

INTISARI

Pemodelan Data Hierarkis Nonlinear Menggunakan *Generalized Additive Mixed Model*: Studi Kasus Analisis Hubungan Durasi Kerja dan Produktivitas Pekerja *Assisted Pollination* PT Astra Agro Lestari Tbk

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Penelitian ini menerapkan *Generalized Additive Mixed Model* (GAMM) untuk menganalisis hubungan kompleks antara durasi kerja dan produktivitas pekerja *assisted pollination* di PT Astra Agro Lestari Tbk. GAMM dipilih karena kemampuannya untuk menangani data dengan struktur hierarkis, hubungan nonlinear, dan dispersi besar melalui integrasi komponen fungsi penghalus (*smoother*) dan efek random. Analisis hubungan dilakukan dengan memanfaatkan komponen *global smoother* pada GAMM yang menggambarkan rata-rata data tanpa melihat hierarki karena aspek tersebut telah dimodelkan oleh komponen lainnya. Hasil penelitian menunjukkan bahwa GAMM dengan variabel respons distribusi normal mampu memodelkan data secara lebih baik dibanding model dasar *Generalized Linear Model* (GLM), *Generalized Additive Model* (GAM), maupun GAMM dengan variabel respons distribusi gamma dan inverse-gaussian. Temuan utama mengungkapkan adanya hubungan nonlinear positif antara durasi kerja dan produktivitas, kecuali untuk durasi kerja lebih dari 8 jam 6 menit. Produktivitas pekerja *assisted pollination* cenderung stagnan pada rentang durasi kerja 4 jam 54 menit hingga 5 jam 30 menit dengan rata-rata produktivitas 2,52 ha.

ABSTRACT

Nonlinear Hierarchical Data Modeling Using Generalized Additive Mixed Model: A Case Study of Analyzing the Relationship Between Work Duration and Productivity of Assisted Pollination Workers at PT Astra Agro Lestari Tbk

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This research applies Generalized Additive Mixed Model (GAMM) to analyze the complex relationship between working duration and productivity of assisted pollination workers at PT Astra Agro Lestari Tbk. GAMM was selected for its capability to handle data with hierarchical structures, nonlinear relationships, and large dispersion through the integration of smoother and random effect components. The relationship analysis was conducted by utilizing the global smoother component in GAMM, which represents the average of the data without considering hierarchy since this aspect has been modeled by other components. The research results demonstrate that GAMM with normally distributed response variable is capable of modeling data more effectively compared to baseline models including Generalized Linear Model (GLM), Generalized Additive Model (GAM), as well as GAMM with gamma and inverse-gaussian distributed response variables. The main findings reveal a positive nonlinear relationship between working duration and productivity, except for working durations exceeding 8 hours 6 minutes. The productivity of assisted pollination workers tends to remain stagnant within the working duration range of 4 hours 54 minutes to 5 hours 30 minutes, with an average productivity of 2.52 ha.