



ABSTRAK

Produktivitas pengembangan perangkat lunak berpengaruh langsung terhadap biaya, waktu rilis, dan kualitas produk, namun estimasi *effort* dan biaya masih menjadi tantangan, terutama pada sistem kompleks seperti Sistem Informasi Manajemen Rumah Sakit (SIMRS). Variasi tingkat keahlian programmer memengaruhi produktivitas, sementara pengukuran yang objektif dan terstandarisasi masih sulit diterapkan. COSMIC *Function Point* (CFP) sebagai standar ISO/IEC 19761 menyediakan metode pengukuran berbasis *data movement*, tetapi prosesnya yang *time-intensive* membatasi adopsi dalam *Agile development*.

Penelitian ini menggunakan studi kasus pada *software house* SIMRS dengan 59 *work items* selama 4 *sprint*, menghasilkan *dataset* final 58 *work items*, 8 programmer, dan 209 CFP setelah *outlier detection*. Pengukuran CFP dengan bantuan *Artificial Intelligence* (AI) menggunakan *Large Language Model* (LLM) Claude dilakukan dalam tujuh *run* untuk analisis produktivitas dan efisiensi waktu, dengan validasi ahli oleh *Project Manager*. Analisis deskriptif-komparatif menggunakan metrik produktivitas (CFP/jam) dilakukan berdasarkan tingkat keahlian programmer.

Hasil penelitian menunjukkan bahwa programmer senior memiliki produktivitas tertinggi (0,32 CFP/jam), yaitu 3,9 kali lebih tinggi dari junior dan 1,9 kali dari mid-level (0,17 CFP/jam). Evaluasi *AI-assisted CFP measurement* menunjukkan efisiensi tinggi dengan *processing rate* 0,858 CFP/detik, konsistensi yang cukup (CV 18,51%), dan akurasi moderat dengan *agreement rate* 60% pada komponen inti COSMIC. Penelitian ini menghasilkan *benchmark* produktivitas CFP berdasarkan tingkat keahlian yang dapat digunakan untuk perencanaan *sprint* berbasis data serta membuktikan bahwa *AI-assisted measurement* menjadikan CFP lebih praktis untuk adopsi dalam *Agile development*.

Kata kunci— Produktivitas perangkat lunak, COSMIC *Function Point*, Sistem Informasi Manajemen Rumah Sakit (SIMRS), *Agile development*, *AI-assisted measurement*



ABSTRACT

Software development productivity directly impacts cost, time-to-market, and product quality; however, effort and cost estimation remains a significant challenge, particularly for complex systems such as Hospital Information Management Systems (HIMS). Variations in programmer expertise levels affect productivity, while objective and standardized measurement approaches remain difficult to implement. The COSMIC Function Point (CFP) method, as defined in ISO/IEC 19761, provides a data movement-based measurement approach, yet its time-intensive process limits adoption in Agile development environments.

This research employed a case study approach within a HIMS software house, examining 59 work items across 4 sprints, yielding a final dataset of 58 work items, 8 programmers, and 209 CFP following outlier detection. AI-assisted CFP measurement utilizing the Claude LLM was conducted through seven runs to analyze productivity and time efficiency, with expert validation performed by the Project Manager. Descriptive-comparative analysis employing productivity metrics (CFP/hour) was conducted based on programmer expertise levels.

The findings demonstrate that senior programmers achieved the highest productivity (0.32 CFP/hour), representing a 3.9-fold improvement over junior programmers and 1.9-fold improvement over mid-level programmers (0.17 CFP/hour). Evaluation of AI-assisted CFP measurement revealed high efficiency with a processing rate of 0.858 CFP/second, adequate consistency (CV 18.51%), and moderate accuracy with a 60% agreement rate on core COSMIC components. This research establishes CFP productivity benchmarks based on expertise levels that can be utilized for data-driven sprint planning, while demonstrating that AI-assisted measurement renders CFP more practical for adoption in Agile development contexts.

Keywords— Software productivity, COSMIC Function Point, Hospital Management Information System (HMIS), Agile development, AI-assisted measurement