd step: BASIC/ROOT CAUSES

For each direct cause, dig deeper to find the Basic/Root causes (see list 3.3-3.3.1 for organisational causes – list 3.3.2 for human causes) by asking the questions:

- What was needed for that basic cause to happen?
- Was it necessary?
- Was it sufficient?

Example
3.3.1.2 i) Incomplete risk analysis: the transport company did not inspect the site for parking of loaded trucks. The cleaning station did not assess the exit of the parking area. Inadequate routing on the site

3.3.1.7 i) Inadequate design: the design of the exit was not adequate. There were no warning signs that vehicles should not turn right

3.3.1.9 i) Work environment inadequate: inadequate lighting of the parking exit
The root cause analysis method for logistics operations

4th step: CORRECTIVE ACTIONS

For each basic/root cause corrective actions must be implemented in order to prevent re-occurrence of the same kind of incident

Two types of corrective actions

1. Organisational causes. See the list 4.2
   - Select the type of cause and define an appropriate action to close the gap

2. Human causes
Accident Investigation Tree example 1

Type of event

Direct causes

Root causes

Corrective actions

3.1.12 Roll-over

3.1.9 Leaving the Road

3.2.16 Non-standard operation: A loaded truck manoeuvring in a cleaning station

3.3.1.2 i) Incomplete risk analysis: The site was not assessed for parking of loaded trucks by the transport company

3.3.1.7 i) Inadequate design: The design of the exit was not adequate. Inadequate routing on the site

3.3.1.9 i) Inadequate working environment: Inadequate lighting of the parking exit

3.3.2.2 iii) Unintentional human error. Poor judgement: The driver failed to perceive the sharpness of the turn

At this point the investigation team wondered if it was realistically possible to turn right safely and decided to inspect the site. The investigation team concluded that it is not possible to turn right safely

4.2.3 Carry out risk analysis by the transport company and implement mitigating measures:
4.2.3.1 BBS training/refreshing
4.2.3.4 Introduce near-misses and unsafe acts and conditions reporting system
4.2.3.6 Road information system:
4.2.3.11 Improve lighting

4.2.19 Improve design of site exit

4.2.18 Initiate improvements with external sites: In this case with the cleaning station

3.2.2.2 Human failure: The driver followed the example of empty truck drivers
Reporting the incident

Following reports should be issued:

1. An **immediate incident notification** to the stakeholders (basic information by a quick call followed by the “first incident report” within 24 hours),

2. An **investigation report** (full description of the event, facts and evidence, root causes analysis & corrective actions) for sharing the findings with the stakeholders

3. A **report** for sharing the **learning** via **Cefic** (optional)
Focus on the processes in your own control

Look for management system errors and not for personal error

Make sure your report is clear also after one year

Do not hesitate to ask for support in the process to third parties

AND FOR SURE DO NOT BLAME EMPLOYEES OR THIRD PARTIES
Whilst exiting a parking zone of a cleaning station, the driver had to turn right onto the road. The turn was taken too sharply and the rear wheels passed onto the grass verge. The wheels slid and drove down the banking, leading to the tip and roll-over of the vehicle.
3.2 Immediate/direct causes (Partial view)

3.2.1 Non-standard operation
3.2.2 Weather conditions
3.2.3 Equipment / material failure
3.2.4 Instrument failure
3.2.5 Instrument non calibrated
3.2.6 Falling to use PPE properly
3.2.7 Too high speed
3.2.8 Inappropriate loading of truck (overweight / underweight/uneven load distribution)
3.2.9 Incorrect (un) loading
3.2.10 Incorrect lifting
3.2.11 Incorrect position for task
3.2.12 Incorrect cargo securing
3.2.13 Incorrect storage / placement
3.2.14 Lack of coordination between operator and driver
3.2.15 Lack of instrument
3.2.16 No warning

Facts of Example

1. This was the first time the driver visited this cleaning station. The driver used a gate/road he/she was unfamiliar with
2. The incident happened during the dawn. The visibility was reduced
3. The turn was to the right and the driver sat on the left
4. The driver misjudged the road corner
5. The driver was not injured and there was no leakage
6. The driver had loaded at another site the evening before and stayed overnight on the parking of the cleaning facility
7. There were more drivers leaving through the same gate, but these vehicles were empty (cleaned)
8. There were tyre marks on the grass
3.3.1 Organisational causes (partial view)

3.3.1.1 Inadequate training / coaching programme
   i) Inadequate communication (omission / misunderstanding / wrong information)
   ii) Inadequate guidance / supervision / monitoring / coaching
   iii) Inadequate / lack of training (driver not familiar with load / route, inadequate skills, lack of knowledge, etc.)
   iv) No BBS programme (including defensive driving / roll-over prevention)

3.3.1.2 Inappropriate (use of) procedures/processes
   i) No/incomplete or incorrect risk analysis
   ii) No/inadequate procedure
   iii) Task design inadequate (competence requirements not well defined, responsibility not clear, repetitive tasks, excessive length of shift, etc.)
   iv) Corrective action not implemented
   v) Procurement process failure (inadequate specifications, inadequate receiving/inspection, inadequate contractor selection)
   vi) Quality assurance / quality control failure

3.3.1.3 Incorrect contractor management
   i) Inappropriate selection process
   ii) Inadequate definition or communication of requirement
   iii) Inadequate monitoring and reviewing of requirements

3.3.1.4 Inadequate fitness to work
   i) Inadequate physical / mental condition, sick, misuse of drugs, fatigue

3.3.1.5 Incompatible goals
   i) Task planning inadequate
   ii) Work pressure too high

More facts from Example:

➢ the transport company did not inspect the site for parking of loaded trucks. The cleaning station did not assess the exit of the parking area. Inadequate routing on the site

➢ the design of the exit was not adequate. There were no warning signs that vehicles should not turn right

➢ inadequate lighting of the parking exit

➢ ...
4.2 Corrective actions on organizational causes:

4.2.1 Implement HSE management systems
4.2.2 Improve visible and felt (senior) management commitment to HSE
4.2.3 Carry out risk analysis and implement mitigation measures accordingly.

See examples below of mitigation measures:

4.2.3.1 BBS training/refreshing training
4.2.3.2 Fatigue risk management
4.2.3.3 Installation of interlock systems to avoid human error
4.2.3.4 Near-misses and unsafe acts and conditions reporting
4.2.3.5 Preventive maintenance
4.2.3.6 Road information systems
4.2.3.7 Route familiarization training
4.2.3.8 Subcontractors selection (for example through SQAS) and follow up of gaps and performance issues
4.2.3.9 Task analysis
4.2.3.10 Investigate if working at height can be avoided or provide fall protection
4.2.3.11 Improve lighting

4.2.4 Clarify responsibilities
4.2.5 Define/implement/improve procedures
4.2.6 Implement Management of Change
4.2.7 Improved engineering

4.2.8 Follow up of corrective actions from previous incident