ATM047 – ATM Performance Indicators

Unit 1.2 – ATM PERFORMANCE INDICATORS

Subunit 1.2.1 – GANP Indicators

October - 2024

GANP INDICATORS

OBJECTIVE
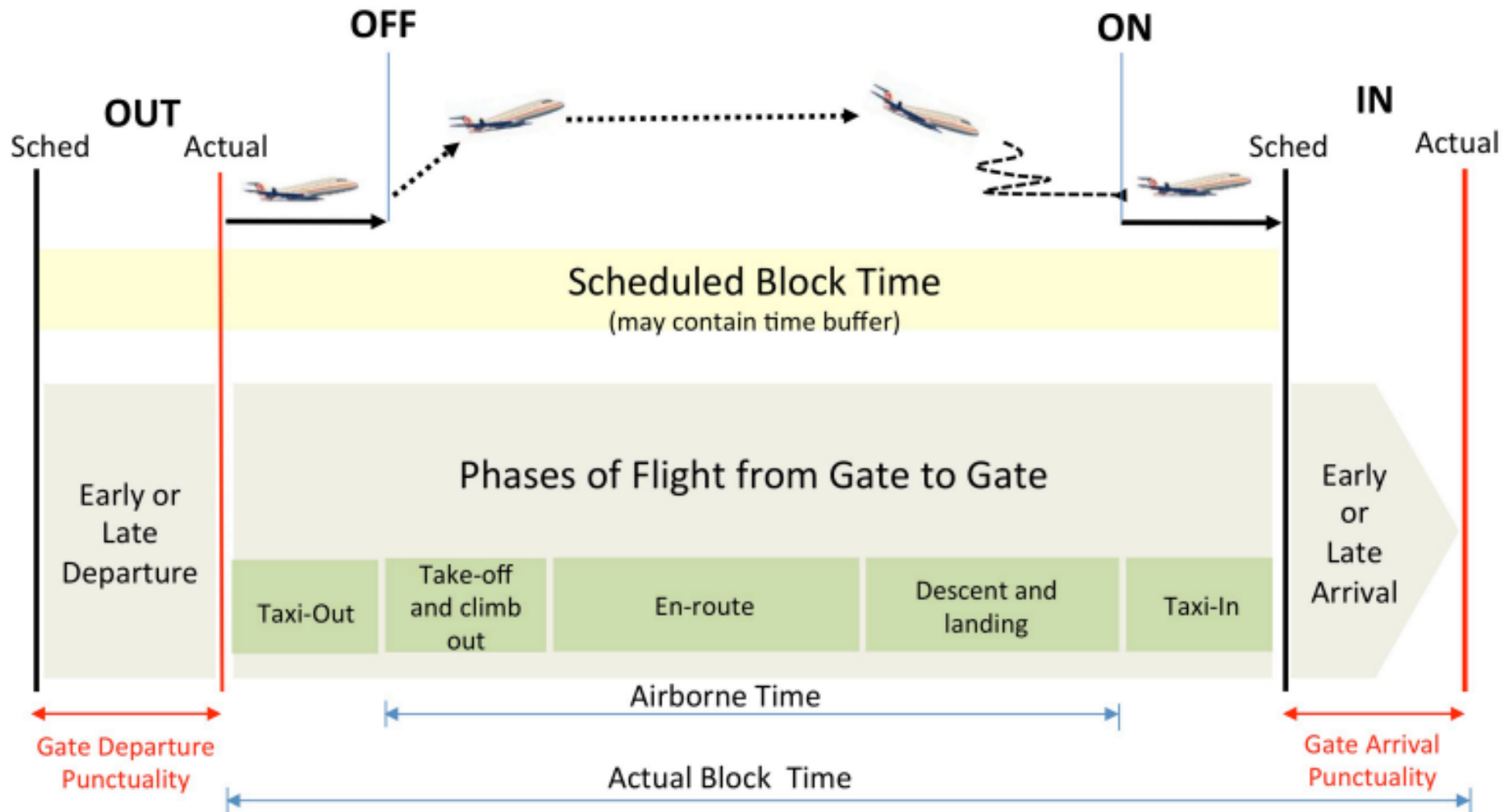
Have knowledge on ATM Performance Indicators recommended by ICAO in the Global Air Navigation Plan (GANP).

