



第十三次空中航行会议

2018年10月9日至19日，加拿大蒙特利尔

委员会A

议程项目 1: 空中航行全球战略

1.4: 空中航行业务案例

将成本收益分析作为业务案例的一部分以支持资产部署

(由秘书处提交)

执行摘要	
本文件提出一份成本收益分析（CBA）检查单，以支持通过航空系统组块升级（ASBU）框架发展空中航行基础设施，并协助确保获得供资和融资进行资产部署。 行动：请会议同意第3段所载的建议1.4/x — 用成本收益分析支持资产部署。	
战略目标：	本工作文件涉及安全及空中航行能力和效率的战略目标。
财务影响：	对航空界的影响： 无。 对国际民航组织的影响（相对于当前的经常方案预算资源水平）： 国际民航组织的现行规定制定及实施推广工作将在今后三年期内继续进行，因此需要在财务和人力两方面追加资源，以支持国际民航组织在全球空中航行规划方面的努力。
参考文件：	Doc 9161号文件：《空中航行服务经济手册》 Doc 9562号文件：《机场经济手册》 Doc 9750号文件：《全球空中航行计划》 AN-Conf/13-WP/11号文件

1. 引言

1.1 在选择部署能为空中航行系统带来运行改进的资产时拟予分析的主要方面之一，是该资产能给航空社团带来的收益和其对于所涉利害攸关方的相关费用之间的关系。

1.2 总体而言，这项分析涉及数据收集和估算拟部署资产的绩效收益的各种设想。

1.3 本工作文件为尚无成本收益分析（CBA）流程的国家和其他利害攸关方提供一份可支持决策流程的简化检查单。这份简化检查单通过部署航空系统组块升级（ASBU）框架所述的各项要素，亦见于 AN-Conf/13-WP/11 号文件，使成本收益分析更好地界定最优的运行解决办法。

2. 讨论

2.1 业务案例描述开展或不开展一个方案或一组项目的理由，目的在于推动与投资决策所设各方的协调，并提供辅助信息，以确保获得供资和融资进行资产部署。业务案例的一个主要部分是财务分析或评价。业务案例的许多组成部分中通常包括成本收益分析和经济影响分析（EIA）。

2.2 成本收益分析可定义为反映项目的公共和私营收益及项目费用的一种方法。成本收益分析查明能最好地满足使净收益最大化的经济目标的投资选择。这些收益包括航空基础设施投资的积极影响，例如由于基础设施扩建而增加的经济活动。

2.3 经济影响分析可定义为旨在查明项目的累计经济影响的一种方法。经济影响分析的结果，通常用来确定对航空基础设施投资的经济可持续性。

2.4 国家、机场或空中航行服务提供者（ANSP）做出的每项重大决策，都应该由分析来支持，以展示由对航空基础设施投资所产生的费用和收益。航空服务提供者、航空服务使用者和航空界之外的广大全球社团都将从这些分析中大获裨益。

2.5 但是，国家需要加强能力，分析高质量和分解的航空数据，这可用来准确估算对于所查明项目的（财务或其他）要求，减少投资风险和不确定性，并评价投资回报（ROI）。

2.6 成本收益分析提供了一个基本分析工具以协助决策。有很多关于开展成本收益分析的信息源，既有综合的也有专门针对航空部门的。本文件述及的流程，基于现有样例，并采用基础设施投资项目成本收益分析检查单的形式。

2.7 关于案例分析、成本收益分析和经济影响分析的指导载于《空中航行服务经济手册》（Doc 9161 号文件）和《机场经济手册》（Doc 9562 号文件）。

2.8 此外，秘书处开发了通信、导航和监视（CNS）/空中交通管理（ATM）数据库和财务分析计算系统（DFACS），这是一个互动式的分析决策工具，以帮助空中航行服务提供者和空域用户构建、评价和比较实施空中航行系统备选方案或情景的业务案例。对财务分析计算系统进行了强化，使其作为业务案例评价工具，既包括机场也包括空中航行服务基础设施。这一强化的财务分析计算系统的应用和用户手册将供各国免费下载。

3. 结论

3.1 各组织机构均面临就如何最好地实现其目标而做出决策的问题。为了指导其投资决策，各组织机构都使用评价技术以研究各种选项，并选择能使净收益最大化的解决办法。每项重大的基础设施投资决策都应该由分析来支持，以展示对于提供者、用户并在适当时对于更大社团的预期成本和收益。

3.2 为了支持利害攸关方的分析，通过航空系统组块升级框架改进空中航行基础设施，并确保获得供资和融资进行资产部署，请会议同意以下建议：

建议 1.4/X — 用成本收益分析支持资产部署

会议：

- a) 敦促各国和空中航行服务提供者（ANSPs）在确定最优的解决办法，以通过使用航空系统组块升级（ASBU）框架改进空中航行系统的绩效时进行成本收益分析（CBA）；
- b) 鼓励尚无相关流程的国家和空中航行服务提供者使用简化机制，例如全球空中航行计划门户网站上提供的检查单，对空中航行基础设施投资项目进行成本收益分析，以支持航空系统组块升级（ASBU）框架中所述的改进；和
- c) 要求国际民航组织通过专门讲习班支持实施成本收益分析。

