

Prediksi Jenis dan Kebutuhan Safety Sparepart pada Pembangkit Listrik Menggunakan Perspektif Logistik dan Pemeliharaan = Types and Needs of Safety Spare Parts Prediction in Power Plants Using a Logistical and Maintenance Perspective.;Ekspresi Faktor Transkripsi Oct-4 pada Fraksi Sel Punca Adipocyte-derived dan Umbilical Cord-derived = The Expression of Oct-4 Transcription Factor in Adipocyte-derived and Umbilical Cord-derived Stem Cell Fraction;Ekspresi Faktor Transkripsi Oct-4 pada Fraksi Sel Punca Adipocyte-derived dan Umbilical Cord-derived = The Expression of Oct-4 Transcription Factor in Adipocyte-derived and Umbilical Cord-derived Stem Cell Fraction

Ennol Endrianto, author

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Abstrak

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Produktifitas pada pembangkit listrik merupakan kinerja terpenting dalam industri Operasi dan pemeliharaan, produktifitas tersebut banyak dipengaruhi oleh ketersediaan sparepart dalam rangka perawatan mesin-mesin, sehingga minimum stok safety sparepart yang harus dihitung pada saat awal tender harus benar-benar dihitung agar tidak terjadi kegagalan operasi dikarenakan tidak adanya sparepart. Tujuan paling penting dari hampir semua sistem produksi adalah mencapai kinerja optimal dengan biaya terendah sehingga ketersediaan minimum stok tidak boleh terlalu banyak dan tidak boleh terlalu sedikit. Untuk mengatasi permasalahan ini dibutuhkan estimasi jumlah dan jenis spare part yang harus dijaga. Metode yang digunakan pada penelitian ini adalah klasifikasi Multi kriteria dengan sudut pandang logistik dan juga pemeliharaan. Penelitian ini menggunakan data rekomendasi dari pabrikan sebagai initial solution berjumlah 564 item per satu lokasi pembangkit dari lima lokasi yang akan dihitung dan mengelompokkan sesuai dengan kebutuhan VED (Vital, Essential, Desireable) untuk mengetahui tingkat kekritisan yang dibagi menjadi "H" High, "M" Medium, "L" Low. Setelah mengetahui spare part apa saja yang harus disediakan sesuai dengan kekritisannya, akan dicari jumlah spare part dengan menggunakan expert judgement sebagai penentu emergency spare part. Hasil dari penelitian yang telah dilakukan didapatkan kekritisan "H" sebesar 6%, "M" sebesar 94% dan "L" sebesar 0%. Jumlah item yang direkomendasikan kurang dari rekomendasi pabrikan sebesar 52% serta penurunan biaya pencadangan safety sparepart sebesar 6%.

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**ABSTRACT**

Productivity at the power plant is the most important performance in the operation and maintenance industry, productivity is much influenced by the availability of spare parts in the framework of maintenance of engine, so the minimum stock of safety spare parts that must be calculated at the beginning of the tender in order to avoid operation failure due to absence of spare parts. The most important goal of almost all production systems is to achieve optimal performance at the lowest cost so that the minimum availability of stock must not be too much and not too little. To overcome this problem, an estimation of the number and types of spare parts that must be maintained is needed. The method used in this study is a multi-criteria classification with a logistical perspective as well as maintenance. This study uses recommendation data

from the manufacturer as an initial solution totaling 564 items per one plant location from five locations to be calculated and grouping according to the needs of VED (Vital, Essential, Desirable) to determine the level of criticality which is divided into "H" High, "M" Medium, "L" Low. After knowing what spare parts must be provided in accordance with their criticality, we will look for the number of spare parts using expert judgment as a determinant of emergency spare parts. The results of the research that have been carried out obtained criticality "H" by 6%, "M" by 94% and "L" by 0%. The number of items recommended is less than the manufacturer's recommendations by 52% and a reduction in the cost of spare parts safety by 6%.

**Latar Belakang:** Terapi sel punca, walaupun membuka alternatif baru terhadap tatalaksana regeneratif namun masih mempunyai hambatan dalam etik dan juga penolakan sistem imun, terutama dalam penggunaan sel punca embrionik (ESCs). *Induced Pluripotent Stem Cells* (iPSCs), mempunyai karakteristik yang mirip dengan ESCs namun tidak dibatasi oleh masalah etik. Gen Oct-4 mempunyai peran penting dalam mempertahankan *pluripotency* dan juga dalam menginduksi sel iPSCs. Kemungkinan untuk menggunakan *Adipocyte-derived Stem Cells* (ADSC) dan *Umbilical Cord-derived Stem Cells* (USC) dalam pembuatan *induced Pluripotent Stem Cells* (iPSCs) sangat menjanjikan dan sedang dieksplorasi. Tingkat *pluripotency* dari ADSC dan USC belum pernah dilakukan sebelumnya. Maka dari itu, penelitian ini bertujuan untuk membandingkan tingkat *pluripotency* antara dua jenis sel punca mesenkimal melalui ekspresi gen Oct-4.

**Metode:** Ekstraksi RNA dilakukan pada *Adipocyte-derived Stem Cells*, *Umbilical Cord-derived Stem Cells* dan *Breast Cancer Stem Cells*. Ekspresi relatif dari gen Oct-4 didapatkan melalui *One-Step quantitative RT-PCR*. Analisis statistik dilakukan menggunakan SPSS 24.0.

**Hasil:** ADSC mengekspresikan lebih banyak Oct-4 mRNA, sebanyak 1.68 kali, dibandingkan USC.

**Kesimpulan:** Walaupun USC lebih primitif dan seharusnya juga lebih pluripoten, data menunjukkan bahwa ADSC memiliki *pluripotency* yang lebih tinggi dari USC. Penelitian lanjutan perlu dilakukan untuk mengetahui gen *pluripotency* yang terlibat di *pluripotency core network*.

**Background:** Stem cell therapy, despite providing new alternative approaches to regenerative treatment still presents with problems of ethical barriers and immune rejection, especially in the use of embryonic stem cells (ESCs). The induced Pluripotent Stem Cells (iPSCs), has similar characteristics to ESCs yet is not restricted by the ethical problems. Oct-4 gene plays a crucial role in the maintenance of pluripotency and in the induction of pluripotent stem cells. The possibilities of using mesenchymal stem cells such as Adipocyte-derived Stem Cells (ADSC) and Umbilical Cord-derived Stem Cells (USC) for induced Pluripotent Stem Cells (iPSCs) are promising and still being explored. The pluripotency level of the ADSC and USC have not been conducted before. Therefore, this research aims to compare the pluripotency level between the two type of mesenchymal stem cells through the Oct-4 gene expression.

**Method:** Extraction of RNA was performed from Adipocyte-derived Stem Cells, Umbilical Cord-derived Stem Cells and Breast Cancer Stem Cells. The relative expression of Oct-4 gene was obtained through One-Step quantitative RT-PCR. Further statistical analysis was done using SPSS 24.0.

**Results:** The ADSC expressed higher levels of Oct-4 mRNA, by 1.68 times, compared to USC.

**Conclusions:** Although USC is more primitive and should be more pluripotent, the data suggests that ADSC has a greater pluripotency than USC. Further study is required to examine other pluripotency genes involved in the pluripotency core network.

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