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MCA 100-22
SISCEAB ATM Indicators Methodology
(2020)

KPI – GANP INDICATORS

Título do Indicador	CAPACIDADE DO ESPAÇO AÉREO (KPI06)
Área do Negócio	Capacidade
Descrição do Indicador	A CHS expressa a capacidade de fluidez do tráfego de determinado setor.
Objetivo	Compreender melhor a alocação dos recursos no que tange à capacidade de controle do espaço aéreo, bem como identificar lacunas que podem vir a ser potenciais gargalos de infraestrutura e necessidades de investimento. São valores utilizados em tempo real para gerenciamento de fluxo, assim como monitoramento da eficiência do serviço.
Identificação das Variáveis	NRef expressa o número ótimo de aeronaves em controle simultâneo que determinado setor ATC é capaz de manter por um período de tempo. Npico é a capacidade de controle simultâneo que determinado setor ATC tem condições de manter por no máximo 19 (dezenove) minutos (contínuos ou não) no intervalo de uma hora.
Fórmula (Métrica)	$$KPI_{06} = \frac{3600 * (0{,}683 * NRef + 0{,}317 * NPico)}{T}$$

KPI – GANP INDICATORS

EN-ROUTE AIRSPACE CAPACITY

Definition – The maximum volume of traffic an airspace volume will safely accept under normal conditions in a given time period.

Measurement Units – Variant 1: Movements/h.
                                    Variant 2: Number of aircraft (occupancy count).

Operations Measured – The nominal capability of an ANSP to deliver ATM services to IFR traffic in a given volume of en-route airspace, as seen at a given planning horizon. For each horizon a different type of capacity is to be considered:
- Planned capacity: expected values one or more years ahead for planning and investment purposes.
- Declared capacity: values used during the strategic and pre-tactical ATFM processes .
- Expected capacity: values as finalised at the end of the pre-tactical process.
- Actual capacity: values as actually used on the day of operation during tactical ATFM and ATC.

KPI – GANP INDICATORS

EN-ROUTE AIRSPACE CAPACITY

Variants
Variant 1: airspace throughput (entry flow rate).
Variant 2: airspace occupancy count.

Objects Characterized – The KPI is typically used at the level of individual sectors (sector capacity) or en-route facilities (ACC capacity).

KPI – GANP INDICATORS

EN-ROUTE AIRSPACE CAPACITY

Utility of the KPI– The KPI measures an upper bound on the allowable throughput or occupancy count of an en-route facility or sector.

Planned capacities are primarily used for multi-year and investment planning. Declared, expected and actual capacities are used in traffic flow management as well as for measuring and monitoring service delivery and efficiency. Some ANSPs may prefer not to declare capacities, and only have these capacities established on a daily basis based on known/current operational factors.

Establishing capacities at different planning horizons provides an important reference for understanding the total system performance under normal operating conditions and provides a basis to work from when determining the impact of operational factors limiting capacity. These factors include – but are not limited to – ATCO availability and workload.

KPI – GANP INDICATORS

EN-ROUTE AIRSPACE CAPACITY

Parameters

- Variant 1: time interval at which the throughput declaration is made.

- Variant 2: time interval at which the average occupancy count declaration is made.

Data Requirement – The various capacities are determined by the ANSP, and are dependent on traffic pattern, sector configuration, ATCO and system capability, etc.

