

MANAGEMENT REVIEW

Management without theatre.

OPERATIONS

THE ISHIKAWA DIAGRAM

Where the fishbone came from, how far quality professionals trust the seven basic tools, how to draw one, Ishikawa's three types, what hospital investigations ended up proposing, and a card for one diagram.



< 25%

of 397 senior quality professionals trained in the seven basic tools thought they can solve more than 95% of quality problems.

ANTONY, MCDERMOTT & SONY, 2021

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NO. 76 · OPERATIONS

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When something goes wrong, the first explanation offered is usually a single cause, often a person. The Ishikawa diagram makes a team write down every cause it can think of, sorted into groups, before it chooses one. This issue asks where the diagram came from, how it is drawn, and what it can and cannot prove.

Kaoru Ishikawa is credited with the first diagram, in 1943, and counted it among seven basic tools he said could solve 95% of problems at work; in a survey published in 2021, fewer than a quarter of 397 quality professionals trained in them went that far. ASQ's procedure starts from one effect and generic categories such as the 6Ms. Patient-safety researchers warn that “root cause” suggests a single one. At one medical centre, eight years of analyses ended most often in training, process change and policy.

Stiven Janaqi EDITOR · STIVEN CATALYST

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HOW TO READ THIS ISSUE

Figure

Every figure has its source and year at the foot of its page.

Our reading

Where the editors interpret rather than the research, it says so.

Practice

The steps and the card are proposals to try, not research results.

COVER STORY

Sorting the causes

Kaoru Ishikawa is credited with drawing the first cause-and-effect diagram in 1943, to show engineers at Kawasaki Steel how the many factors behind a result could be sorted and related to one another.

01**The head**

the effect: one problem, written in a box on the right

02**The bones**

the main categories of causes, branching off the spine

03**The small bones**

causes and sub-causes, found by asking why it happens

The shape gave it its other name, the fishbone. Ishikawa counted it among seven basic quality tools, with the check sheet, the Pareto chart, the histogram, the scatter diagram, stratification and the control chart.

OUR READING

The diagram does not find the cause. It stops a team from settling on the first one that comes to mind.

Sources: A. Mark Doggett, Quality Management Journal 12(4), 2005; Kaoru Ishikawa, JUSE, 1968 (via Secondary summaries); ASQ, 2026

The 1943 story as Doggett (2005) tells it; Ishikawa's own account was not available to us, and other accounts give other dates and places. ASQ lists the names fishbone, cause-and-effect and Ishikawa diagram.

THE NUMBERS

Widely used, modestly trusted

Ishikawa held that seven basic tools, used skilfully, could solve 95% of problems at work. In a study published in 2021, Jiju Antony, Olivia McDermott and Michael Sony put the claim to 456 senior quality professionals on five continents.

456

senior quality professionals
answered the online survey

< 25%

of the 397 trained in the
tools thought they can solve
over 95% of quality
problems

The Pareto chart was the most widely used of the seven, scatter diagrams and stratification the least; the tools were used most in production and least in IT and finance.

OUR READING

Professionals use the tools widely and expect less of them than their author did. That is the right frame of mind for the diagram.

Source: Jiju Antony, Olivia McDermott & Michael Sony, IEEE Transactions on Engineering Management 70(11), 2021

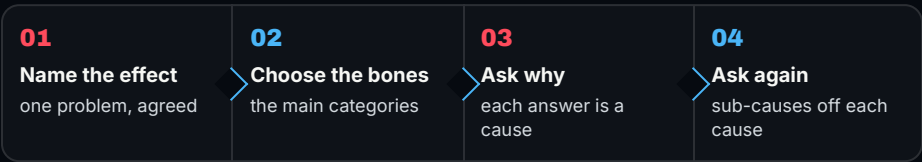
Self-reports in an online survey. Those not trained in the tools stopped after the first questions; the 25% is of the 397 who went on (90 of 397). Ishikawa's 95% as the authors quote it.

THE MODEL

How to draw one

ASQ's procedure, which cites Nancy Tague's Quality Toolbox, starts with the team agreeing on one problem statement, the effect, and writing it in a box on the right, at the end of a horizontal spine.

THE FOUR STEPS (ASQ)



Manufacturing: the 6Ms

- Methods
- Machinery
- Materials
- Measurement
- Manpower
- Mother Nature

What they cover (ASQ)

- Machinery: equipment, software
- Methods: procedures, regulations
- Manpower: training, skills
- Mother Nature: the environment
- Sometimes a seventh M: money

OUR READING

The people bone is the easy one. “Careless operator” ends the search; why the process let the slip through is the next question.

Source: ASQ, 2026

Ishikawa introduced the 6Ms as generic labels but encouraged teams to name their own (ASQ). The right column shortens ASQ's notes on the categories.

