BS ISO 17258:2015

BSI Standards Publication

Statistical methods — Six Sigma — Basic criteria underlying benchmarking for Six Sigma in organisations

bsi.

...making excellence a habit.™

Document Sharing Hub

National foreword

This British Standard is the UK implementation of ISO 17258:2015.

The UK participation in its preparation was entrusted to Technical Committee MS/6, Methodologies for business process improvement using statistical methods.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2015. Published by BSI Standards Limited 2015

ISBN 978 0 580 75798 3

ICS 03.120.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2015.

Amendments issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO 17258:2015

INTERNATIONAL STANDARD

ISO 17258

First edition
2015-01-15

Statistical methods — Six Sigma — Basic criteria underlying benchmarking for Six Sigma in organisations

Méthodes statistiques — Six Sigma — Critères fondamentaux d'une évaluation comparative Six Sigma pour les organisations

Reference number
ISO 17258:2015(E)

Documents
Document Sharing Hub
© ISO 2015

Full document details: BS ISO 17258:2015

COPYRIGHT PROTECTED DOCUMENT

© ISO 2015

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO 17258:2015

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviations **1**
5 General considerations on benchmarking **2**
5.1 Objectives and framework 2
5.1.1 Objective 2
5.1.2 Framework 2
6 Benchmark **2**
6.1 Overview and requirements for the criteria 3
6.1.1 Types and description of criteria 3
6.1.2 Requirements for criteria 3
6.2 Overview and requirements for the measures 3
6.2.1 Scope of measures 3
6.2.2 Generic measures 4
6.2.3 Industry specific measures 8
6.2.4 Summary of measures 9
7 Benchmarking **10**
7.1 Objective establishment step 10
7.2 Measurement step 10
7.2.1 Data collection 10
7.2.2 Data arrangement 11
7.2.3 Data quality validation 11
7.3 Controlling the quality of the measurement results 11
7.3.1 Precision 11
7.3.2 Consistency 11
7.3.3 Up-to-date 11
7.4 Comparison step 11
7.5 Internal benchmarking 11
7.5.1 Historical benchmarking 12
7.5.2 Functional benchmarking 12
7.5.3 I/O benchmarking 12
7.6 External benchmarking 12
7.7 Supply chain benchmarking 12
7.7.1 Benchmarking in an organization 12
7.7.2 Benchmarking in a supply chain 13
7.8 Six Sigma project selection 13
8 Interface with other types of benchmarking **13**
Annex A (informative) **Three dimensions of benchmarking** **15**
Annex B (normative) **Table of criteria (generic)** **16**
Annex C (informative) **Table of criteria with examples of results** **18**
Annex D (normative) **Table of criteria for the food processing industry** **20**
Annex E (normative) **Table of criteria for the automotive industry** **22**
Annex F (normative) **Table of criteria for the retail banking industry** **24**
Annex G (normative) **Table of criteria for clothing and leather industry** **27**

Documents
Document Sharing Hub

© ISO 2015 – All rights reserved

Full document details: BS ISO 17258:2015

Annex H (normative) **Table of criteria for the telecoms industry** **29**
Annex I (normative) **Table of criteria for the hotel business** **31**
Annex J (normative) **Table of criteria for the retail business** **33**
Annex K (informative) **Example from the poultry industry** **35**
Bibliography **37**

© ISO 2015 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 69, *Statistical methods*, Subcommittee SC 7, *Six Sigma*.

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

Introduction

Benchmarking is frequently used in various domains in connection with business activities. The Six Sigma methodology requires an evaluation step using a benchmarking process. In other words, a method for the comparison of levels of quality, performance, and productivity with the state-of-the-art is required. This International Standard establishes what to compare and develops a methodology to conduct a correct comparison between an organization's levels of quality, performance, and productivity. The numbers given by the benchmarking can be integrated into any improvement programme to quantify any progress. They can also be used by other assessment processes in the organization such as regulation compliancy or financial performance evaluation.

Benchmarking is the whole process of collecting and processing data and information and comparing the results. The benchmark is the reference point for comparison.

The main point of this benchmarking methodology, based on transparency and the universal principle of evaluation, is to give confidence to its calculating procedures and the results, so that comparisons between organizations are accepted by all parties.