Data Feed Providers – Air Navigation Service Providers (ANSP).
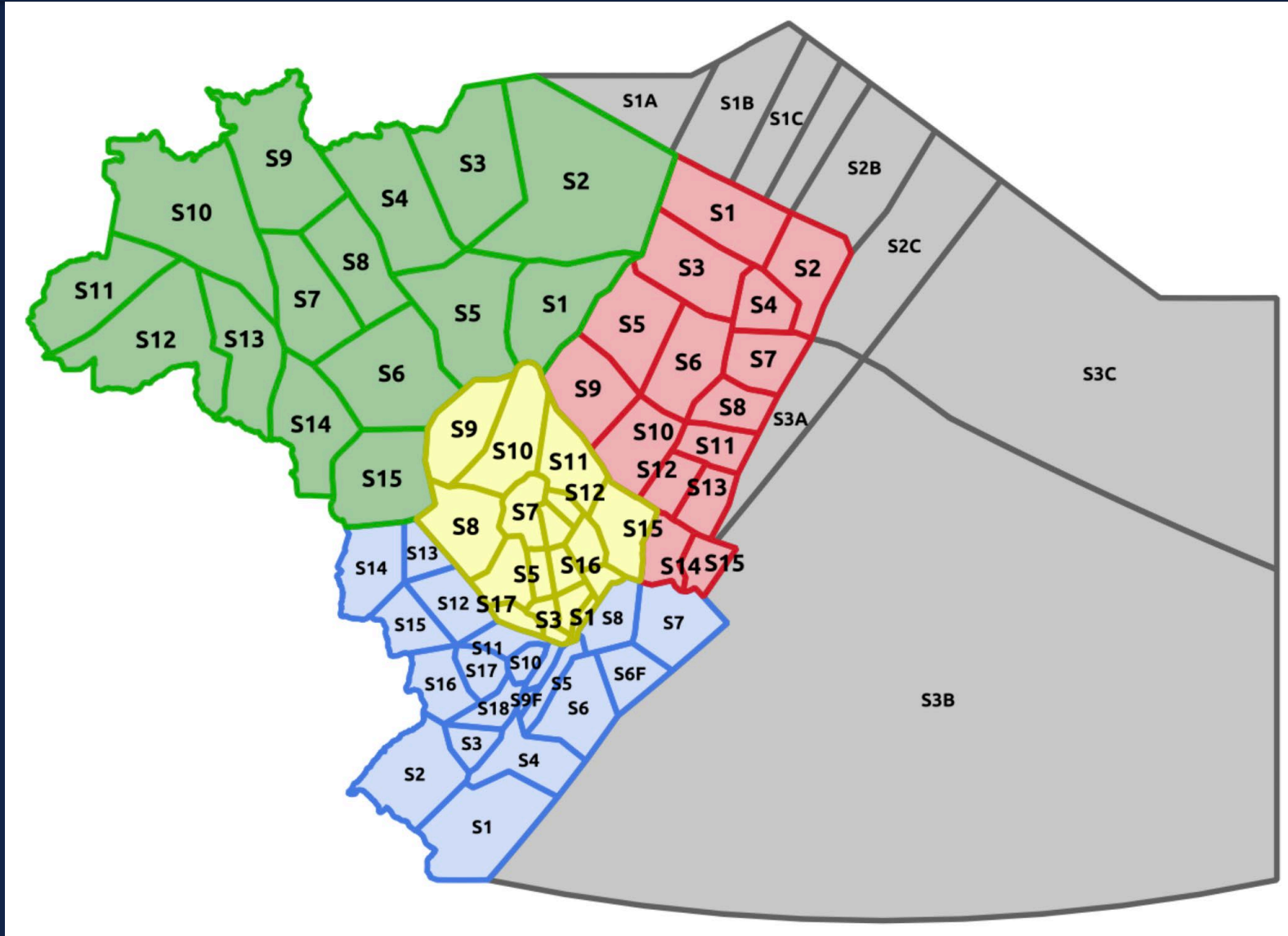
KPI – GANP INDICATORS

EN-ROUTE AIRSPACE CAPACITY

Formula / Algorithm

At the level of an individual en-route facility:

1. Select highest value from the set of established capacities (the maximum configuration capacity).

2. Compute the KPI: for variant 1, convert the value to an hourly movement rate, if the declaration is at smaller time intervals.

