Addis Ababa Science and Technology University

Graduate Studies

Department of Environmental Engineering

Final year Presentation

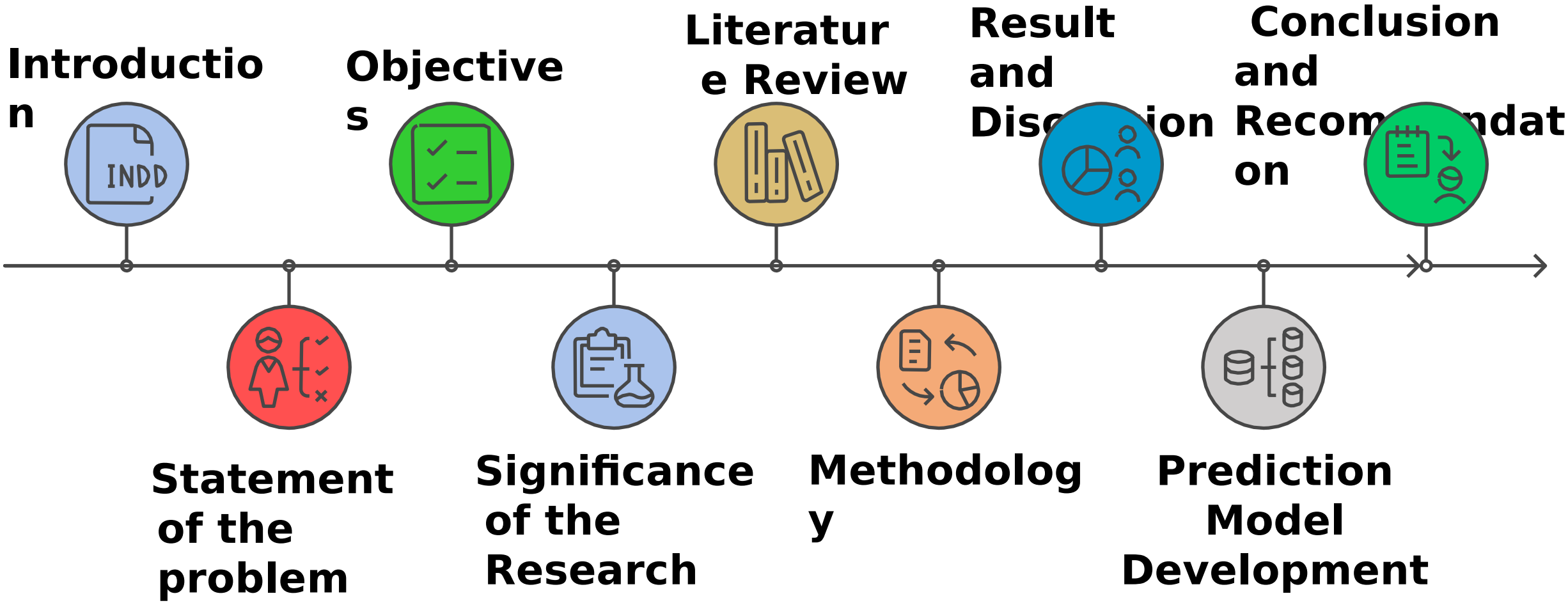
Title of the Project

Name of the student

Advisor – Name of the advisor

March 6, 2026

Presentation Outline

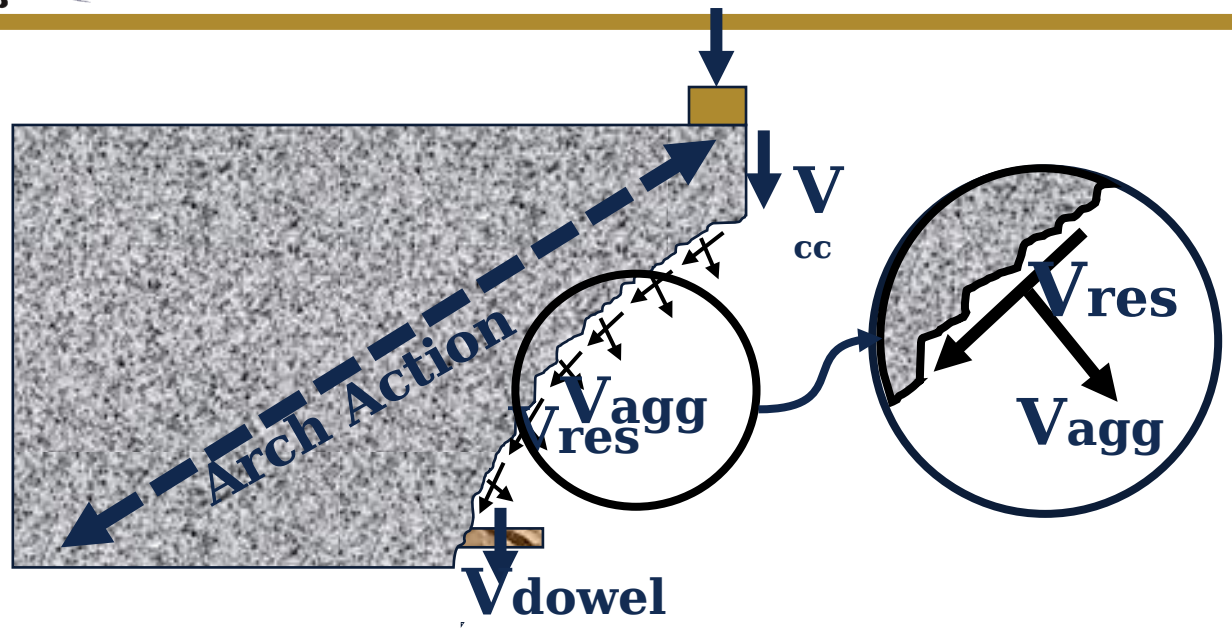


Introduction

Shear Strength of Reinforced Concrete Beams

- Subject to an extensive research

Introduction…



Introduction

Size Effect

- Beam
- reinforcement
- For beams

Concrete Contribution (*Vc*)

- Building effects
- This omission

- **Addressing**
- **Addressing**

Statement of the problem

- Write your word here

Objective

General Objectives

- To develop

Specific Objectives

- Investigate
- Propose
- Validate

Significance of the Research

Enhances

Advancing the design

Suggests



Addresses

Provide

Shear

Literature Review

Effect of b/d (Width-to-Depth Ratio) on Shear Strength

Effect Category	Authors	Findings
Positive Effect (b/d increases shear strength)	Conforti et al. (2017)	Found shear strength increases with b/d up to 3, then plateaus
	Cantone et al. (2021)	For wide beams, b/d ≤ 5 increases shear strength; beyond this, no benefit
No Effect (b/d has minimal or no impact)	Kani (1967)	Concluded that beam width has little effect on shear strength
	Lubell et al. (2004, 2006)	Found that b/d has minimal impact on shear resistance
	Kim et al. (2013)	Confirmed no significant effect of b/d on shear for recycled aggregate concrete
	de Sousa et al. (2021)	Parametric study showed no significant effect of b/d on shear strength

Methodology

Integrated Methodological Approach for Shear Strength Prediction

Statistical Analysis

- Identifying trends and gaps in shear strength models

Experimental Program

- Isolating geometric parameters through controlled testing

Finite Element Analysis

- Validating and extending parameters with simulations

Genetic Algorithm Optimization

- Developing a prediction model (Size effect factor and Stirrup confinement contribution)

