DEVELOPING A BENCHMARKING MODEL FOR NZ RCAs

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01 Background

Some big challenges and opportunities for NZ to achieve more sustainable transport

- Economy
- Environment
- Ageing road networks & limited RCA budgets

RCAs should refine road maintenance and management practices to deliver strong outcomes with maximum efficiency.

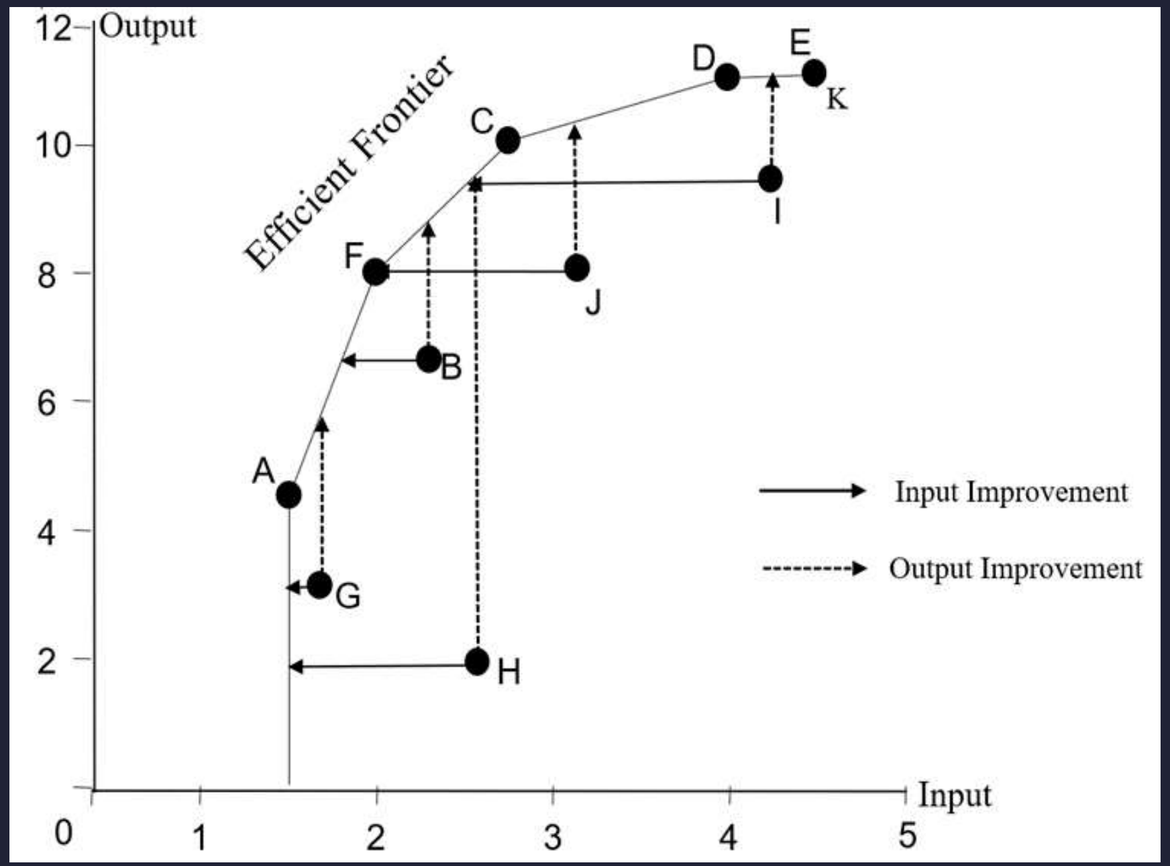
NZTA currently uses & reports on comparative analysis - limited value as RCAs have varying drivers and priorities.

NOT COMPARING APPLES TO APPLES

Previous research has proven the value of PERFORMANCE BENCHMARKING through DEA.