KPI – GANP INDICATORS

KPI – GANP INDICATORS

Quadro 11 - CHS da FIR SBBS[33]

RSP	CHS	RBR	CHS	RRJ	CHS
BS-01	46	BS-07	47	**BS-14 L**	**46**
BS-02	**46**	BS-08	49	**BS-14U**	**46**
BS-03	46	BS-09	49	**BS-15 L**	**48**
BS-04	47	BS-10	49	**BS-15 U**	**45**
BS-05	47	BS-11	49	**BS-16 L**	**46**
BS-06	48	BS-12	47	**BS-16 U**	**46**
BS-17	47	BS-13	47		

KPI – GANP INDICATORS

Quadro 12 - CHS da FIR SBCW[34]					
SBCW	**CHS**	**RBR**	**CHS**	**RRJ**	**CHS**
CW-01	44	CW -07	49	CW -13	44
CW -02	44	CW -08	48	CW -14	49
CW -03	48	**CW -09**	**48**	CW -15	49
CW -04	49	**CW -10**	**48**	CW -16	49
CW -05	**48**	**CW -11**	**44**	CW -17	44
CW -06	44	CW -12	44	CW -18	48

KPI – GANP INDICATORS

Título de Indicador	CAPACIDADE DE CHEGADA NO AEROPORTO (KPI09)
Área do Negócio	Capacidade
Descrição do Indicador	O maior número de pousos que um dado aeroporto pode suportar em uma hora de operação (também chamado de capacidade de pouso declarada ou taxa de aceitação do aeroporto).
Objetivo	Indicar a maior quantidade de pousos que o aeroporto aceita dada a configuração de pista e as condições meteorológicas. O indicador é tipicamente usado para planejamento ATFM e para planos de investimento do aeroporto.
Identificação das Variáveis	Conforme MCA 100-14:
Fórmula (Métrica)	Conforme MCA 100-14:

KPI – GANP INDICATORS

AIRPORT PEAK CAPACITY

Definition – The highest number of operations an airport can accept in a one-hour time frame (also called declared capacity). Can be computed for arrivals, departures or arrivals+departures.

Measurement Units – Number of departures / hour, Number of landings / hour, Number of (departures+landings) / hour.

Operations Measured – The capacity declaration of an airport.

Variants
Variant A: Airport peak arrival capacity.
Variant D: Airport peak departure capacity.
Variant AD: Airport peak movement capacity (departures + arrivals).
Objects Characterized – The KPI is computed for individual airports.

KPI – GANP INDICATORS

AIRPORT PEAK CAPACITY

Utility of the KPI – Este KPI indica el número máximo de operaciones que aceptará un aeropuerto, utilizando la configuración de pista más favorable en condiciones operativas óptimas.

This KPI indicates the highest number of operations that an airport will accept, using the most favorable runway configuration under optimum operational conditions. The runways may or may not be the most constraining factor for airport capacity: at some airports the most constraining factor may be the terminal airspace, the taxiways, the number of gates, passenger handling capacity etc.

The KPI is typically used for scheduling and ATFM purposes, and to develop capacity investment plans.

