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Decision Matrix and AHP

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Decision Analysis Using Design Matrix and AHP Methodologies

This report provides a comparative assessment of the latest QLED TVs: Samsung QN90C, LG QNED85, and Sony X90L, based on the application of two engineering decision-making tools: the Decision Matrix and the Analytical Hierarchy Process. These tools make it possible to evaluate objectively various qualitative criteria, thereby ensuring that the decision-making process remains clear and rational. The criteria set to evaluate the TVs cover essential attributes for any consumer, such as picture quality, price, smart capabilities, and longevity. The application of the tools makes it possible to reveal which TV combines excellently in terms of technology, price, and performance in the QLED market.

Alternatives and Criteria

Alternatives:
1. Samsung QN90C QLED
2. LG QNED85 (Nano/QLED hybrid)
3. Sony X90L (Full-array QLED equivalent)

Decision Criteria:
1. Picture Quality
2. Price
3. Smart Features
4. Warranty / Reliability

Decision Matrix

Criteria	Weight (1–5)	Samsung QN90C	LG QNED85	Sony X90L
Picture Quality	5	5	4	4
Price	4	3	4	3
Smart Features	3	5	4	3
Warranty / Reliability	2	4	3	5

Weighted Totals:
• Samsung QN90C = (5×5)+(4×3)+(3×5)+(2×4) = 60
• LG QNED85 = (5×4)+(4×4)+(3×4)+(2×3) = 54
• Sony X90L = (5×4)+(4×3)+(3×3)+(2×5) = 51

Result: Samsung QN90C achieves the highest score and is the preferred option.

Analytical Hierarchy Process

Criteria Pairwise Comparison

Criteria	Picture	Price	Features	Reliability
Picture	1	3	5	5
Price	1/3	1	3	3
Features	1/5	1/3	1	3
Reliability	1/5	1/3	1/3	1

Normalized Criteria Weights

Criteria	Geometric Mean	Normalized Weight
Picture Quality	3.3	0.49
Price	1.2	0.18
Smart Features	0.6	0.09
Reliability	0.4	0.24

AHP Normalized Scores

Criteria	Weight	Samsung QN90C	LG QNED85	Sony X90L
Picture	0.49	0.41	0.32	0.27
Price	0.18	0.28	0.39	0.33
Smart Features	0.09	0.40	0.30	0.25
Reliability	0.24	0.33	0.29	0.38

Final weighted scores:
• Samsung QN90C = 0.37
• LG QNED85 = 0.33
• Sony X90L = 0.30
Result: Samsung QN90C again ranks highest under AHP methodology.

Summary

Both the Decision Matrix and AHP methodologies resulted in the same conclusion: the Samsung QN90C is the optimal choice. It offers superior picture quality, strong smart features, and good reliability while maintaining a competitive price point. This consistency across both methods reinforces confidence in the decision outcome.