



# A Higher-Order Ergonomics Framework for Evaluating User Experience and Ergonomic Load in Indonesia's Rapid Grocery Delivery Applications

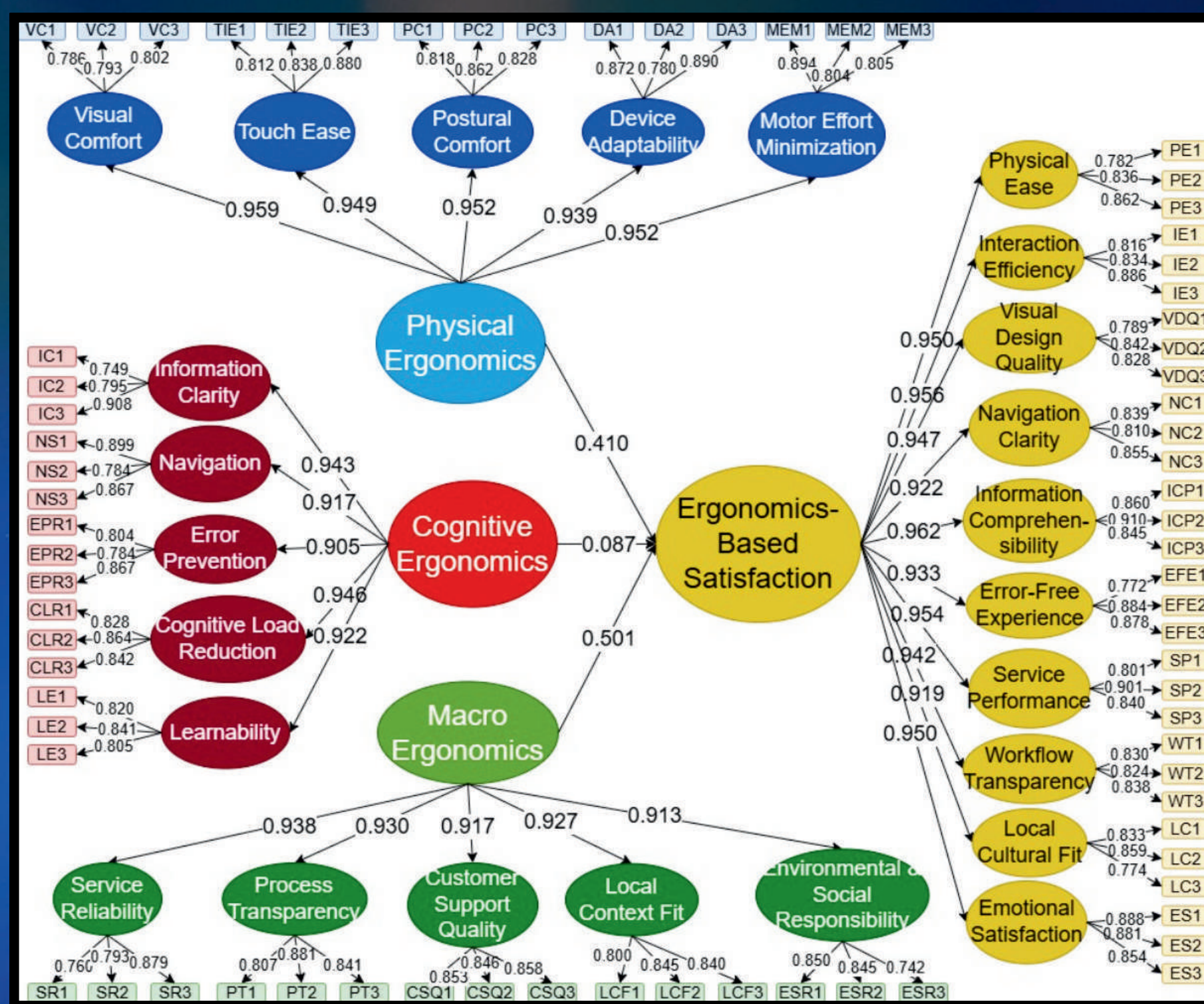