KPI – GANP INDICATORS

AIRPORT PEAK CAPACITY

Parameters – None

Data Requirement:
- Scheduling parameters for slot controlled airports.
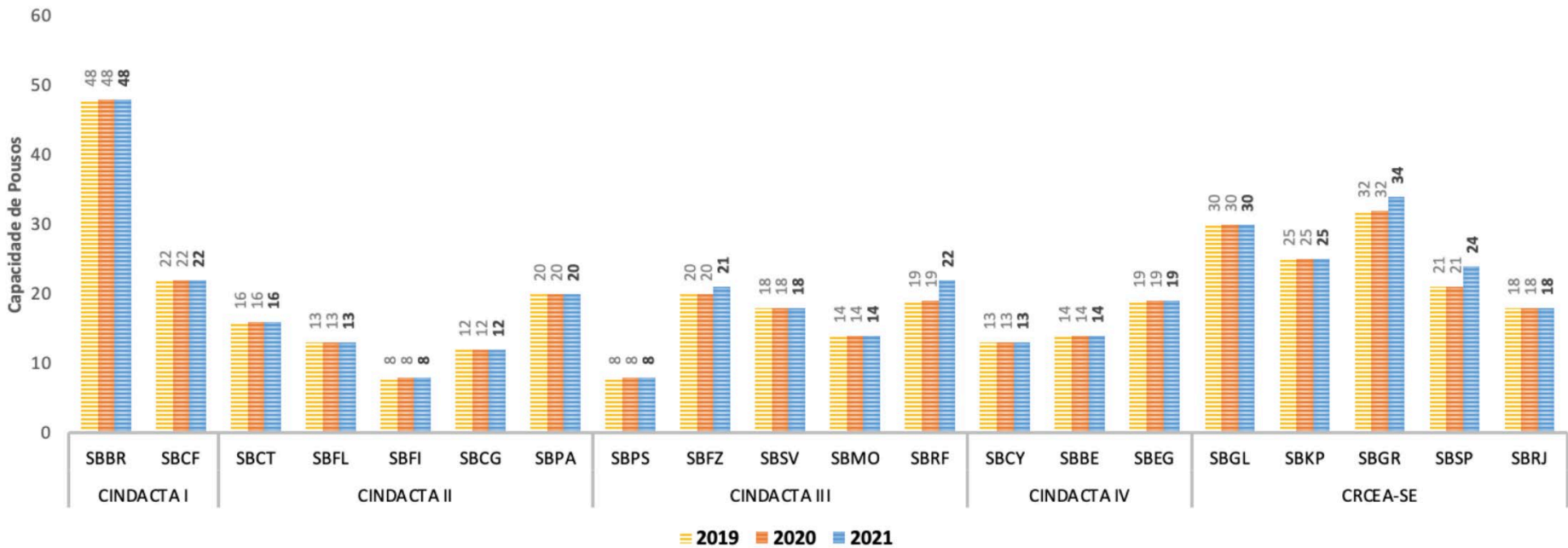- Airport Acceptance Rates (AAR), Airport Departure Rates (ADR).

Data Feed Providers – Airports.

Formula / Algorithm – At the level of an individual airport:

1. Select highest value from the set of declared capacities.

2. Compute the KPI: convert the value to an hourly rate, if the declaration is at smaller time intervals.

KPI – GANP INDICATORS

Figura 62 - Capacidades declaradas de ARR
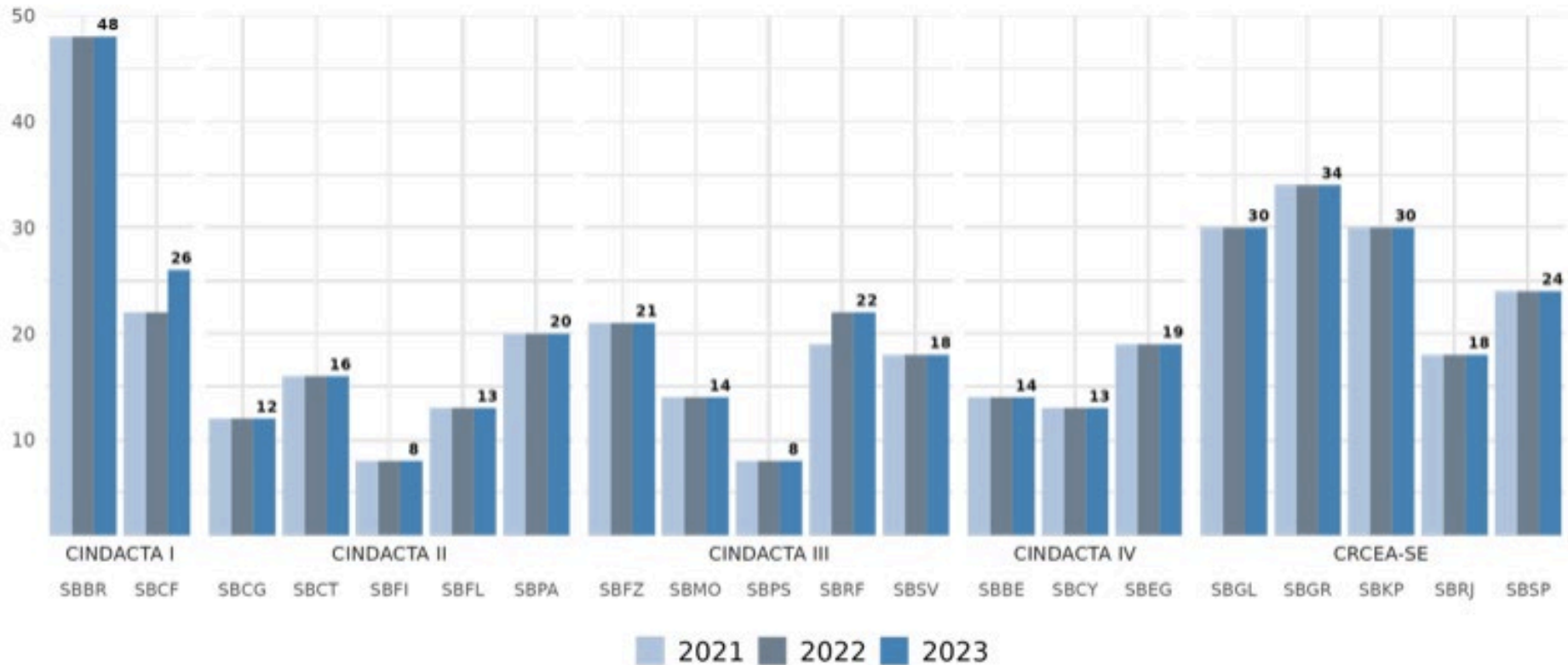
KPI – GANP INDICATORS