—————

APPENDIX

CHECKLIST FOR COST-BENEFIT ANALYSIS
FOR INFRASTRUCTURE INVESTMENT PROJECTS

COMPONENT	DESCRIPTION	NOTES
Objective	This section should present the desired outputs of the project. For example, in the case of an investment in a new radar system, the objective of providing surveillance should be described in terms of expected improvements, including: • enhanced safety; • increased system capacity; • reduced costs; • better weather detection; and • increased traffic.	A common mistake when describing the objective is to focus on inputs required to accomplish the project rather than the desired outputs.
Scope	The scope needs to identify the following: • timescale; • geographic area; • relationship to other projects; • development stage; and • cost estimates.	This section needs to identify affected airspace users. Identification will help to avoid double counting or omission of costs and benefits. Changes in the aviation sector impact many different stakeholders. It is therefore essential that the CBA identify the impact for different stakeholders. This is particularly important as the non-quantifiable and non-financial factors may differ significantly between different stakeholders.
Assumptions	In aviation, assumptions usually cover: • aircraft fleet characteristics; • levels of aircraft activity; • equipment life; • passengers/shipment revenues; • cost of fatalities/injuries; and/or • cost of passenger time.	
Base case and alternatives	The base case provides the benchmark against which the proposed project or investment can be measured. It is the “do-nothing” or “maintain status quo” option, describing what is likely to occur in the absence of the project being evaluated.	Any option viewed as providing an improvement to the status quo should be included as a project alternative.

COMPONENT	DESCRIPTION	NOTES
Time horizon	The time horizon should cover the entire time period over which the project's costs and benefits are expected to occur.	The determination of an appropriate time horizon will be specific to each option being evaluated and will be based on factors such as: • lifespan of capital investments; • period over which relevant policy is likely to apply; and • other demographic, economic or social factors that may impact the project's objectives.
Benefits and costs (identification)	All benefits and costs must be identified for the base case and for each of the alternatives under consideration in the CBA. Once identified, they should be quantified in monetary value where possible.	Typical cost categories include: • capital infrastructure; • fleet; information technology (IT) equipment; • software; • staff costs; • maintenance and repairs; and • relevant economic and societal costs (e.g. noise or emissions). Typical benefits categories include: • access and equity; • capacity; • cost-effectiveness; • efficiency; • environment; • flexibility; • global interoperability; • participation by the air traffic management (ATM) community; • predictability; • safety; • security¹; and • relevant economic and societal benefits.
Benefits and costs (comparison)	Once all of the benefits and costs have been identified and forecast, they need to be converted into a comparable format in order to determine if the project is cost-beneficial, or to assess which options yield the greatest net benefits.	The project's payback period is determined by counting the number of years it takes before cumulative forecast cash flows equal the initial investment.

¹ See Key Performance Areas, *Manual on Air Navigation Services Economics* (Doc 9161)

COMPONENT	DESCRIPTION	NOTES
	For consistency, only incremental benefits and costs expected from the project should be compared. Future costs and benefits must be discounted to their value today or the value of the base year for the project. Once benefits and costs are in a comparable format and have been discounted, different criteria are available to establish whether or not the benefits exceed the costs. These include: • net present value (NPV), i.e. sum of discounted project benefits less discounted costs; • benefit to cost ratio (BCR), i.e. ratio of present value of benefits to present value of costs; and • internal rate of return (IRR), i.e. discount rate at which the NPV of a project is equal to zero.	
Sensitivity analysis	Sensitivity analysis examines how the NPV, total cost or other outcomes vary as individual assumptions or variables are changed.	In a CBA, the project outcome is typically influenced by one or more unknown factors. A complete picture is best presented if uncertainty is explicitly considered and decision-makers understand how “sensitive” the project outcome is to changes in these factors. Key assumptions can be updated, additional alternatives can be identified or the methodology can be revised, making the economic analysis process iterative and ultimately improving the quality of the analysis.

COMPONENT	DESCRIPTION	NOTES
Distributional aspects of benefits and costs	For many governmental investments, the recipients of the benefits are not those who bear the costs. From an overall perspective, society's welfare is improved as long as all accepted projects and regulations have benefits that exceed costs. While the potential for compensation exists between those who benefit and those who bear the costs, such compensation may require further initiatives to implement. If costs are imposed on parties who neither benefit nor are compensated, there is a potential for inequitable impact.	CBA should identify those who benefit from and those who bear the cost of governmental investments, and whether the former actually compensate the latter.
Conclusion and recommendation	The final outcome is a recommendation concerning the proposed objective. The presentation of the conclusions and recommendations is as important as the underlying analysis.	The relevant points should be highlighted in a clear and concise manner that meets the needs of decision-makers and provides them with objective guidance.