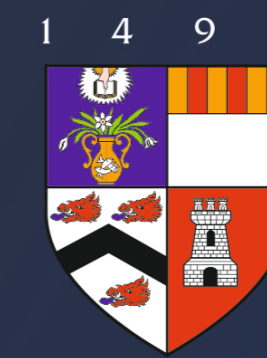# Investigating the Factors Affecting Maintenance Cost of Oil and Gas Processing Facilities - An Econometric Approach

Hossam Elmasry

UNIVERSITY OF ABERDEEN

Motivation

Maintenance cost is considered one of the main factors affecting the cost structure of any production or industrial facility. Although maintenance is an engineering problem, but it requires a huge amount of expenditure to perform. Consequently, this cost has to be minimized.

Aim

➤ Determination of the main factors affecting the maintenance costs of oil and gas processing facilities and petroleum marine terminals.

➤ More specifically is to determine if the age of processing facility has a significance effect on its maintenance costs or not.

Methodology

1- Theoretical Engineering Economics models for determination of the optimum maintenance level.

2- Econometric Regression models for the quantitative estimation of the relation between maintenance cost and facility age.

Three Engineering model are introduced:

- Target Output level Model.
- Standard Linear Value Function Model.
- Non-Linear Value Function Model.

Model Type	Relation with Age
Target Output Model	Maintenance cost increases with age
Linear Value Function Model	Maintenance cost decreases with age
Non-Linear Value Function Model	Full lifecycle model for maintenance
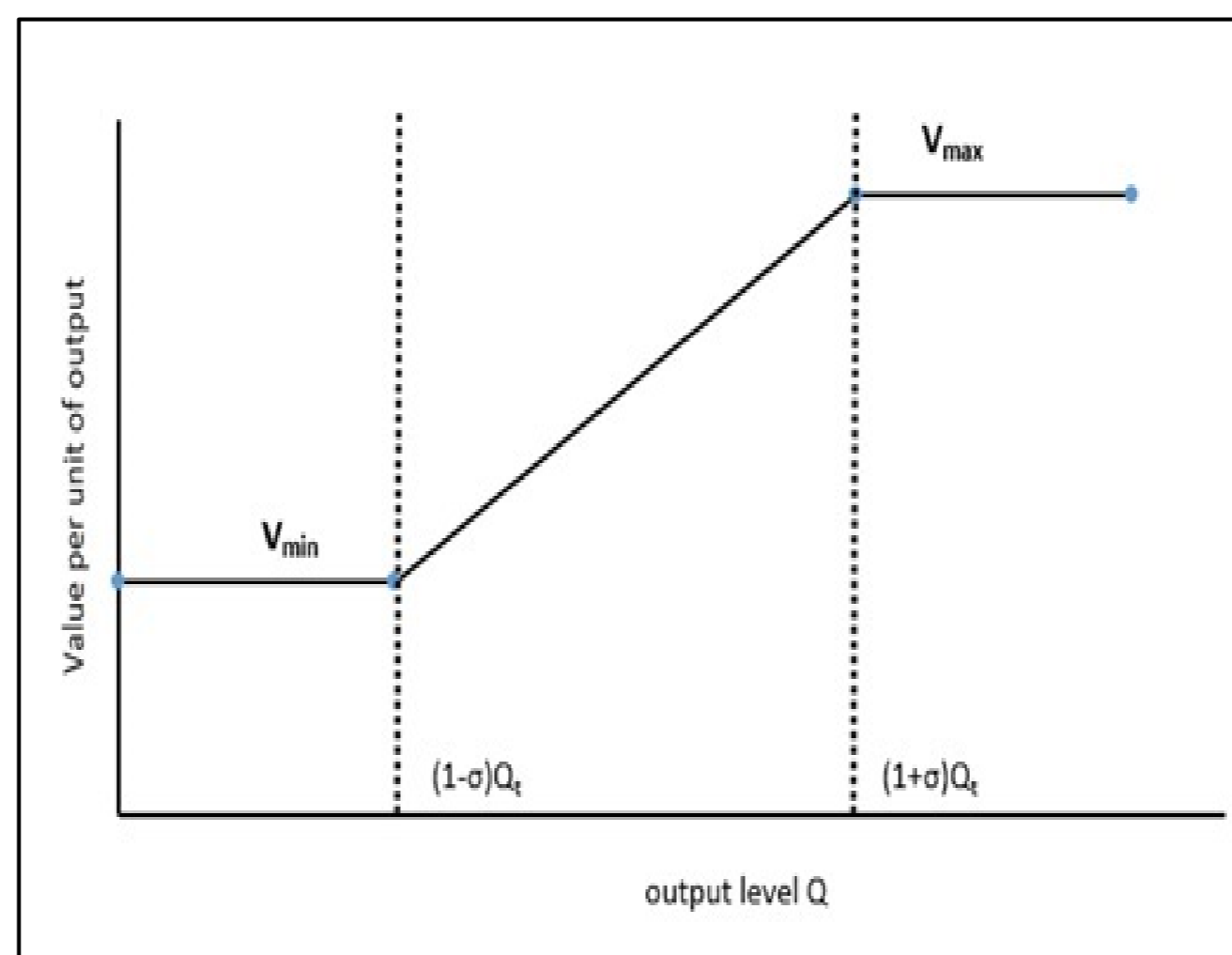
- The non-linear model predicted that maintenance will increase with age until a certain point where it becomes uneconomic to keep high level of output.
- After that, output level starts to decline and the demand for maintenance decreases with age

Econometric Result

Hypothesis Testing	P-values	Significance at 10%
Age	0.083	Yes
Manpower cost per hour	0.021	Yes
Location	0.011	Yes
Operation hours	0.020	Yes
Type of Product	0.699	No
Facility size	0.231	No
Preventive Maintenance %	0.977	No

Conclusion

➤ The Engineering Economic models have demonstrated existence of relationship between maintenance cost and age ,introducing the non-Linear value function model that created a full lifecycle model for maintenance.

➤ The regression models proved that facility age can be considered a statistically significant factor in determining the maintenance cost of oil and gas processing facilities.

Hossam Elmasry   hossam.elmasry.16@aberdeen.ac.uk   +44 (0)7768085013   www.abdn.ac.uk

University of Aberdeen, King's College, Aberdeen, AB24 3FX