TECHNICAL REPORT

ISO/TR 21245

First edition
2018-11

Railway applications — Railway project planning process — Guidance on railway project planning

Applications ferroviaires — Processus de planification de projets ferroviaires — Recommandations pour la planification de projets ferroviaires

Reference number
ISO/TR 21245:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 269, *Railway applications*.

This first edition of ISO/TR 21245 cancels and replaces ISO/TR 21245-1:2016 and ISO/TR 21245-2:2016, which have been technically revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Railway is a superior transport mode in terms of safety and transport capacity and has a very low environmental impact as compared to other modes. Owing to their highly public nature, railway systems can contribute to sustainable economic development in the world with the sound consideration of environment, by means of shortening and leading to predictable travelling time, reducing traffic congestion, developing distribution network, fostering tourism industry, etc.

With these merits of railways, the market of railway has been expanding worldwide, and some countries and regions have experiences of conducting railway projects. In fact, a wide variety of railways are planned across the world, such as urban transit systems for enhancing smoothness of intra-city traffic or improving connectivity with other transportation modes, high speed railways interoperable between different countries/lines or operated on a dedicated line with simple assets, and freight railway systems to transport bulk freight by heavy-haul trains or to reduce environmental impacts like CO_2 emission.

However, it is difficult to gain outcomes as expected due to the complexity of railway systems, as shown in 4.5, especially for organizations without accumulated experiences of railway projects.

Therefore, reviewing and organizing every factor smoothly and efficiently have been challenging due to a lack of standards for appropriate railway project planning.

This document provides guidance for a successful planning process, aimed at helping those engaged in railway project by identifying key points to be considered. It also helps those experienced in railway projects by avoiding:

— possible pitfalls in the planning process such as short-sightedness;

— lack of balanced consideration;

— reworking due to overlooking important factors;

— extra time and cost.

While ISO 21500 is a generic project management standard and does not provide guidance on or discuss any specific aspects in a project field, this document assists planners or decision makers involved in the railway project planning process by incorporating specific characteristics of railway projects.

The goal of this document is to achieve desirable planning of various railway projects which provide benefits to society by underlining key points of the planning process of railway projects to all players, such as planners, consultants, suppliers, governments, clients, capital investors, etc. For players who already have experiences of railway projects, this standard provide benefits where they can strengthen technical validities, plausibility, accountability, unintentional/balanced/harmonized fairness and open/clear/logical/persuasive (transparency) of their proposal, commercial products etc. This document can also be beneficial to players without an experience of railway projects as it provides knowledge to compensate for this lack of experience and thus promote an efficient planning of railway projects. As a result of these, deliverables based on this document will also give indirect benefits to other stakeholders including end users (passengers, consignors).

Railway applications — Railway project planning process — Guidance on railway project planning

1 Scope

This document provides guidance on railway project planning for decision making.

This document explores the key points of railway project planning, based upon the principles of ISO 21500, by incorporating characteristics specific to railway projects.

This document covers:

— the characteristics of railway projects;

— stakeholders and their needs/interests;

— conditions;

— the definition of each process in a railway project;

— key points of planning process;

— correlation and causality among principal factors to be considered.

This document can be used by any type of organization, including public, private or community organizations, and be applied to any type of railway project, irrespective of its complexity, size, duration, etc.

However, this document provides neither detailed requirements nor specific processes for:

— certification;

— deriving a unique solution (specification for particular systems/products);

— decision making itself.

Topics pertaining to general projects are addressed only within the context of railway projects.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21500:2012, *Guidance on project management*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21500 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
administrative authority
person or organization that supervises, plans, funds or approves *railway projects* (3.18) in the planning process

3.2
condition
premise or constraint that *stakeholders* (3.22) involved in the project can find difficult to adjust or change

3.3
consignor
shipper, sender, party which, by contract with a carrier, consigns or sends goods with the carrier, or has them conveyed by the carrier

[SOURCE: ISO 26683-1:2013, 3.11, modified — "him has been replaced by "the carrier".]

3.4
construction
erection of railway related facilities, rolling stock not included

3.5
construction contractor
person or organization that undertakes works as part of a *construction* (3.4) project by virtue of a contract with a client, such as the owner of infrastructure

3.6
decision making
adoption and authorization of a project plan

3.7
feasibility study
study to identify and analyse a problem and its potential solutions in order to determine their viability, costs, and benefits

[SOURCE: ISO/IEC 2382:2015, 2122680, modified — notes to entry have been removed.]

