PENGEMBANGAN APLIKASI SISTEM PAKAR "SI PAK-E" UNTUK IDENTIFIKASI MASALAH KAKI-KAKI MOBIL BMW E36 DENGAN METODE *CERTAINTY FACTOR*

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ABSTRAK

Mobil BMW E36 merupakan kendaraan klasik yang membutuhkan perhatian teknis khusus, terutama pada sektor mesin dan kaki-kaki yang rentan mengalami kerusakan seiring bertambahnya usia pakai. Penelitian ini bertujuan untuk mengembangkan aplikasi sistem pakar berbasis *website* bernama Si Pak-E sebagai alat bantu konsultasi awal bagi pemilik kendaraan dalam mengidentifikasi kerusakan secara mandiri. Pengembangan ini dilakukan guna menyempurnakan sistem terdahulu yang terbatas pada modul *power loss* mesin dengan metode *Forward Chaining*. Pengembangan mencakup perluasan modul kerusakan kaki-kaki dan implementasi metode *Certainty Factor* (CF) guna memberikan hasil probabilitas kerusakan yang dinamis. Selain itu, dilakukan optimalisasi *Role-Based Access Control* (RBAC) dan peningkatan *User Experience* (UX) melalui integrasi multimedia (video, GIF, audio) pada kuesioner gejala untuk membantu pemahaman pengguna awam. Hasil penelitian menunjukkan bahwa penerapan sistem pakar berhasil dilakukan dengan menerapkan metode *Certainty Factor* (CF) yang dibuktikan melalui tingkat kesesuaian antara perhitungan manual dan sistem sebesar 100%, serta pengujian fungsionalitas menggunakan *Black-box Testing* yang juga mencapai tingkat keberhasilan eksekusi 100% tanpa adanya kesalahan. Dengan demikian, aplikasi Si Pak-E terbukti secara empiris lebih presisi dan informatif sebagai alat bantu konsultasi kendaraan mandiri.

Kata Kunci: *Aplikasi Berbasis Website, BMW E36, Certainty Factor, Role-Based Access Control , Sistem Diagnosis, Sistem Pakar*

DEVELOPMENT OF THE "SI PAK-E" EXPERT SYSTEM APPLICATION FOR DIAGNOSING BMW E36 SUSPENSION ISSUES USING THE CERTAINTY FACTOR METHOD

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ABSTRACT

The BMW E36 is a classic vehicle that requires special technical attention, particularly in the engine and undercarriage sectors, which are prone to damage as they age. This research aims to develop a website-based expert system application named Si Pak-E as an initial consultation tool for vehicle owners to identify damages independently. This development was conducted to improve the previous system, which was limited to the engine power loss module using the Forward Chaining method. The development includes expanding the undercarriage damage module and implementing the Certainty Factor (CF) method to provide dynamic damage probability results. In addition, the optimization of Role-Based Access Control (RBAC) and the enhancement of User Experience (UX) were carried out through the integration of multimedia (videos, GIFs, audio) into the symptom questionnaire to help lay users' understanding. The research results show that the application of the expert system has been successfully conducted by implementing the Certainty Factor (CF) method, which is proven by a 100% suitability rate between manual calculation and the system, as well as functionality testing using Black-box Testing, which also achieved a 100% execution success rate without any errors. Thus, the Si Pak-E application has been empirically proven to be more precise and informative as a self-service vehicle consultation tool.

Keywords: *BMW E36, Certainty Factor, Diagnosis System, Expert System, Role-Based Access Control, Web-Based Application*