Methodology- Experimental Program

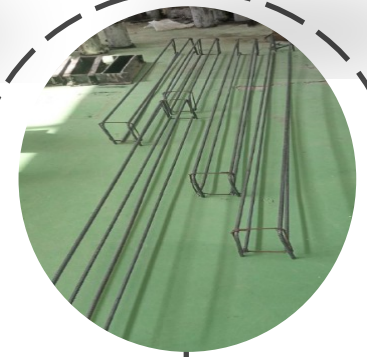
Formwork Preparation

Setting up wooden formwork carefully



Reinforcement Preparation

Measuring and bending reinforcement material



Measurement

Measuring concrete mix according to design



Slump Test

Conducting a slump test for



Concrete Casting

Casting and compacting concrete



Curing

Ensuring proper curing for strength

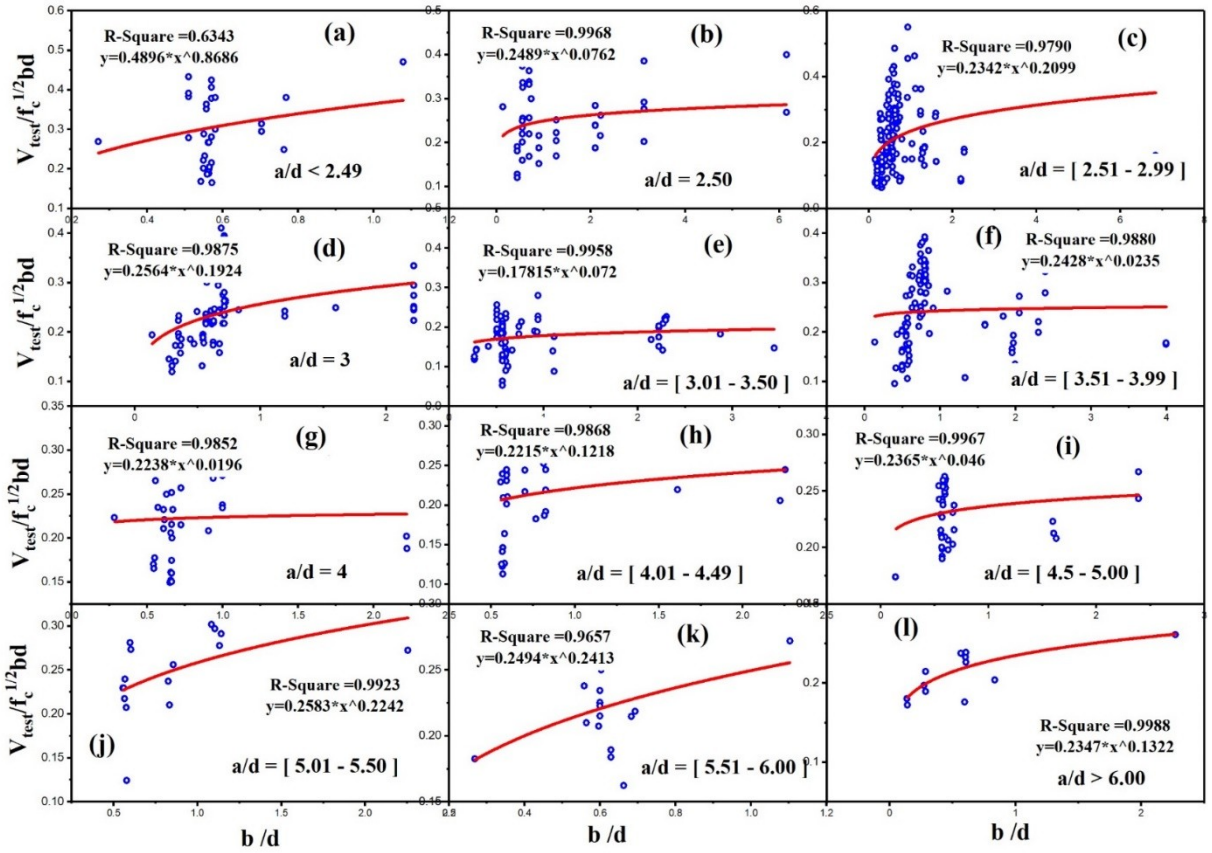


Production of Specimens

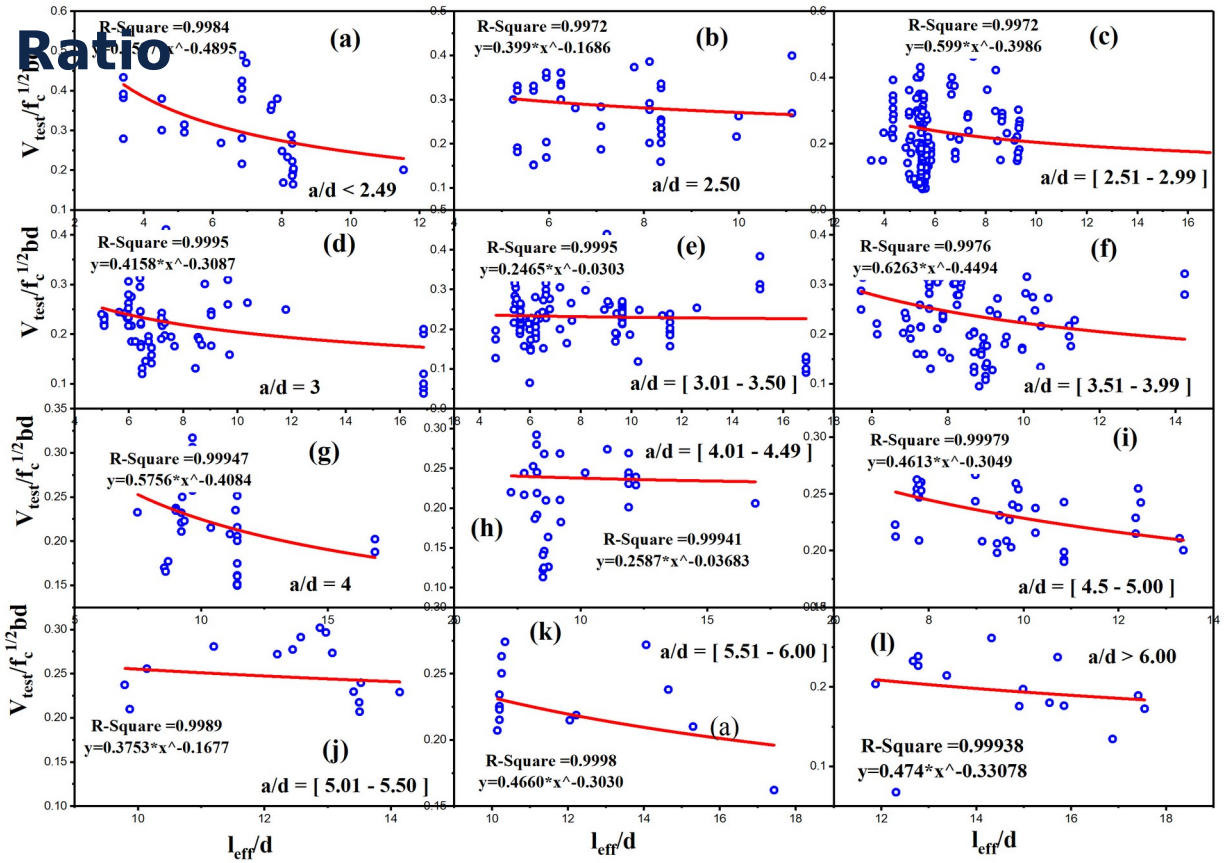
Result And Discussion

Grouped Database based on the Shear span-to-depth ratio

Effect of width-to-depth ratio