Benchmark and Six Sigma's principles

The Sigma measure is a number ranging from, typically, near zero to 10 or more. The value six has traditionally been considered "world class" (that can be approximated by 3,4 defects per million opportunities — see ISO 13053-1 5.3) for mechanical and electronic industries. The criticality of defects within each industry typically defines the Sigma level required in order to be a "world class" benchmark quality level for that application. So, according to the different sectors and markets, the level of "world class" can be different.

The Sigma level is an estimate of the proportion of defects (typically expressed in defects per million). A "world class" Sigma level is the Sigma level that is considered essential to consistently deliver excellence of product and service.

This benchmarking method is applicable to all types of sectors, to all type of processes, to organizations of all sizes, and to all methodologies for improvement, in association with DMAIC, or issues relating to Design for Six Sigma (DFSS).

Criteria and defects

The Sigma level is based on the ratio of estimated (or observed or predicted) number of defects to the number of opportunities according to the specifications and the variability of the process (for example, one "defect" in a million deliveries).

A defect is something that a customer or a user cannot accept or it might have a negative impact on performance.

Two types of customer are identified:

— the end user or consumer (Business to Consumer) and

— the professional (Business to Business).

The consumer has some needs but these needs are often implicit. Product requirements that address these needs are not numerous and they can be summarized by the following:

a) to be safe in its intended usage (security, safety);

b) to do what it is supposed to do (functional, conformity);

c) to be available in the expected shape and not to break in its intended usage (availability, ease of use, reliability);

d) to not do any harm to persons (ethical) or environment (pollution control).

© ISO 2015 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

These four criteria cover most of the consumer's needs for all sectors and on all continents.

A customer will have other criteria but all of these are likely to be summarized by the four generic criteria described above.

Supply chain

A supply chain is the whole supplier/transformer link from the raw material to the final product or the service for the consumer. Each sector has its supply chain organization.

Examples:

— Petrol sector — from the offshore extracting (extractor) unit to the gasoline retailer for consumers.

— Food sector — from the fields and orchards (raw material) to the consumer.

— Automotive sector — from the steel and glass supplier to the car manufacturer.

— Cosmetic sector — from the molecule to the perfume or beauty cream.

The level of quality and performance delivered to the consumer is the "total" of all quality and performance levels of the different transformers along the supply chain.

This benchmarking methodology aims to give a comparison of levels between upstream and downstream transformers (chain efficiency benchmarking) or between transformers at the same step (competitive benchmarking).

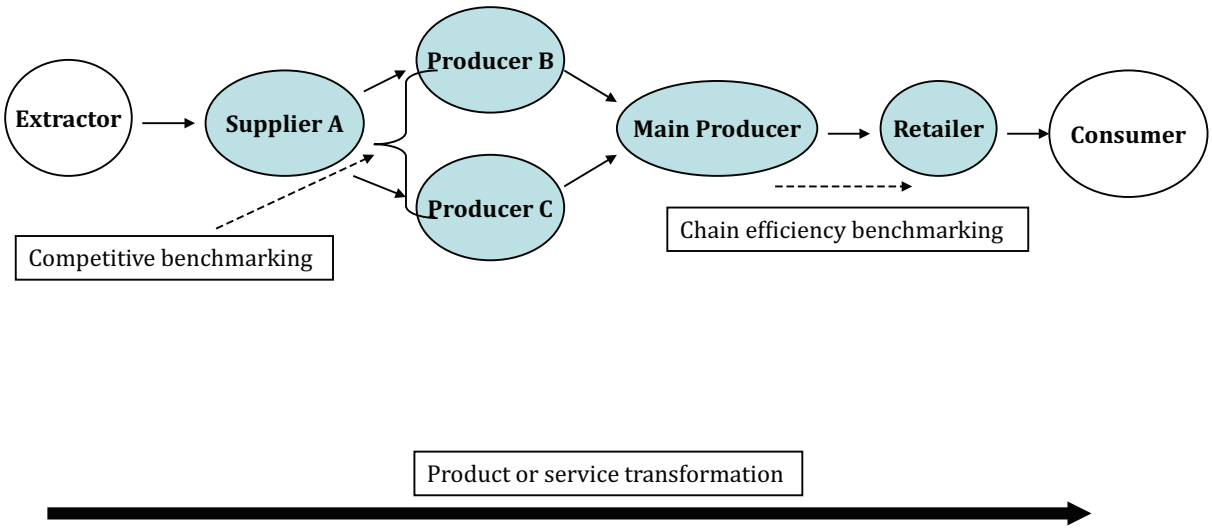

Figure 1 — Supply Chain Cycle

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

Documents
Document Sharing Hub

INTERNATIONAL STANDARD ISO 17258:2015(E)