DEA?

$$\text{Efficiency} = \frac{\text{Weighted sum of Outputs}}{\text{Weighted sum of Inputs}}$$



RESEARCH FOCUS: IMPLEMENTATION OF DEA TO GET PRACTICAL & MEANINGFUL RESULTS.

DEA

Pros

Considers multiple variables that influence RCA performance, e.g., VKT/km, Maintenance Expenditure ($/km), & PHI.

Inherent variable weighting system automatically presents all RCAs with the highest possible efficiency score.

Cons

Complete freedom in allocating weighting to variables leads to ‘unfaithful’ & exaggerated RCA performance assessments.

01 PROBLEM

DEA'S AUTOMATED VARIABLE WEIGHTING GIVES UNREALISTIC RCA EFFICIENCY SCORES

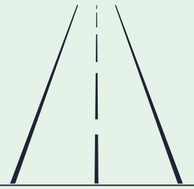
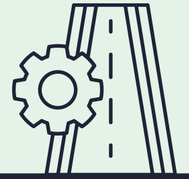
NEED REALISTIC BENCHMARKING MODEL – CONSIDERS KEY VARIABLES & HAS WEIGHT RESTRICTIONS

EFFICIENCY SCORES NEED EVALUATION ALONGSIDE CURRENT ASSET MANAGEMENT ASSESSMENTS – TRM & NZTA AMP SCORES

02 METHODOLOGY

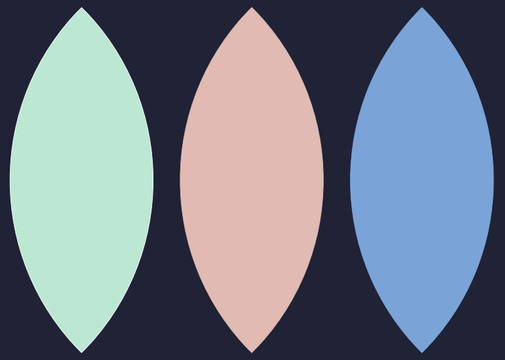
1. CHOOSE APPROPRIATE VARIABLES
2. APPLY VARIABLE WEIGHTINGS & MAKE A RECOMMENDATION
3. VALIDATE DEA SCORES AGAINST EXTERNAL SUBJECTIVE ASSESSMENTS

O3 ANALYSIS VARIABLES

VARIABLE	DEA CATEGORY
 Cost ($/km)	CONTROLLABLE INPUT
 Urban/Rural Roads (%UR)	UN-CONTROLLABLE INPUT
 VKT/km (millions)	UN-CONTROLLABLE INPUT
 Pavement Health Index (PHI)	OUTPUT