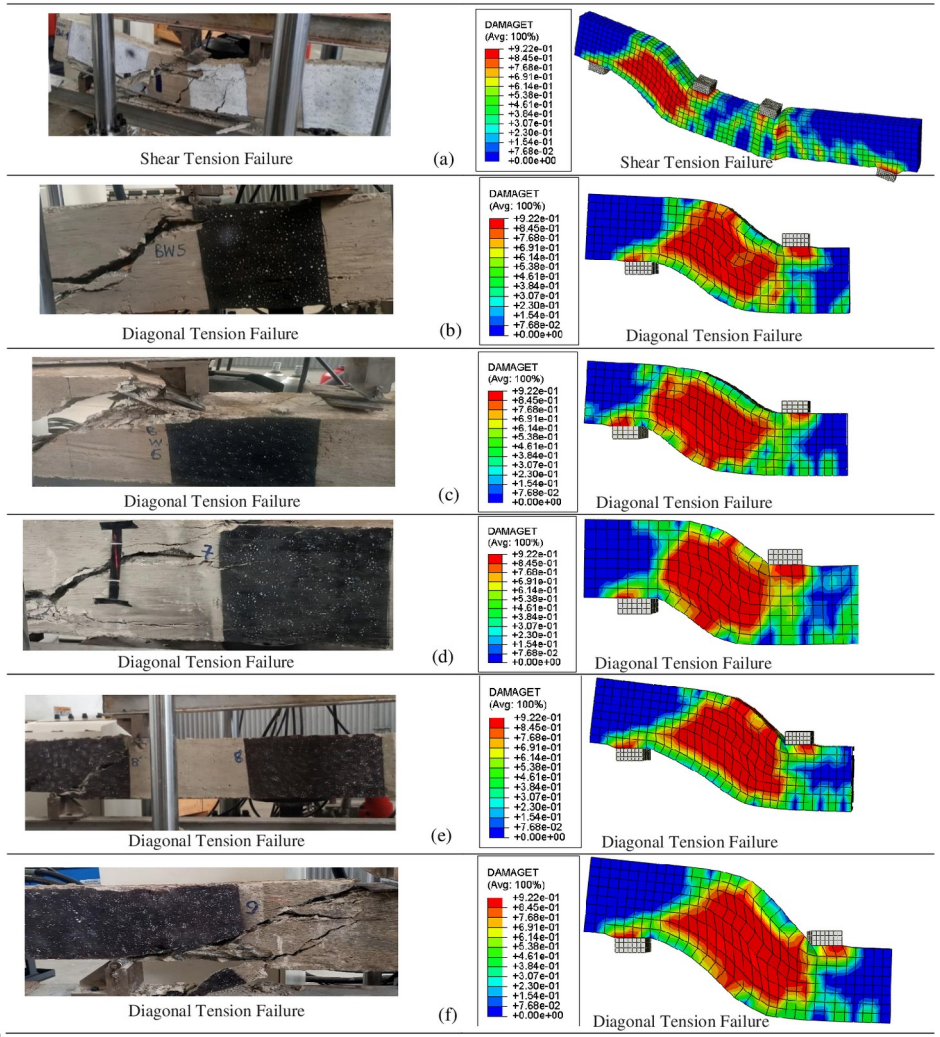
Effect of effective length-to-Depth Ratio



Result And Discussion – FEA - Validation

Load-deflection responses of FEM vs experimental results demonstrates a high level of correlation, with the FE models effectively capturing the nonlinear response of the tested beams.