Statistical methods — Six Sigma — Basic criteria underlying benchmarking for Six Sigma in organisations

1 Scope

This International Standard describes a methodology for establishing the level of quality, performance, and productivity of processes, products, and services according to Six Sigma principles. It is applicable to all sectors (industries, services, administration, etc.) and to all types of organizations, whether it is already involved in an improvement programme such as Six Sigma, Lean, or not. In particular, it can be used to initiate a Six Sigma programme by providing a selection of improvement projects.

NOTE The focus of this methodology is on criteria, measures, measurement process, and comparison process. The results can then be used to identify good practices of benchmarking.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13053-1, *Quantitative methods in process improvement — Six Sigma — Part 1: DMAIC methodology*

3 Terms and definitions

3.1
benchmark
reference point against which comparisons can be made

3.2
benchmarking
activity of comparing objects or practices of interest to each other or against a benchmark to evaluate criteria (or characteristic)

3.3
benchmarking method
logical sequence of general steps to describe the process of quantitatively comparing one or more attributes against a reference attribute with respect to a specified scale

4 Symbols and abbreviations

A measure of total “space”

A_{lost} measure of total lost “space”

C number (count)

C_{air} number of breaches of threshold of air pollution in a specified time

C_{input} input defects level

C_{output} output defects level

C_{process} process or activity defects level

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

C_{water}	number of breaches of threshold of water pollution in a specified time
E	category of user — experienced
F	category of user — first time
k	organization index
N	total number
N_E	number of experienced users
N_F	number of first time users
t	duration of time of study
t_1	duration of time during which a product is returned
t_{lost}	measure of lost time
t_{start}	measure of time required for starting or understanding a product
X	measure (continuous scale)

5 General considerations on benchmarking

Benchmarking is the method for collecting and analysing the data, and from these results, for comparing the quality, performance, and productivity level between two or more organizations.

5.1 Objectives and framework

The following paragraphs describe what an organization is recommended to do in order to deploy benchmarking and to obtain benchmark results.

5.1.1 Objective

The organization should decide upon the objective of the benchmarking before starting any measurement or comparison activities.

NOTE Examples of objectives are to improve processes, to compare to competition, to evaluate the gap for performance improvement.

5.1.2 Framework

The framework encompasses parts that are interrelated. This methodology is built with two main parts:

— benchmark;

— benchmarking.

In the objective's description of benchmarking, an organization should detail these two parts.

6 Benchmark

This clause describes the overview and requirements to determine some reference points for comparison (see 3.1.1 and 3.1.2). The points to be detailed are

— the criteria and

— measures of the criteria.

© ISO 2015 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

6.1 Overview and requirements for the criteria

Benchmarking is required to be applied to the criteria. This methodology defines 10 main criteria. If one of the criteria is irrelevant, the organization will explicitly give an explanation for excluding it from benchmarking. Two optional criteria are proposed, making a total of 12. This International Standard focuses on 10 main and two optional criteria clustered into three types. The main criteria are also named generic criteria.

6.1.1 Types and description of criteria

To have a universal benchmark, 10 main criteria are defined and they are clustered into two types. A third type is for optional criteria (see Table 1).

Table 1 — Benchmarking criteria

Number	Type	Title
1	Type 1: generic quality	Compliance
2		Ethical behaviour
3		Security/Safety
4		Returns (customer listening)
5		Availability
6		One-time delivery
7		On-time to market
8	Type 2: generic efficiency	Productivity
9		Raw material efficiency
10		Energy efficiency
11	Type 3: Option	Ease of use
12		Pollution control

These main criteria are divided into sub-criteria. Annex B gives the list of the sub-criteria. The main criteria describe the basic requirement of the consumer such as security or on-time delivery. The sub-criteria give a practical way to obtain the measure. A main criterion can have from one to eight sub-criteria. In case of several sub-criteria, each one gives a measure and the main criteria can have up to eight resulting measures (8-uple).

