

Ishikawa Diagram: Mastering Root Cause Analysis in Procurement Systematically

The Ishikawa diagram, also known as the fishbone diagram or cause-and-effect diagram, is a visual method for the structured root cause analysis of problems. In procurement, it helps to systematically uncover sources of error in delivery problems, quality defects or process disruptions, instead of only treating symptoms. It was named after the Japanese quality expert Kaoru Ishikawa and has been a standard tool in quality management and continuous improvement for decades.

Key facts

- The Ishikawa diagram visualises cause-and-effect relationships along the typical categories of people, machine, method, material, environment and measurement.
- It is particularly suitable for analysing delivery problems, increased complaint rates or process deviations in procurement.
- The combination with the 5-Why method deepens the analysis down to the actual cause.
- The method can be used across companies, for example in joint workshops with suppliers.
- Its success depends heavily on a sound data basis, for example from KPIs such as On-Time In Full (OTIF) or incoming goods quality.

Definition: Ishikawa diagram

The Ishikawa diagram is a form of diagram for the systematic identification and presentation of the causes of a problem. The effect or defect is noted on a horizontal axis, and so-called bones branch off the main arrow, each representing a cause category with sub-points.

Origin and classification

Kaoru Ishikawa developed the method in the 1960s as part of Japanese quality assurance approaches. Today it is an integral part of the classic quality management tools and is frequently used in the context of 8D reports, FMEA analyses and continuous improvement processes (CIP). It is important for buyers because supplier errors often have multiple causes: a late call-off order or a firm order rarely leads to just one cause, but to the interplay of planning, process and material errors.

Distinction from other analysis methods

While the 5-Whys method goes vertically into depth, the Ishikawa diagram works horizontally in breadth: it uncovers many potential cause categories in parallel. Pareto analyses quantify the significance of individual causes; the Ishikawa diagram collects and structures them. In practice, the methods are complementary: Ishikawa describes the entire possible spectrum, Pareto prioritises, and the 5-Whys verifies each individual cause. Buyers should consider this combination a standard repertoire.

Methodical approach in procurement

The methodological procedure follows four steps: problem definition, category selection, cause collection and prioritisation. The choice of categories is generally oriented towards the 6M categories named below, which are established in industry.

The 6M categories

The classic categories of the 6M approach are: Man/People (competences, training level), Machine (equipment, tools), Method (processes, work instructions), Material (raw materials, components, purchased parts), Milieu or Environment (working conditions, environmental influences) and Measurement (measuring technology, data collection). In procurement, the categories can be filled in concretely: 'Material' includes, for example, the behaviour of suppliers, 'Method' ...

Running a workshop with suppliers

The Ishikawa diagram is particularly effective as a joint analysis with a supplier. Typical scenario: the complaint rate rises and the defect patterns vary. Instead of blaming each other, both sides discuss together on a whiteboard. The buyer checks whether their own specifications, such as call-off orders or Incoterms CFR provisions, have led to misunderstandings. The supplier opens up their process chains. This joint analysis promotes cooperation rather than friction and is a proven instrument for ...

- Joint cause collection at eye level
- Addressing process contributions from both sides
- Reconciling target concepts and actual processes
- Agreeing concrete actions on both the supplier and buyer side

Combination with the 5-Whys method

For each relevant cause on the diagram, the vertical depth analysis follows: Why is the material defective? Because the supplier simplified the goods inspection. Why? Because a pattern adjustment was missing in the last batch. After around four to five follow-up questions, the actual cause is usually visible, which is often systemic in nature. In this way, the demand 'supplier needs training' breaks down into verifiable process actions. The combination of both tools increases the probability that findings will lead to sustainable improvements and not just to ...

Typical application areas and example

Ishikawa diagrams are useful in procurement wherever problems have multiple causes and superficial symptom treatment would prove costly. These include delivery delays, quality fluctuations and cost drivers.

Delivery delays and incoming goods quality

Missing or incomplete deliveries are among the most common applications. The data situation is decisive: is the On-Time In Full (OTIF) value declining temporarily or structurally? Is only one material group affected or the entire portfolio? The analysis in the 'Method' category typically uncovers incorrect demand planning, outdated reorder point parameters or unclear call-off orders. In the 'Material' category, supplier-side problems appear, such as a sub-tier supplier failure or structural bottlenecks in upstream products.

Cost driver analysis

Unnecessary costs can also be broken down using the Ishikawa diagram. An increase in procurement costs for standard components can have causes in several bones: workflow weaknesses (e.g. duplicate ordering due to manual account assignment), a lack of communication with suppliers (no supplier credit check before placing orders) or structural factors such as the degree of account assignment automation of line items. The method prevents buyers from jumping to the most obvious cost driver without considering the interplay of causes.

Key KPIs and data basis

An Ishikawa diagram without a data basis becomes a gut-feeling diagram. Sound KPIs provide the objective orientation as to which cause branch should actually be explored in depth.

KPIs for anchoring the analysis

KPIs that quantify deviations and make trends visible are particularly suitable: On-Time In Full (OTIF) for delivery reliability and completeness, the complaint rate for quality problems, inventory KPIs such as coverage or capital tie-up for stock issues, and incoming goods quality for incoming errors. In practice, many causes only become apparent by comparing several KPIs: a declining incoming goods quality for one material group points to a supplier problem – regulatory or internal causes are rather unlikely.

From diagram to impact

After the analysis, the identified actions should be measurably linked back to the KPIs. Example: if a sample shipment response has been agreed to clarify quality deviations, the complaint rate in the coming months shows whether the action is effective. Without feedback, Ishikawa analyses degenerate into one-off workshops. A simple action list with a person responsible, deadline and primary reference KPI is helpful – often that is all that is needed to create sustainability.