04 DEA MODEL DEVELOPMENT

TRIAL 1



EXP %UR VKT/km

DOUBLE ENDED
WEIGHT CONTROL

TRIAL 2

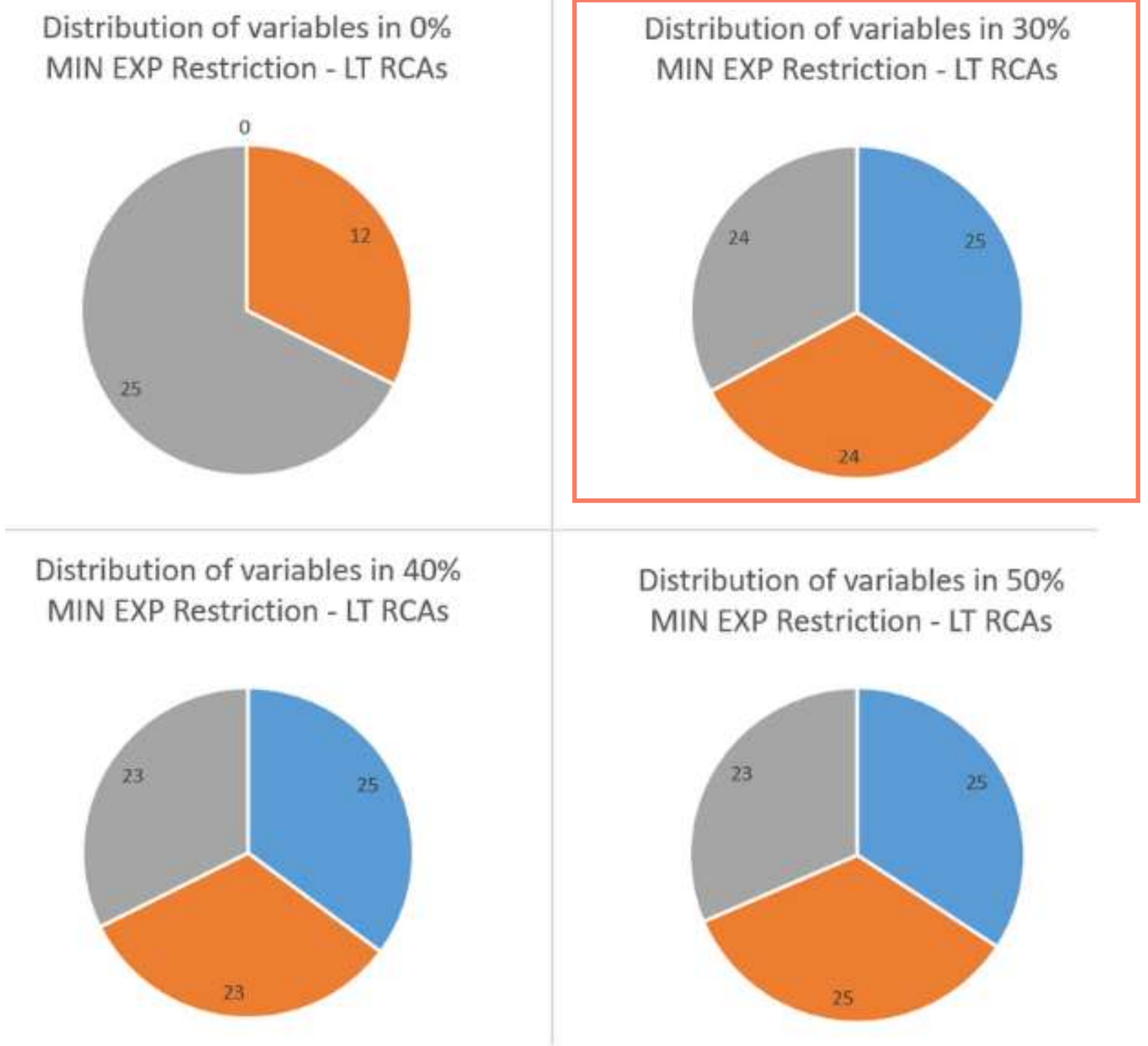
EXP %UR VKT/km

SINGLE ENDED
WEIGHT CONTROL

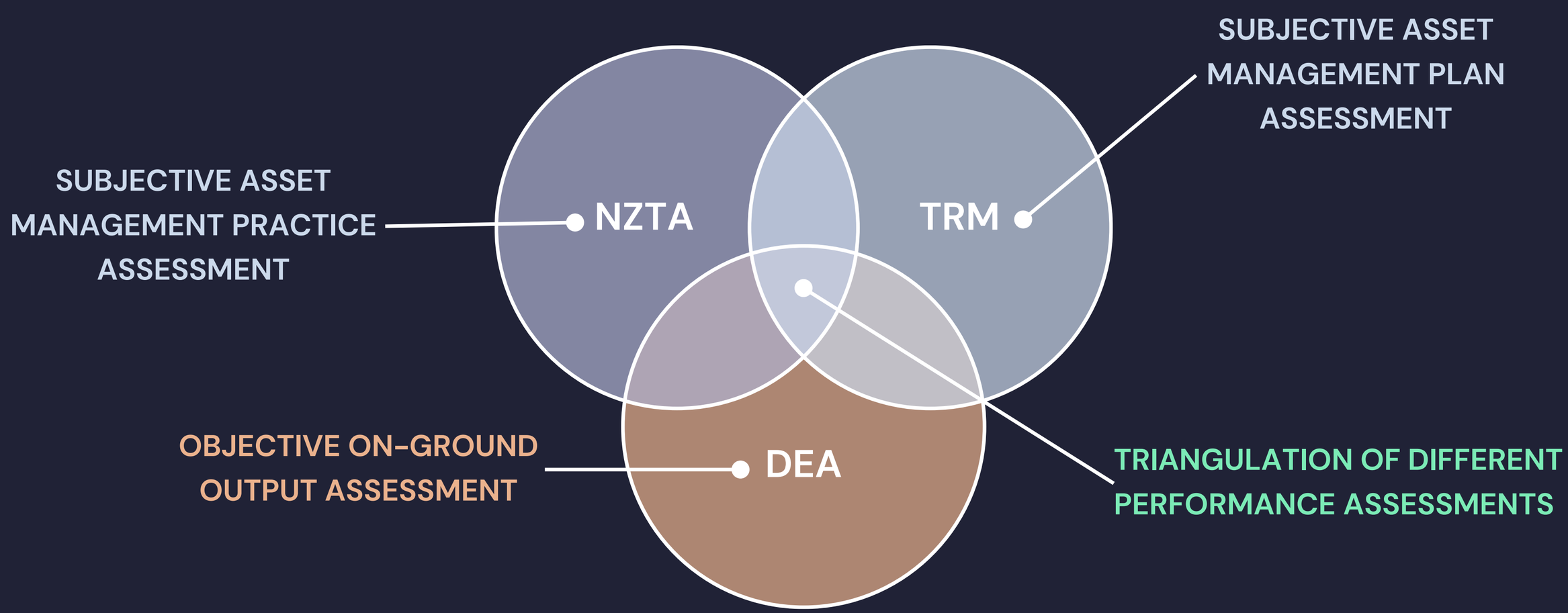
FINAL MODEL

EXP %UR VKT/km

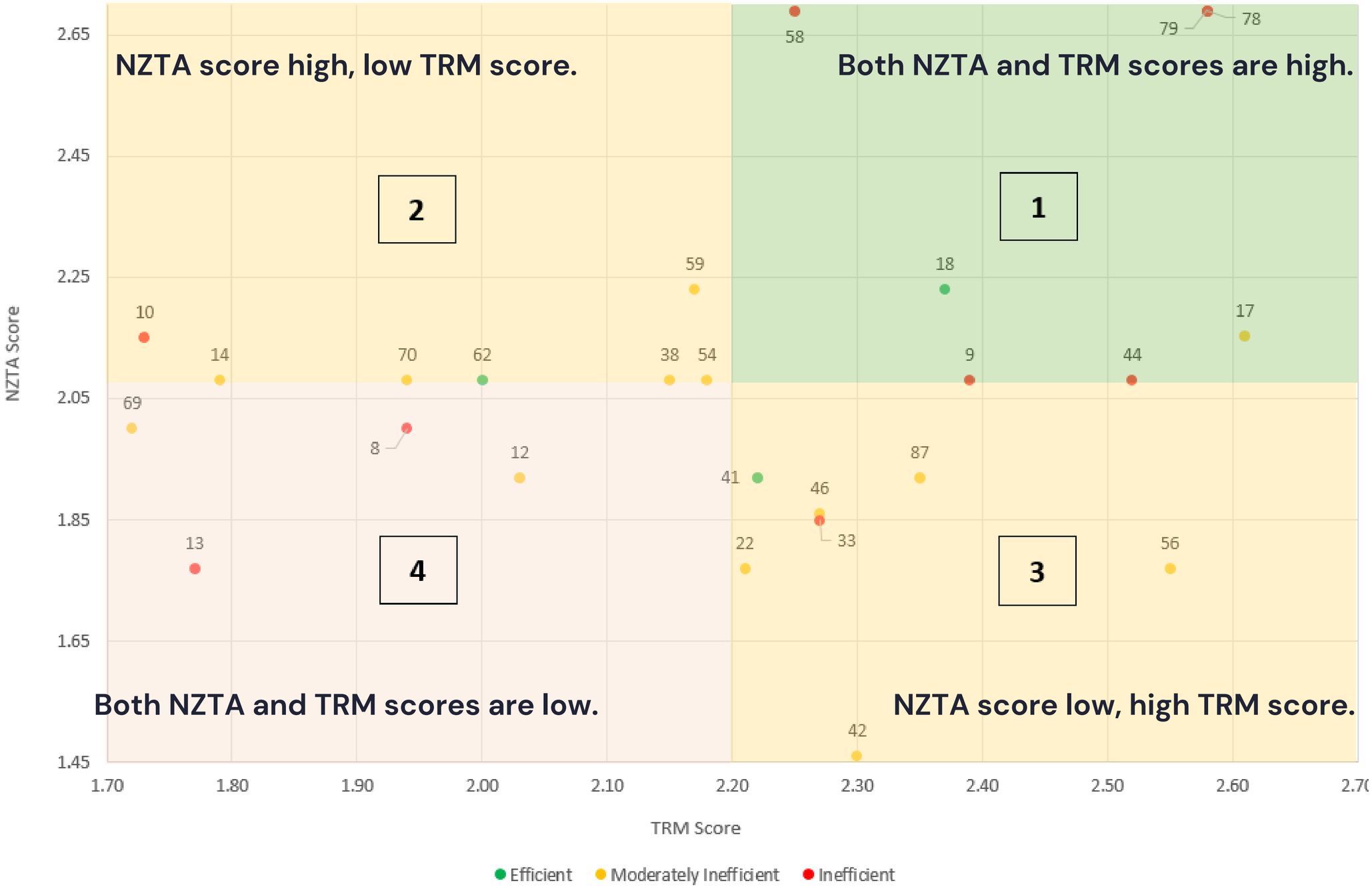
ONLY EXPENDITURE
RESTRICTED FROM THE
MINIMUM END


Distribution of variables in 0%
MIN EXP Restriction - LT RCAs
0
12
25
Distribution of variables in 30%
MIN EXP Restriction - LT RCAs
24
25
24
Distribution of variables in 40%