3.8
hazard
potential source of harm

[SOURCE: ISO/IEC Guide 51:2014, 3.2]

3.9
infrastructure manager
person or organization that is responsible in particular for establishing, managing and maintaining railway infrastructure

3.10
infrastructure operator
person or organization that operates infrastructure required for the functioning of the railway services

3.11
inputs
deliverables of planning work as candidates for *decision making* (3.6)

3.12
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14025:2006, 3.20]

3.13
manager of rolling stock
keeper of rolling stock
person or organization that is responsible in particular for managing and maintaining rolling stock

3.14
manufacturing
production of railway vehicles and railway related products

3.15
need
prerequisite identified as necessary to achieve an intended outcome, implied or stated

3.16
passenger
person on board a train not belonging to the crew

[SOURCE: ISO 20283-5:2016, 3.1.2, modified —"ship" has been replaced by "train".]

3.17
pre-feasibility study
study that is to be conducted before a *feasibility study* (3.7) to identify the suitable scenario(s) from multiple alternatives

3.18
railway project
unique set of processes consisting of coordinated activities with start and end dates, performed to create or change a unique railway product, system, operation or *service* (3.21)

[SOURCE: ISO 21500:2012, 3.2, modified — clarified for railways.]

3.19
railway undertaking
person or organization that is authorized to transport passengers or goods by railway and runs train or that only runs train

3.20
safety
freedom from unacceptable risk of harm

[SOURCE: IEC 62278:2002, 3.35]

3.21
service
result of activities between a *supplier* (3.23) and a customer, and the internal activities carried out by the supplier to meet the requirements of the customer

[SOURCE: ISO/IEC Guide 14:2003, 2.2, modified —"client" was replaced by "customer".]

3.22
stakeholder
individual or organization having a right, share, claim or interest in a system or in its possession of characteristics that meet their needs and expectations

[SOURCE: ISO/IEC 27032:2012, 4.45]

3.23
supplier
party that produces, provides, or furnishes an item or *service* (3.21)

[SOURCE: ISO 28219:2017, 3.11]

4 Specificities of railway projects

4.1 General

Railway projects should be considered with particular care due to their inherent specificities (Figure 1).