EXAMPLE Compliance has four sub-criteria: regulation, functional, contractual, and company policies. A result of measures would be (100 %, 95 %, 82 %, and 95 %) and if the company has no policy, then it would be (100 %, 95 %, 82 %, and not applicable).

6.1.2 Requirements for criteria

The organization should describe its policy and implementation of the 10 generic criteria with all its sub-criteria (total of 30). Annex B gives the description of all main criteria and sub-criteria. If one of the sub-criteria has no practice (e.g. no ethical charter or no charity programme in the organization), it shall be explicitly mentioned and excluded from the benchmarking.

6.2 Overview and requirements for the measures

This sub-clause gives an overview and the requirements for the measures.

6.2.1 Scope of measures

The measures are performed on the main processes of the organization (see Introduction).

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

The inputs of the organization level process are the inputs of the organization. The outputs of the organization level process are the outputs (or deliveries) of the organization. The main process is a bundle of processes and each process is a set of activities. Each process can belong to a type of process such as functional process (e.g. purchasing, sales, finance), support process (IT process, HR), or management process (project management, accounting management).

For each benchmarking, the organization should describe which processes are in the scope.

6.2.2 Generic measures

This is a requirement to obtain measures for the generic criteria.

6.2.2.1 Measure for compliance

Compliance is related to the application of legal regulations, business commitments, and organizational policies. The organization will describe the regulations, the business agreements, and the policies it applies. The measure is described in Table 2.

Table 2 — Compliance

Information need	Compliance on regulation commitments and policies of an organization
Unit of measure	Count number (compliance requirements, compliance requirements not fulfilled)
Measurement method	Count total number of compliance requirements (N) Count number of compliance requirements not fulfilled (C)
Data type	Integer
Measure	(N, C, (N - C)/N) (%)
Function	Divide total number of requirements (N) minus number of requirements not fulfilled (C) by total number of requirements (N)

Note For example, counting the number of non-conformities and the total number of requirements of ISO 9001:2008 standard will give this measure.

Counting the number of security practices not fulfilled and the total number of security practices that are mandatory will also give another measure.

6.2.2.2 Measure for ethical behaviour

Ethical behaviour is related to all of the social responsibility activities of an organization. The organization should establish the list of its ethical "good practices" (GP). The measure is described in Table 3.

Table 3 — Ethical behaviour

Information need	Ethical good practices (GP)
Unit of measure	Count number (ethical good practices, ethical good practices not fulfilled)
Measurement method	Count total number of ethical GP to be applied (N) Count the number of ethical GP not fulfilled (C)
Data type	Integer
Measure	(N, C, (N - C)/N) (%)

© ISO 2015 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015

Table 3 *(continued)*

Function	Divide the total number of ethical GP (N) to be applied minus the number of ethical GP not fulfilled (C) by the total number of ethical GP to be applied (N)

Note For example, do not throw your old computer but send it to a school or association.

6.2.2.3 Measure for security/safety

This measures what the consumer is expecting for its security (or safety). A breach of security (or safety) is an event that jeopardizes the vital functions of an organism or an organization. The measure is described in Table 4.

Table 4 — Security/Safety

Information need	Security (or safety) for an organism or an organization
Unit of measure	Count number (breaches of security or safety)
Measurement method	Count total number of breaches of security (or safety) (C) over a specified period of time t
Data type	Integer
Measure	(C, t, C/t)
Function	Number of breaches of security over a specified period of time (week, month, year, etc.)

6.2.2.4 Measure for returns

A return is an explicit action issued from a dissatisfied customer (problem report, complaint, product return, a request for return). The measure is described in Table 5.

Table 5 — Returns

Information need	Returns from consumers
Unit of measure	Count number identified returns (complaints, product return, report, withdrawal of goods, etc.)
Measurement method	Count number of returns (complaints, product return) (C) by specified period of time (t) Count number of units sold (U)
Data type	Integer
Measure	(C, t, U, C/U)
Function	Divide the total number of returns by specified period of time (week, month, year) by the number of units sold

6.2.2.5 Measure for availability

This International Standard records availability with two measures:

— proportion of time (i.e. useful time/total time);

— proportion of space (i.e. space where usable/total space).

The measure is described in Table 6.

© ISO 2015 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 17258:2015