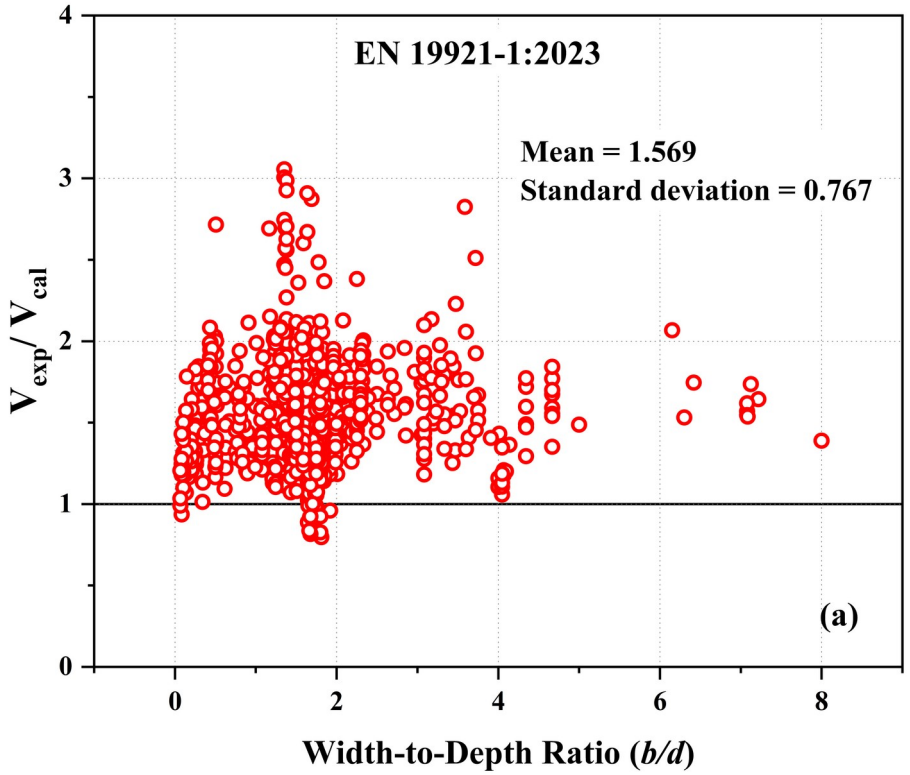
The FE models' accuracy was further verified by comparing failure modes, as depicted

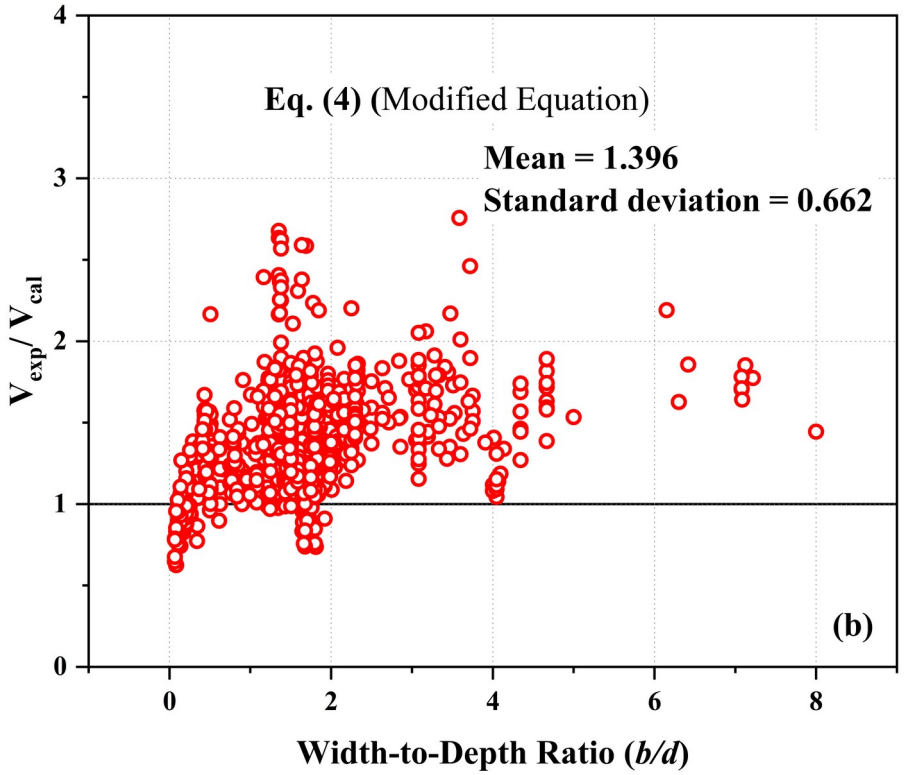


Result And Discussion - FEA

Modification of EN 1992-1-1:2023 - Validation

- Using the experimental database compiled by Collins et al.(2009), which includes 1,849 tests from sources such as the ACI Journal, ASCE Journal, and others.
- For this study, 916 rectangular beams with concentrated loads and shear failures were selected.