[More in the essay](#)

Pareto and 5 Why in practice, not in PowerPoint

WHAT THE RESEARCH SAYS

Three types, one warning

Ishikawa described three ways to build the diagram. They differ in what forms the bones: the sources of variation, the steps of the process, or a free list of causes sorted afterwards.

01**Dispersion analysis**

the bones are sources of variation, such as the 6Ms

02**Process classification**

the spine follows the steps; causes branch off each one

03**Cause enumeration**

all possible causes listed first, then grouped and related

Writing on root cause analysis in patient safety, Mohammad Farhad Peerally, Susan Carr, Justin Waring and Mary Dixon-Woods (2017) argue that the method spread with too little attention to what made it work where it came from, and that the term “root cause” suggests a single cause and invites stories that are too simple.

OUR READING

Most problems have several causes acting together. A diagram with one bone circled is a place to start checking, not a verdict.

Sources: Kaoru Ishikawa, JUSE, 1968 (via Secondary summaries); M. F. Peerally, S. Carr, J. Waring & M. Dixon-Woods, BMJ Quality & Safety 26(5), 2017

The three types as Doggett (2005) summarises Ishikawa's guide; we did not see the book. On blame after errors, see No. 50.

HOW IT IS MEASURED

What the analyses proposed

One way to judge a cause analysis is by what it changes. Kellogg and colleagues reviewed 302 root cause analyses done at a large academic medical centre over eight years; 106 proposed solutions, 499 in all.

THE COMMONEST TYPES AMONG 499 PROPOSED SOLUTIONS (2017)

Training



Process change



Policy reinforcement



The commonest events were complications of procedures, cardiopulmonary arrests, neurological deficits and retained foreign bodies. Several types of event recurred in the eight years despite repeated analyses. The authors conclude that the solutions proposed most often were weak ones, less likely to prevent a recurrence.

OUR READING

Judge the analysis by its last line: was the cause checked with data, and does the fix change the process rather than remind people of it?

Source: K. M. Kellogg, Z. Hettinger, M. Shah et al., BMJ Quality & Safety 26(5), 2017

One medical centre. The abstract says 731 solutions; the paper's text and table count 499, the base of the shares. These were root cause analyses in general, not only fishbone diagrams. On stronger and weaker actions, see No. 46.

TOOL OF THE ISSUE

The fishbone card

One card per problem. Write the effect so it can be measured, fill every bone before choosing, then check the likeliest causes with data. Take the one that holds into a 5 Whys.

01 The effect what, where, since when, how much: one sentence

02 The bones the 6Ms or your own; no more than six

03 Causes on each bone why does it happen? one cause per line

04 The three likeliest chosen by the team and circled on the diagram

05 Check with data what will confirm or rule out each one, who checks, by when

06 Action and review what changes in the process, and when you look again

Sources: ASQ, 2026; Kaoru Ishikawa, JUSE, 1968 (via Secondary summaries)

A practice proposed by the editors, after ASQ's procedure and Ishikawa's types. Count how often each checked cause occurs with a Pareto chart (No. 15); the 5 Whys tool takes one branch further.

[Open the tool: 5 Whys](#)

stivencatalyst.com/tools/five-whys/

SOURCES AND METHOD

Every figure has a source.

The figures in this issue come from the sources below. The year shows how recent each one is.

Guide to Quality Control

Kaoru Ishikawa, JUSE, 1968 · via Secondary summaries

Root Cause Analysis: A Framework for Tool Selection

A. Mark Doggett, Quality Management Journal 12(4), 2005

<https://doi.org/10.1080/10686967.2005.11919269>

What is a Fishbone Diagram? Ishikawa Cause & Effect Diagram

ASQ, 2026

<https://asq.org/quality-resources/fishbone>

Revisiting Ishikawa's Original Seven Basic Tools of Quality Control: A Global Study and Some New Insights

Jiju Antony, Olivia McDermott & Michael Sony, IEEE Transactions on Engineering Management 70(11), 2021

<https://doi.org/10.1109/TEM.2021.3095245>

The problem with root cause analysis

M. F. Peerally, S. Carr, J. Waring & M. Dixon-Woods, BMJ Quality & Safety 26(5), 2017

<https://doi.org/10.1136/bmjqs-2016-005511>

Our current approach to root cause analysis: is it contributing to our failure to improve patient safety?

K. M. Kellogg, Z. Hettinger, M. Shah et al., BMJ Quality & Safety 26(5), 2017

<https://pubmed.ncbi.nlm.nih.gov/27940638/>

EDITORIAL METHOD

Each figure was checked for its year, its publisher and what exactly it measures. Where the publisher's page could not be opened, the figure was checked against independent summaries and is marked “via”. The editors' interpretation is marked “Our reading”. Figures that could not be confirmed are not in the issue.



MANAGEMENT REVIEW

Management without theatre.

Every issue, one management question, checked against the best research.

ALL ISSUES

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