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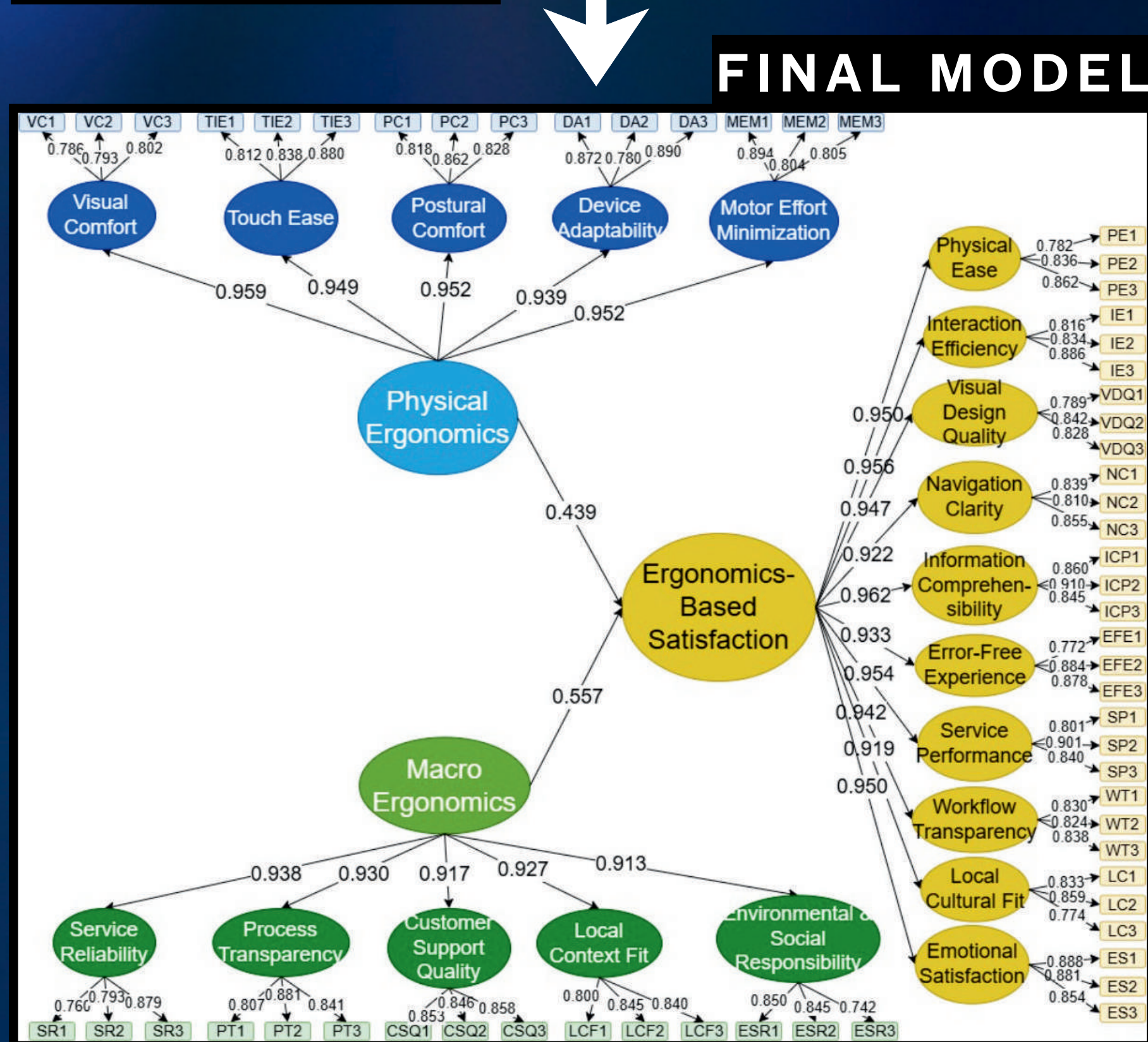
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## INTRODUCTION

