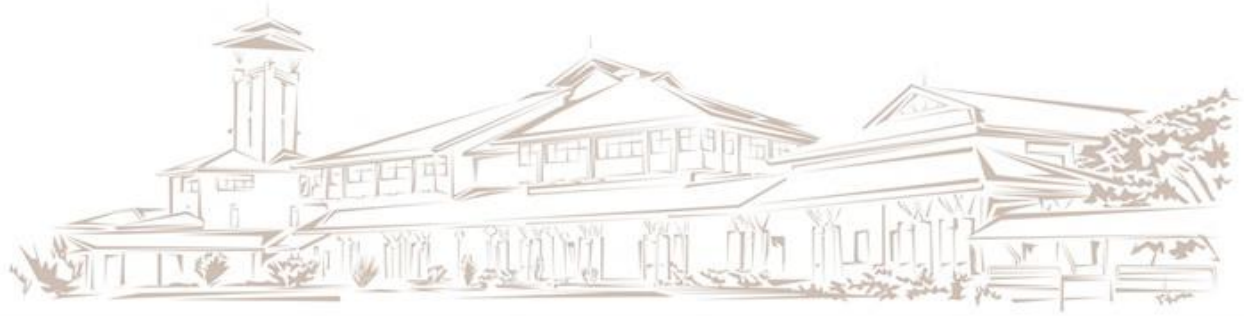


"A man is
great by
deeds, not by
birth"
-Chanakya
Welcome to IIMK



INDIAN INSTITUTE OF MANAGEMENT KOZHIKODE



Working Paper

IIMK/WPS/275/QM&OM/2018/19

May 2018

**Markov Model for Assessment of Availability Measures of Wind
Turbine**

Thangamani Gurunathan ¹

¹Associate Professor, Quantitative Methods and Operations Management at the Indian Institute of Management Kozhikode, Kozhikode, India. IIMK Campus P.O., Kozhikode, Kerala 673570, India; Email: gtmani@iimk.ac.in; Phone Number (+91) 495 2809255

ABSTRACT

Companies are often interested in knowing availability of their complex system to ensure operational effectiveness and to minimize cost. One such complex system is wind turbine and its reliability and availability are more important for its cost-effective operations. A systematic approach is presented in this paper to estimate the availability of a wind turbine system. Considering the various subsystems of wind turbine, system states are defined and modelled using Markov process approach. Some of the subsystems of the wind turbine system are in one of the states such as good, operating at reduced efficiency (due to partial failure) or under complete failure. The partial and/or complete failure scenarios also consider the failures because of external events/conditions like harsh environment. The system is modeled as a Markov process using Chapman-Kolmogorov equations. The quantitative evaluation is performed for the system and the characteristic parameters such as availability is assessed. This paper also presents the steady state availability of the various states of the subsystems and a sensitivity analysis of important subsystems. The method promises to be useful for assessing the availability of any complex systems.

Research Office

Indian Institute of Management Kozhikode

IIMK Campus P. O.,

Kozhikode, Kerala, India,

PIN - 673 570

Phone: +91-495-2809238

Email: research@iimk.ac.in

Web: <https://iimk.ac.in/faculty/publicationmenu.php>