Figura 3.35: Capacidade declarada de chegada por aeroporto (KPI09)

Source: *Relatório de Performance do SISCEAB 2023*

KPI – INDICADORES GANP

Título do Indicador	TAXA PICO DE CHEGADA NO AEROPORTO (KPI10)
Área do Negócio	Capacidade
Descrição do Indicador	Representa o 95º percentil do movimento de pousos reportados em um aeroporto, na continuidade de horas ordenadas da menos ocupada até a hora mais movimentada.
Objetivo	Indicar a taxa de pousos para uma demanda pico em um período de tempo. Para aeroportos congestionados, esse número pode representar a capacidade; para aeroportos não congestionados, representa uma medida de demanda.
Identificação das Variáveis	ALDT
Fórmula (Métrica)	95º percentil: uma ordenação da hora menos movimentada/congestionada para a mais movimentada/congestionada.

KPI – GANP INDICATORS

AIRPORT PEAK THROUGHPUT

Definition – The 95th percentile of the hourly number of operations recorded at an airport, in the "rolling" hours sorted from the least busy to the busiest hour. Can be computed for arrivals, departures or arrivals+departures.

Mesurement Units – Number of departures / hour, Number of landings / hour, Number of (departures+landings) / hour.

Operations Measured – The actual number of operations at an airport.

KPI – GANP INDICATORS

AIRPORT PEAK THROUGHPUT

Variants
Variant 1: IFR operations only.
Variant 2: IFR + VFR operations (relevant for airports with a high percentage of VFR traffic).

To be combined with:
Variant A: Airport peak arrival throughput.
Variant D: Airport peak departure throughput.
Variant AD: Airport peak movement throughput (departures + arrivals).

Objects Characterized – The KPI is computed for individual airports.

KPI – GANP INDICATORS

AIRPORT PEAK THROUGHPUT

Utility of the KPI – This KPI gives an indication of "busy-hour" actual movement rates at an airport, as recorded during a given time period. For congested airports, this throughput is an indication of the effectively realized capacity; for uncongested airports it is a measure of demand.

Parameters – Time interval for "rolling" hours.
　　　　　　Recommended value: 15 minutes.

Data Requirement – For each flight:
- Actual landing time (ALDT).
- Actual take-off time (ATOT).

Data Feed Providers – Airports.

KPI – GANP INDICATORS

AIRPORT PEAK THROUGHPUT

Formula / Algorithm

At the level of individual flights:

1. Select flights, exclude helicopters

At the level of individual "rolling" hours:

2. . Convert the set of flights to hourly landing rates and departure rates by "rolling" hour.