Indonesia's rapid growth in grocery delivery apps has improved convenience but also created new ergonomic challenges for mobile users. Existing studies rarely evaluate physical, cognitive, and system-level factors together. This project develops a Higher-Order Ergonomics Framework to understand how these dimensions influence user satisfaction in Indonesia's grocery delivery platforms.



### INITIAL MODEL



### FINAL MODEL

## RESULTS

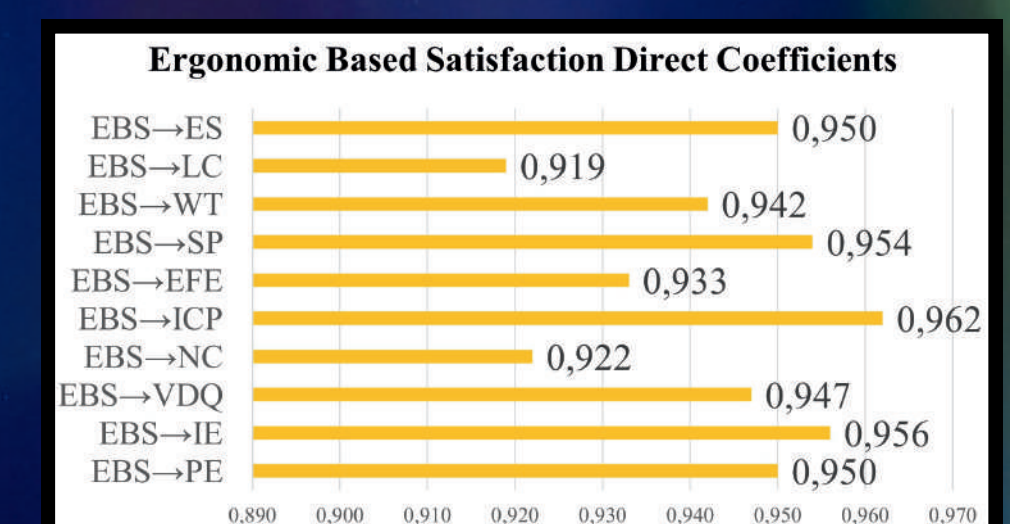
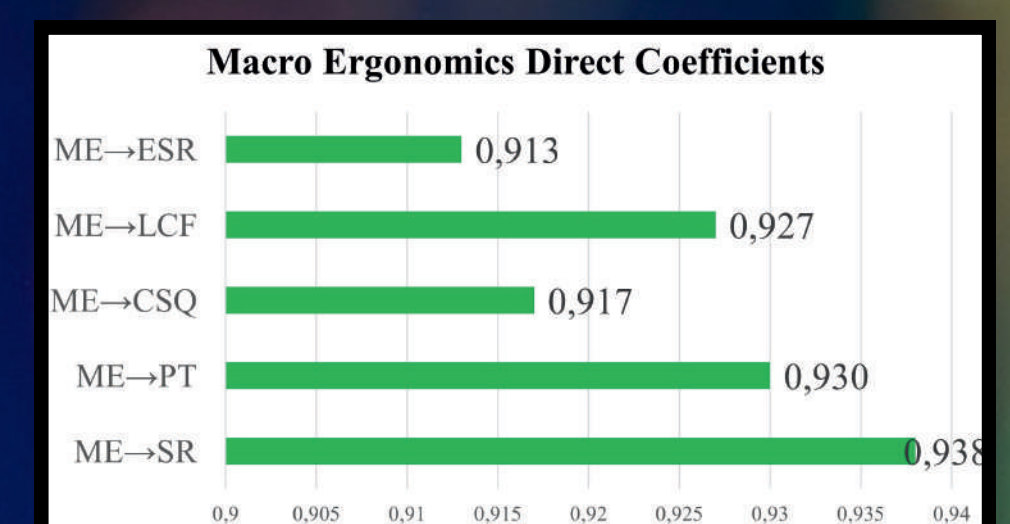
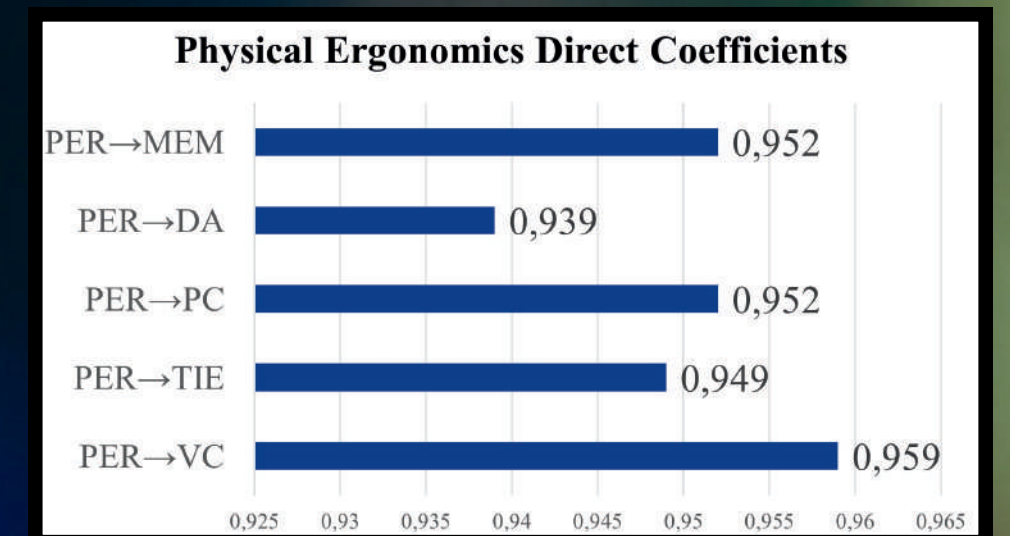
Macro Ergonomics was the strongest predictor of satisfaction ( $\beta = 0.557$ ), followed by Physical Ergonomics ( $\beta = 0.439$ ), while Cognitive Ergonomics was insignificant. The top first-order contributors were Information Comprehensibility ( $\beta = 0.962$ ), Interaction Efficiency ( $\beta = 0.956$ ), and Service Performance ( $\beta = 0.954$ ). Within each dimension, Visual Comfort ( $\beta = 0.959$ ) and Service Reliability ( $\beta = 0.938$ ) were the most influential factors. The final model demonstrated acceptable fit (SRMR = 0.073) and strong explanatory power ( $R^2 = 0.82-0.93$ ).