MIN EXP Restriction - LT RCAs
23
25
23
Distribution of variables in 50%
MIN EXP Restriction - LT RCAs
23
25
25
No. of RCAs with EXP weighting more than or equal to 30%
No. of RCAs with INV %UR weighting >0%
No. of RCAs with INV VKT/km weighting >0%

05 DEA + TRM + NZTA



TRM vs NZTA AMP Score Comaprisons for LT RCAs



06 RECOMMENDATION

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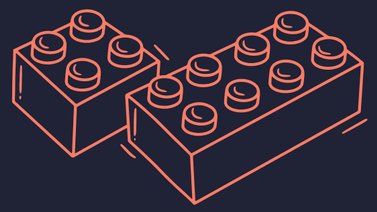
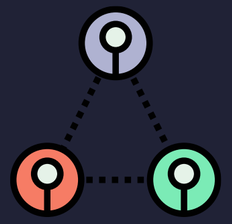
For this study's variables, Expenditure ($/km) should be restricted to a minimum 30%-50% weighting.



Beneficial to have RCAs with similar characteristics in clubs or peer groups.



Varied performance evaluations yield holistic understanding of RCA efficiency.

07 LIMITATIONS & MOVING FORWARD

LIMITATION:

Limited data set, so no environmental variables.

MOVING FORWARD:

Dynamics of DEA understood under restrictions, now expanding benchmarking model across SH NOCs with critical variables.

THANK YOU

HAPPY TO TAKE QUESTIONS