CHAPTER FOUR: RESULTS AND DISCUSSION

4.0This chapter presents the outcomes of the fabrication process, evaluates the performance of the twin metal panel door, analyzes cost implications, and discusses challenges encountered.

4.1 Final Output Description

4.2 The completed twin metal panel door measured approximately 1980 mm x 900 mm, suitable for a standard residential or institutional entryway. It consisted of:

4.3 Two vertically aligned mild steel panels reinforced with horizontal and vertical stiffeners.

4.4 A welded steel angle frame to hold the panels securely.

4.5 Heavy-duty hinges to support the door's weight

4.6 A metallic handle and lockset for secure access control.

4.7 A fine surface finish with red oxide primer and black enamel paint.

4.8 The door operated smoothly on its hinges, and the lockset functioned properly after installation. It demonstrated adequate stiffness, strength, and aesthetics.

4.9 Performance Evaluation

4.10 Criteria ObservationStructural Integrity .The door was firm and free from vibration. SecurityLockset and hinges were solid and secure. Aesthetic Quality Clean surface finish with uniform paint coverage. Durability Expected to withstand corrosion and wear. Swing Mechanism Smooth opening and closing without misalignment. The fabrication process successfully met the design specifications. The door was tested under standard use conditions and found to be suitable for regular residential or office use.

4.11 Cost Analysis

S/N	Item	Quantity	Unit price(#)	Total(#)
1	Mild steel sheet (1 guage)	1 sheet	30,000.00	30,000.00
2	Angle iron (30mm x 30mm)	3 lengths	25,000.00	25,000.00
3	Welding electrodes (E6013)	1 pack	6,500.00	6,500.00
4	Lockset and handle	1 set	6,000.00	6,000.00
5	Hinges (Heavy-duty)	2 pieces	2,500.00	5,000.00
6	Red oxide primer	1 liter	3,000.00	3,000.00
7	Enamel paint (Black)	1 liter	3,000.00	3,000.00
8	Grinding and finishing materials	-	-	5,000.00
	Total cost			#83,500.00

This cost reflects the practical affordability of producing a standard metal door in local workshops compared to imported alternatives which may exceed ₦83,500

4.12 Challenges Encountered

Welding Defects: Initial welds had porosity due to poor electrode angle and contamination; resolved by cleaning surfaces and adjusting welding parameters.

Material Handling: Steel sheets were heavy and required teamwork during alignment.

Paint Drips: Occurred during the first coat of enamel application; corrected with controlled brushing and better mixing.

Tool Wear: The cutting disc became blunt mid-process, necessitating its replacement.Despite these challenges, the final product met functional and design expectations.