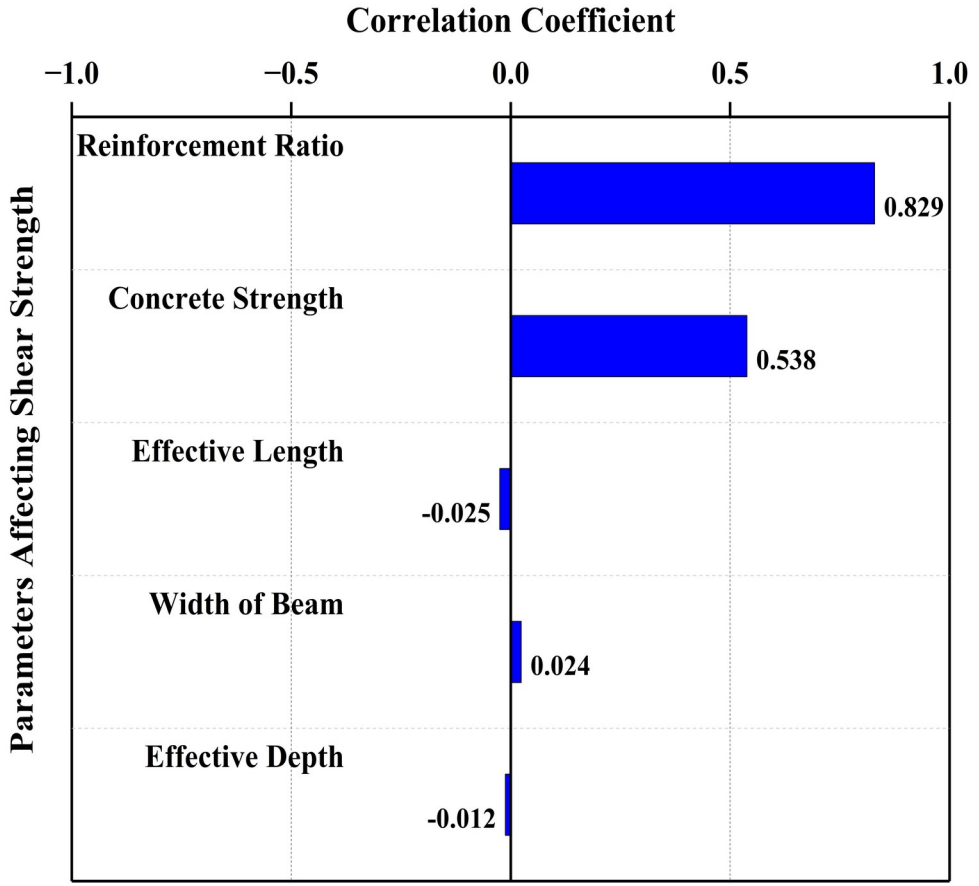


Result And Discussion

Modification of EN 1992-1-1:2023 - Sensitivity Analysis

- Using 100,000 data points generated using Monte Carlo simulation with spreadsheet

Parameter	Base Value	Mean	SD
Longitudinal Reinforcement Ratio (ρ)	0.02	0.02	0.005
Concrete Compressive Strength (f_{ck})	30	30	5
Width of Beam (b)	0.3	0.3	0.02
Effective Depth of Beam (d)	0.5	0.5	0.03
Effective Length of	5	5	0.5



Conclusions

Conclusions :

- **N**
  - National
  - Literature
- **U**
  - The.
- **R**
  - Models

Recommendations

- The final
- experiment
- recommend


THANK YOU