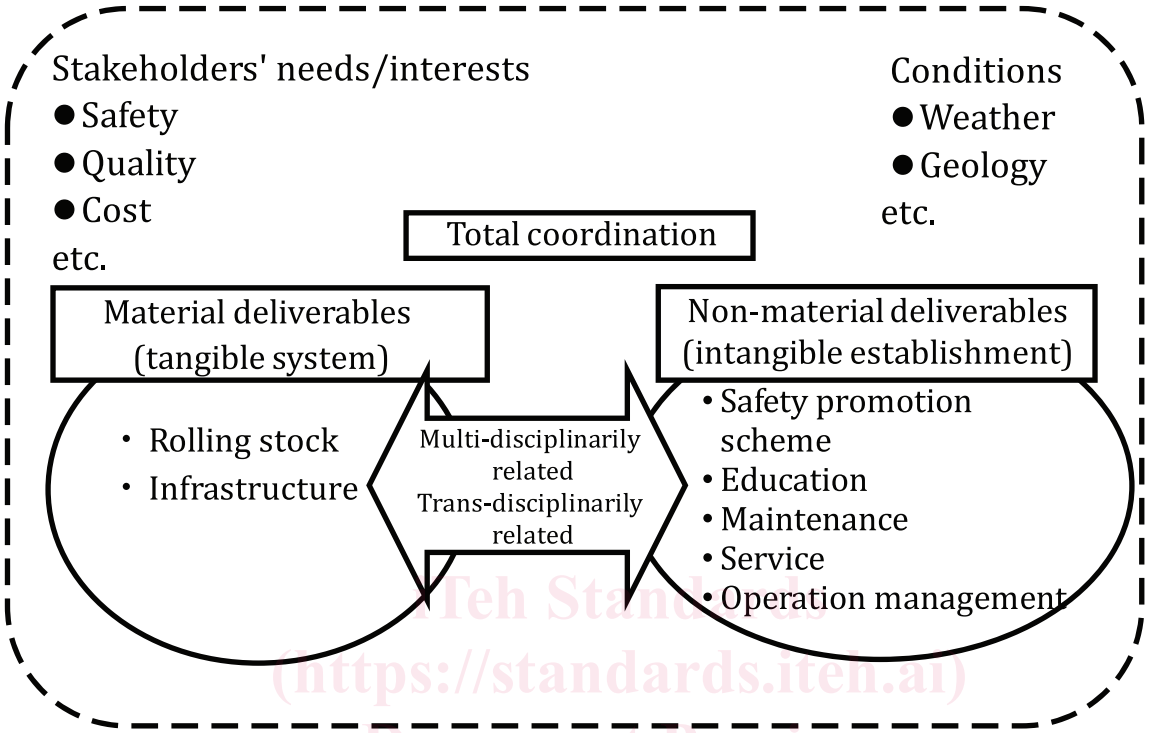

Figure 1 — Aspects of railway project

Among them, the following should be underlined: high capital investment, a large number of stakeholders involved with many interfaces, long life cycle, high system integration and complexity.

Due to the above mentioned specificities of the railway project and the factors (stakeholders' needs/interests and conditions), different solutions can be necessary to optimize the project outcome.

For the same reason, last minute change or inadequate balancing of factors can negatively impact the project schedule, cost or result (failure risk or maintainability requirements can increase).

4.2 Capital aspect of railway projects

Like many other important infrastructure projects, railway projects rely on high capital investment but also on long term capital immobilization. Very often, funding is entirely or significantly composed of public subsidies.

This specificity has to be considered when planning a project as it can have an impact on:

— project schedule and deadlines (potentially impacted by election, reduction of available public money, etc.);

— technical decisions (e.g. considering life cycle cost instead of investment cost);

— design choice (e.g. choosing a solution to be upgraded later).

Project funding aspects are not standard and depend on local context. Therefore, they should be considered on a case by case basis.

4.3 Stakeholders of railway projects

A railway system involves many stakeholders inside and outside of the project as an organic combination. It can impact its users, people living along the wayside or other transit systems in the area. Project stakeholders that should be considered in the planning process are presented in Figure 2.

