ABSTRAK

Penelitian ini membahas analisis kestabilan model matematika penyebaran kecanduan media sosial dengan pendekatan kompartemen *SEARQ* (*Susceptible, Exposed, Addicted, Recovered, Quit*). Analisis dilakukan dengan menentukan titik ekuilibrium bebas kecanduan dan endemik, serta menguji kestabilannya menggunakan kriteria *Routh-Hurwitz*. Hasil analisis menunjukkan bahwa kestabilan sistem sangat dipengaruhi oleh nilai bilangan reproduksi dasar ($\mathcal{R}_0$). Jika $\mathcal{R}_0 < 1$, sistem cenderung menuju titik ekuilibrium bebas kecanduan, yang berarti kecanduan akan menghilang dari populasi. Sebaliknya, jika $\mathcal{R}_0 > 1$, sistem bergerak menuju titik ekuilibrium endemik, sehingga kecanduan tetap bertahan dalam jangka panjang. Simulasi numerik mendukung hasil ini dengan memperlihatkan peran penting perbandingan antara laju rekrutmen (π) dan laju kematian alami (μ) terhadap dinamika perubahan total populasi. Secara keseluruhan, penelitian ini menegaskan bahwa keberlangsungan kecanduan media sosial dalam suatu populasi ditentukan oleh interaksi antarparameter dalam model.

Kata kunci: *Kecanduan media sosial, Model Matematika, SEARQ, Kestabilan, Routh-Hurwitz, Bilangan Reproduksi Dasar, Simulasi Numerik.*

ABSTRACT

This study discusses the stability analysis of a mathematical model for the spread of social media addiction using the *SEARQ* compartmental approach (*Susceptible, Exposed, Addicted, Recovered, Quit*). The analysis is carried out by determining the addiction-free and endemic equilibrium points and testing their stability using the Routh-Hurwitz criteria. The results show that the stability of the system is strongly influenced by the basic reproduction number ($\mathcal{R}_0$). If $\mathcal{R}_0 < 1$, the system tends to move toward the addiction-free equilibrium, which means that addiction will eventually disappear from the population. Conversely, if $\mathcal{R}_0 > 1$, the system moves toward the endemic equilibrium, indicating that addiction will persist in the long term. Numerical simulations support these findings by highlighting the important role of the comparison between the recruitment rate (π) and the natural death rate (μ) in the dynamics of total population change. Overall, this study confirms that the persistence of social media addiction in a population is determined by the interaction among the parameters in the model.

Keywords: *Social Media Addiction, Mathematical Model, SEARQ, Stability, Routh-Hurwitz, Basic Reproduction Number, Numerical Simulation.*