Risks, limitations and best practices

The Ishikawa diagram is a powerful tool, but not an end in itself. The most common sources of error can be clearly identified and avoided.

Typical application errors

Common errors are: jumping too quickly to the first plausible-sounding cause (confirmation bias), purely descriptive symptom statements ('the supplier is unpunctual' instead of concrete process conditions) and diagrams that are aborted too early once a culprit has been found. Session dynamics also create risks: dominant participants shape the picture, while quieter process participants on the shop floor go unheard. A neutral moderator and the advance collection of data sheets significantly reduce this risk.

Success factors in practice

Good Ishikawa analyses are characterised by three features: they are based on concrete observations rather than assumptions, they involve the process participants from the outset, and they end with prioritised, schedulable actions. To make the overall analysis effective, it should be defined when the case is considered closed – for example, when the OTIF value has been back within the target range for several weeks. With structural supplier problems, the consequences should also include reviewing a change of supplier if improvement measures remain ineffective.

Current developments and digital implementation

The classic method is experiencing a journey into new contexts through digital tools. Buyers should be aware of what is changing – even if the underlying logic remains the same.

Digital boards and AI support

Instead of whiteboards and sticky notes, many teams today use digital whiteboards or ERP-near connectors. Advantages: diagrams remain documented, can be linked to KPIs and edited across locations. AI modules can use fault and complaint data to suggest likely cause categories – as a source of ideas, not as a substitute decision. The human synthesis of process knowledge and data remains the true core of the method.

Integration with supplier systems

Increasingly, root cause analyses are being linked directly to supplier portals and joint evaluation processes. Insights from Ishikawa workshops flow into supplier rating corridors, influence the selection of PO orders or framework delivery schedules and thus form a basis for structural procurement decisions. Companies that systematically document root cause analyses thereby build up a reliable knowledge and supplier specification base over the years – an often underestimated competitive advantage.

Typical metrics

On-Time In Full (OTIF): > 95 %

Usual target corridor for delivery reliability in practice; deviations are a trigger for an Ishikawa analysis.

Complaint rate: < 1 %

Typical guideline value; rising rates indicate categorised causes.

Incoming goods quality: > 98 %

Proportion of defect-free incoming deliveries; supports the success assessment of root cause analyses.

Action completion rate: > 90 %

Proportion of actions from Ishikawa analyses completed on schedule; measures the sustainability of the method.

Practical example

A medium-sized mechanical engineering company recorded increasing delays in purchased parts of a critical material group over several months. The OTIF value of the main supplier fell significantly, while incoming goods quality initially remained unremarkable. Instead of immediately considering a change of supplier, the head of procurement invited the supplier to a joint Ishikawa analysis. The diagram quickly showed: the error did not lie with the supplier alone, but in the interplay of imprecise call-off orders from the purchasing company, a lack of coordination in demand planning and unclear communication of target dates.

- Joint Ishikawa analysis with supplier, procurement and materials planning as a one-day workshop
- Refinement of demand planning and standardisation of call-off order processes
- Agreement of a standard call-off with fixed review dates and defined escalation paths
- Monthly monitoring of the OTIF value until a sustained return to the target range

Conclusion

The Ishikawa diagram is a simple-to-learn but effective tool for making the causes of complex problems in procurement visible. Its value does not arise from the graphic itself, but from a disciplined process: a sound data basis, openness in the workshop and consistently followed-up actions. Buyers who regularly use the tool to address supplier-related problems, process deviations or cost drivers reduce symptom treatment and create sustainable improvements. In addition, the joint analysis with suppliers promotes cooperation at eye level – an important building block for stable supplier relationships. Those who link the method with KPIs such as OTIF or complaint rate turn an idea generation exercise into a measurable management process.

Frequently asked questions

What is an Ishikawa diagram in simple terms?

The Ishikawa diagram is a cause-and-effect diagram in the shape of a fishbone: the problem is placed on the left, and possible causes are collected on the branching bones according to categories such as people, machine, method and material. It helps to systematically consider all influencing factors instead of only treating symptoms. It is used particularly frequently in quality management and in procurement.

How do you create an Ishikawa diagram step by step?

First, the problem is precisely formulated and noted as the effect at the head of the diagram. Then the cause categories are selected (typically the 6M) and individual causes are collected as a team and noted along the bones. Subsequently, the most promising causes are explored in depth using the 5-Why method and converted into prioritised, scheduled actions.

What does 6M mean in root cause analysis?

The 6M stand for Man (People), Machine, Method, Material, Milieu (Environment) and Measurement. These categories typically cover all potential influencing factors on a problem in industry. In procurement, the categories can be filled in concretely, for example methods for demand planning or material for purchased parts and supplier behaviour.

When should an Ishikawa diagram be used in procurement?

It is suitable wherever problems have multiple causes and where treating symptoms would become costly: for delivery delays, increased complaint rates, quality deviations or unexpected cost increases. It is also proven as a structured response to complaints within 8D processes. A sufficiently good data basis is a prerequisite in order to objectively support the cause assessment.

What is the difference between an Ishikawa diagram and an FMEA?

The Ishikawa diagram works retrospectively: it analyses a problem that has already occurred backwards to its cause. The FMEA works preventively: it assesses potential failures and their effects before they occur. The two methods complement each other – the Ishikawa analysis provides insights that can feed into the later FMEA definition and preventive measures.

Can Ishikawa diagrams also be created jointly with suppliers?

Yes, this is particularly effective in practice. Joint analyses prevent blame being assigned, promote transparency in both process chains and frequently lead to actions on both sides. A cooperative, problem-solving-oriented relationship is a prerequisite. This form of collaboration sustainably strengthens the supplier relationship and reduces repeat errors.