Relationship Between Hypothesis					
No.	Hypothesis	Initial Model Effect ( $\beta$ )	Initial Model p-value	Modified Model Effect ( $\beta$ )	Modified Model p-value
1	PER→VC	0.959	0.000	0.959	0.000
2	PER→TIE	0.949	0.000	0.949	0.000
3	PER→PC	0.952	0.000	0.952	0.000
4	PER→DA	0.939	0.000	0.939	0.000
5	PER→MEM	0.952	0.000	0.952	0.000
6	CE→IC	0.943	0.000	-	0.000
7	CE→NS	0.917	0.000	-	0.000
8	CE→EPR	0.905	0.000	-	0.000
9	CE→CLR	0.946	0.000	-	0.000
10	CE→LE	0.922	0.000	-	0.000
11	ME→SR	0.938	0.000	0.938	0.000
12	ME→PT	0.930	0.000	0.930	0.000
13	ME→CSQ	0.917	0.000	0.917	0.000
14	ME→LCF	0.927	0.000	0.927	0.000
15	ME→ESR	0.913	0.000	0.913	0.000
16	EBS→PE	0.950	0.000	0.950	0.000
17	EBS→IE	0.956	0.000	0.956	0.000
18	EBS→VDQ	0.947	0.000	0.947	0.000
19	EBS→NC	0.922	0.000	0.922	0.000
20	EBS→ICP	0.962	0.000	0.962	0.000
21	EBS→EFE	0.933	0.000	0.933	0.000
22	EBS→SP	0.954	0.000	0.954	0.000
23	EBS→WT	0.942	0.000	0.942	0.000
24	EBS→LC	0.919	0.000	0.919	0.000
25	EBS→ES	0.950	0.000	0.950	0.000
26	PER→EBS	0.410	0.000	0.439	0.000
27	CE→EBS	0.087	0.316	-	0.000
28	ME→EBS	0.501	0.000	0.557	0.000

SEM Fit Indices			
Fit Index	Initial Model	Modified Model	Threshold
SRMR	0.073	0.073	0.00 to 0.08
Normal Fit Index	infinite	infinite	0.00 to 0.70

## DISCUSSION

- Macro Ergonomics is the strongest contributor to EBS, driven by reliability, transparency, and local service alignment.
- Physical Ergonomics also plays a meaningful role, particularly through visual comfort and touch interaction. In contrast,
- Cognitive Ergonomics shows little direct impact on EBS, suggesting these elements are already reflected within overall user satisfaction.



## METHODOLOGY

- 253 respondents from Indonesia completed a survey measuring 15 ergonomic constructs (75 indicators).
- Constructs were grouped into Physical, Cognitive, and Macro Ergonomics using a 5-point Likert scale.
- Data were analyzed with Higher-Order SEM (SmartPLS) to assess reliability and structural relationships.

## FUTURE STUDIES

Limited by a JaBoDeTaBek sample and self-reported data, the study encourages broader and comparative future research. Strengthening service reliability and interface comfort remains essential for improving ergonomic satisfaction.