3. Sort the "rolling" hours from the least busy to the busiest hour.

4. Compute the KPI: it equals the rate value of the 95th percentile of the "rolling" hours.

KPI – GANP INDICATORS

Figura 63 - Taxa pico de chegada
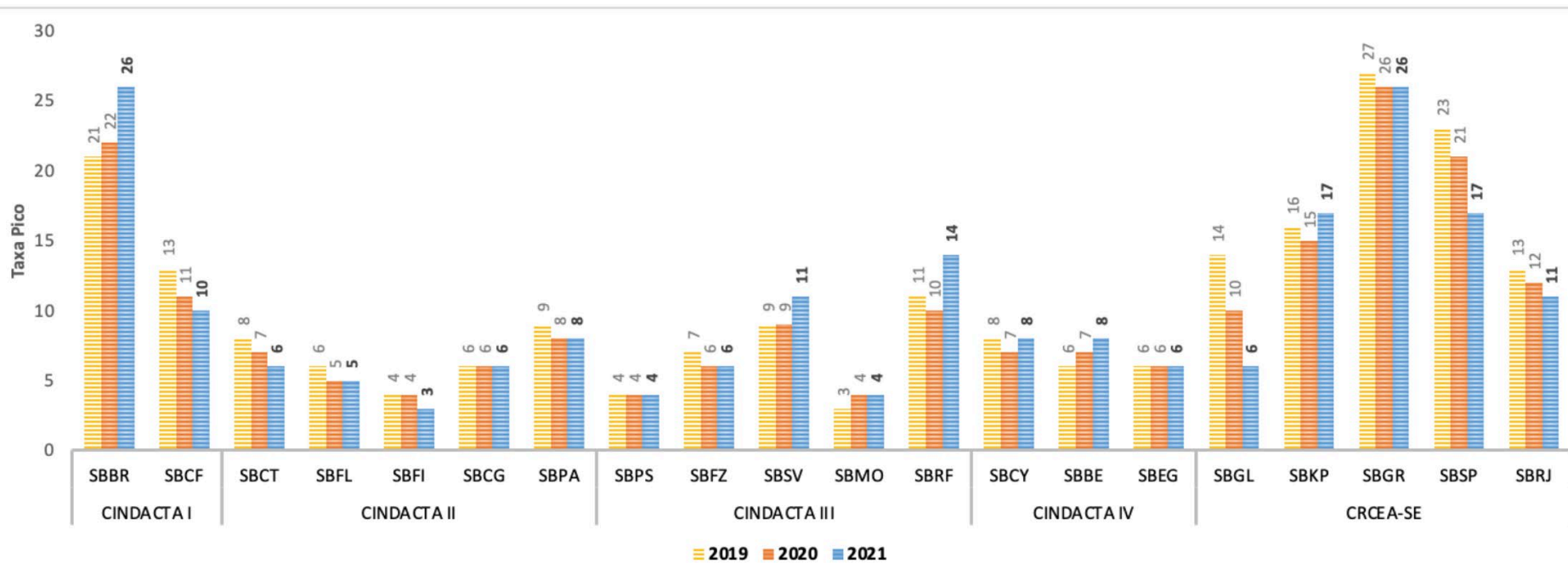
KPI – INDICADORES GANP
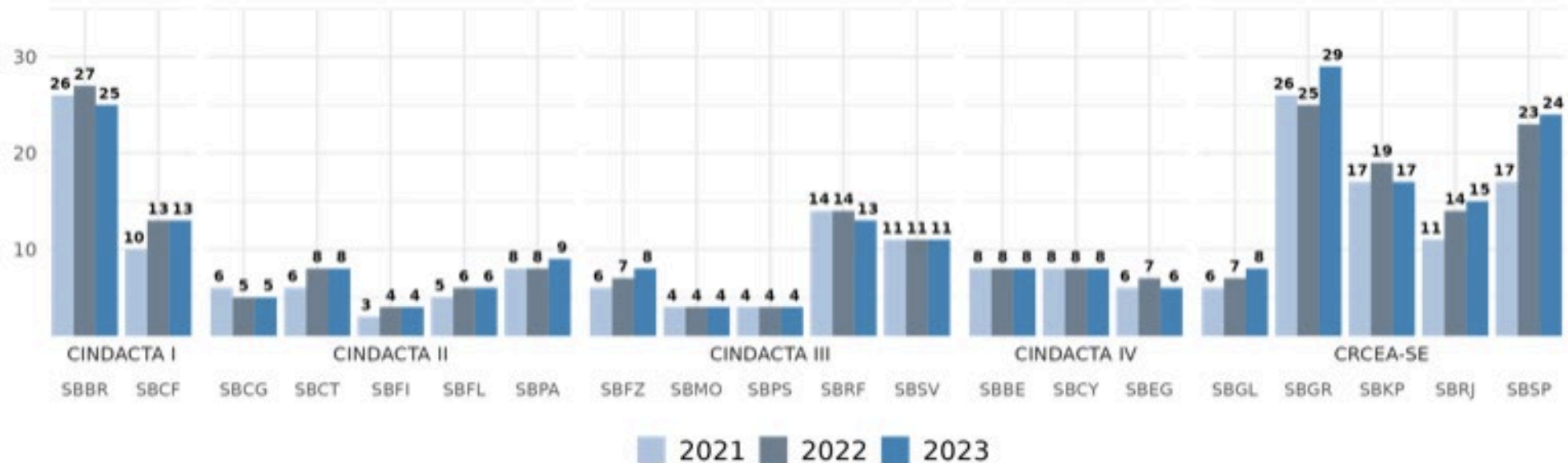
Figura 3.36: Taxa Pico de Chegada (KPI10)