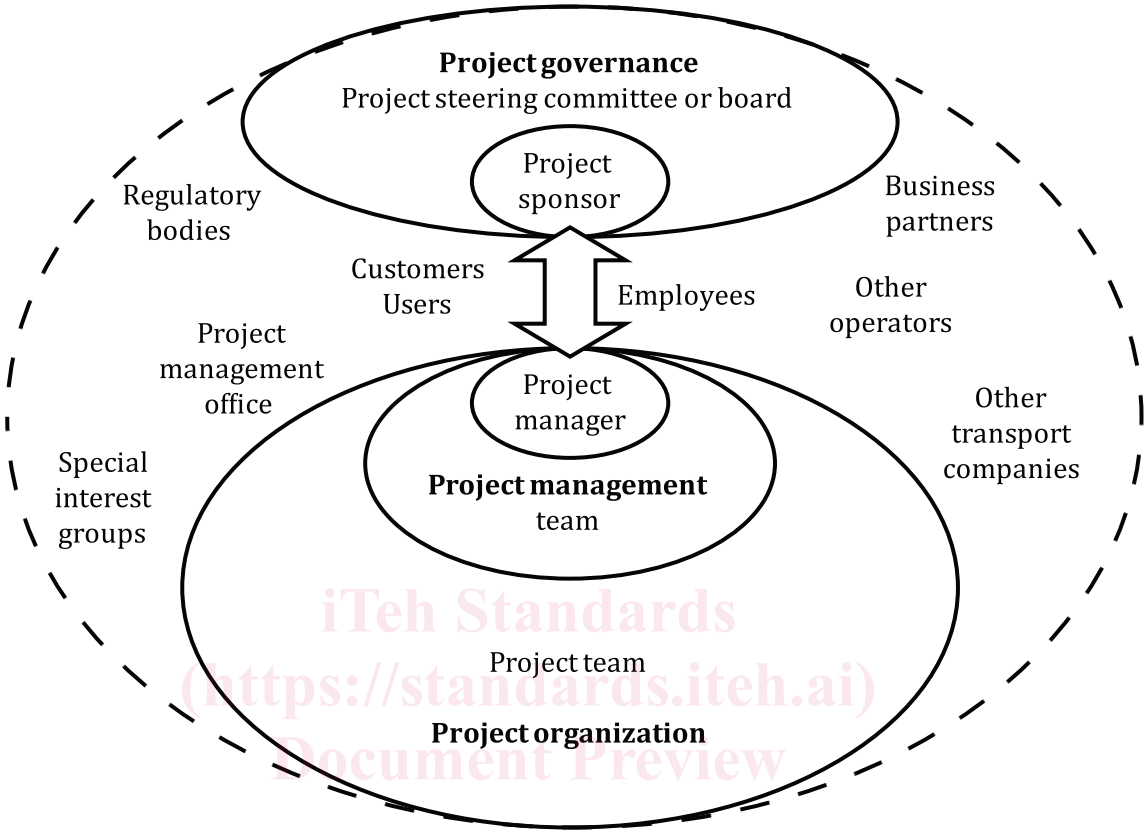

Figure 2 — Stakeholders of railway projects

Various stakeholders are involved throughout life of railway.

Each stakeholder has different goals and expectations. Identification of stakeholders and their needs is a key activity when initiating a railway project. Therefore, the factors listed in Clause 8 should be considered in planning railway projects with the aim to define an optimally balanced solution as it can have an impact on:

— technical decisions (e.g. choosing a transportation system, number of seats);

— operation (e.g. maximum operational speed);

— cost and revenue (e.g. amount of fare paid, life cycle cost);

— public acceptance (e.g. impact on wayside, sustainability).

Project funding aspects can differ depending on local context. Therefore, they should be considered on a case by case basis.

4.4 Long life cycle of railway projects

A railway system is built and operated for a long time. Both the railway project itself and the subsequent operational phase last long. Therefore, a long-term perspective is always necessary when carrying out a railway project.

This specificity has an impact on:

— life cycle costs as well as initial costs from multilateral points of view;

— future traffic and therefore capacity;

— territorial organization/development;

— technical aspects (e.g. obsolescence management, integration of innovative solution).

Therefore, it is important to consider factors (stakeholder's needs/interests and conditions) on a reasonable timescale to avoid/limit/facilitate future adaptation.

4.5 High technical integration and complexity of railway systems

4.5.1 General

The railway system is to be understood as a complex aggregation of each part, component or subsystem, including their interfaces, which is necessary for a safe and sustainable (environment protecting) operation of trains on a dedicated network. In this document, a brief description of the subsystems is given.

This description and the related requirements formulated in consideration of the factors to be taken into account are intended to serve only as an example of appropriate planning since the classification of subsystems differs across countries and organizations.

In principle, railway subsystems can be classified as technical (for tangible assets) and functional (for intangible assets).

4.5.2 Technical subsystems

4.5.2.1 Wayside facilities

Wayside facilities are understood to consist of the infrastructure, the energy power supply system for the train and the signalling system.

Infrastructure is understood as consisting of the track, engineering structures (bridges, tunnels, etc.), associated station infrastructure (platforms, zones of access, including the needs of persons with reduced mobility, etc.), safety and protective equipment. In order to ensure the safety of the railway system, it is essential to prevent hazards (e.g. from instability, fire, undesirable intrusions into installations, trains passing through stations).

Energy power supply is understood as consisting of the electrification system including overhead lines and on-board parts of the electric consumptions measuring equipment (if installed). The safe operation of the energy supply system is to be ensured (e.g. by avoiding interference between energy supply subsystem and the environment beyond specified limits).

Signalling equipment is understood as consisting of all the equipment necessary to command and control movements of trains authorized to travel on the network. The control, command and signalling system is to ensure a safe operation (e.g. even under specified degraded conditions).

4.5.2.2 Rolling stock

Rolling stock is understood as consisting mainly of the car body, on-board command and control system, current-collection devices, traction and energy conversion units, braking system, coupling system, running gear (bogies, axles, etc.) and suspension, doors, man/machine interfaces (driver, on-board staff and passengers).

Additional considerations may be necessary when they are assembled into a rolling stock.