KPI – GANP INDICATORS
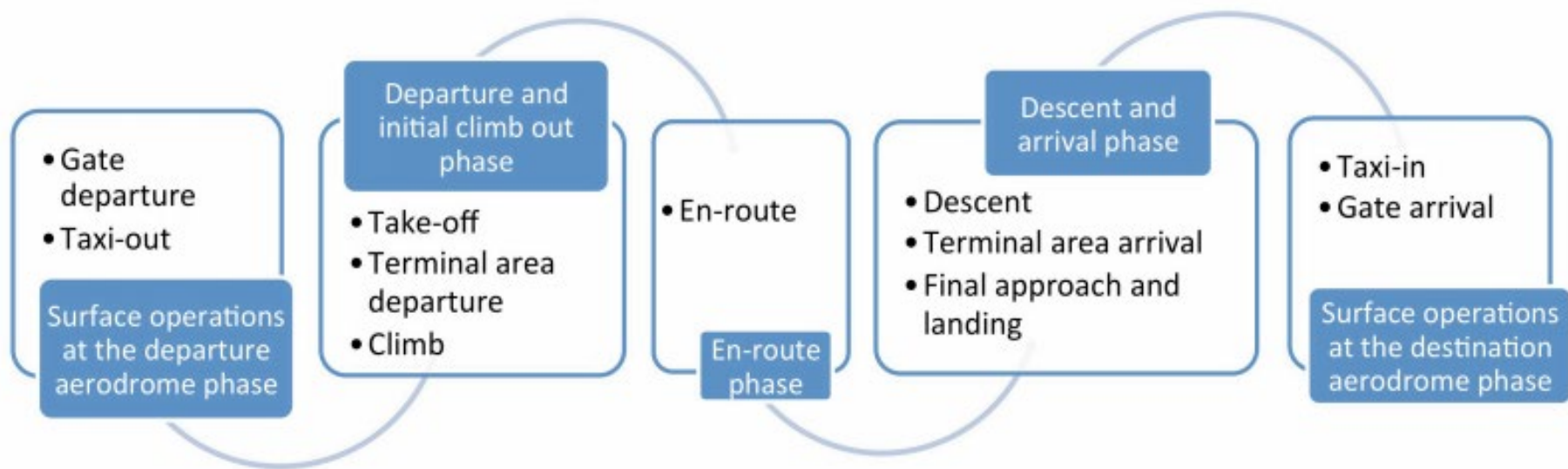
Muito obrigado!

CURSO ATM047 – INDICADORES DE DESEMPEÑO ATM
Unidad 1.2 – INDICADORES DE DESEMPEÑO ATM
Subunidad 1.2.1 – INDICADORES GANP

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