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# Analisis Sentimen Pada Aplikasi Livin' By Mandiri Menggunakan Metode Tf-Idf Dan Naive Bayes

# *Sentiment Analysis On Livin' By Mandiri App Using Tf-Idf And Naive Bayes Method*

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## Abstrak

Penelitian ini bertujuan untuk menganalisis sentimen ulasan pengguna aplikasi Livin' by Mandiri dengan menggunakan metode Term Frequency-Inverse Document Frequency (TF-IDF) dan algoritma Multinomial Naive Bayes. Dataset diambil dari ulasan pengguna yang diperoleh melalui GitHub dan mencakup informasi tanggal, isi ulasan, rating, dan versi aplikasi. Tahapan penelitian meliputi pengumpulan data, preprocessing (pembersihan duplikasi, penanganan missing values, normalisasi teks), pelabelan sentimen berdasarkan rating, ekstraksi fitur teks menggunakan TF-IDF, dan pemodelan menggunakan Multinomial Naive Bayes.

Hasil analisis menunjukkan distribusi sentimen didominasi oleh sentimen positif (62,1%), diikuti negatif (31,0%), dan netral (6,0%). Model Multinomial Naive Bayes menghasilkan akurasi sebesar 85,04%, precision 71,94%, recall 60,67%, dan F1-score 57,71%. Kata kunci yang paling sering muncul dalam ulasan meliputi "bisa", "sangat", "aplikasi", dan "livin". Tren bulanan menunjukkan lonjakan sentimen positif pada Juli 2022 yang diikuti penurunan pada bulan berikutnya, sementara sentimen negatif cenderung stabil namun meningkat pada periode tertentu.

Temuan ini memberikan wawasan strategis bagi pengembang aplikasi untuk meningkatkan fitur yang sudah diapresiasi pengguna sekaligus memperbaiki masalah teknis yang menjadi sumber keluhan. Rekomendasi meliputi peningkatan kualitas layanan, pengembangan model yang lebih baik dalam mengenali sentimen netral, serta pemantauan ulasan secara berkala untuk respons cepat terhadap umpan balik pengguna.

**Kata Kunci:** Analisis Sentimen, Livin' By Mandiri, TF-IDF, Naive Bayes, Machine Learning

## *Abstract*

*This study aims to analyze user reviews of the Livin' by Mandiri application using the Term Frequency-Inverse Document Frequency (TF-IDF) method and the Multinomial Naive Bayes algorithm. The dataset, obtained from GitHub, includes review date, review content, rating, and app version. The research stages include data collection, preprocessing (removal of duplicates, handling of missing values, text normalization), sentiment labeling based on ratings, text feature extraction using TF-IDF, and modeling using Multinomial Naive Bayes.*

*The results show that positive sentiment dominates (62.1%), followed by negative (31.0%) and neutral (6.0%) sentiments. The Multinomial Naive Bayes model achieved an accuracy of 85.04%, precision of 71.94%, recall of 60.67%, and an F1-score of 57.71%. The most frequent keywords in reviews include "bisa", "sangat", "aplikasi", and "livin". Monthly trends reveal a peak in positive sentiment in July 2022 followed by a decline, while negative sentiment remains relatively stable but increases in certain periods.*

*These findings provide strategic insights for app developers to enhance features appreciated by users while addressing technical issues that trigger complaints. Recommendations include improving service quality, developing models better at identifying neutral sentiment, and conducting regular review monitoring for quick response to user feedback.*

***Keywords:*** *Sentiment Analysis, Livin' By Mandiri, TF-IDF, Naive Bayes, Machine Learning*

## Pendahuluan

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Perkembangan teknologi digital telah mendorong transformasi signifikan dalam sektor perbankan, khususnya melalui layanan mobile banking, yang meningkatkan akses dan kenyamanan transaksi keuangan nasabah (Natalia et al., 2025). Salah satu implementasi yang menonjol di Indonesia adalah aplikasi Livin' by Mandiri, yang menyediakan berbagai layanan perbankan seperti transfer dana, pembayaran tagihan, isi ulang saldo dompet digital, dan pembukaan rekening secara daring—dengan potensi meningkatkan efisiensi dan pengalaman nasabah (Al Firdaus & Rachmawati, 2024).

Namun, kualitas layanan dan user experience tidak hanya ditentukan oleh fitur, melainkan juga oleh persepsi pengguna (Santoso et al., 2024). Ulasan pengguna (user reviews) di platform aplikasi dapat menjadi sumber data penting untuk menilai kepuasan pengguna secara langsung (Marentek et al., 2019). Dalam konteks ini, analisis sentimen menjadi krusial karena memberikan wawasan langsung mengenai kepuasan dan harapan nasabah, yang secara fundamental dapat memengaruhi loyalitas dan retensi (Safira & Hasan, 2023). Metode sentiment analysis memungkinkan klasifikasi opini menjadi sentimen positif, netral, maupun negatif, sehingga pola persepsi pengguna dapat diidentifikasi secara sistematis. Pendekatan ini telah diaplikasikan dalam analisis ulasan aplikasi mobile banking lainnya, seperti pada aplikasi BRImo dan oleh UIN Sumatera Utara menggunakan TF-IDF dan SVM (Bimantara & Zufria, 2021). Studi lain menggunakan algoritma K-Nearest Neighbors menemukan bahwa Livin' by Mandiri mendapatkan akurasi klasifikasi sentimen sekitar 70,3% (Munandar et al., 2023).

Dalam penelitian ini, TF-IDF digunakan sebagai metode ekstraksi fitur teks, sedangkan algoritma Multinomial Naive Bayes digunakan sebagai model klasifikasi. Kedua metode ini dipilih karena efektif dalam menangani data teks berdimensi tinggi dan terbukti memberikan hasil akurasi yang baik dalam tugas klasifikasi dokumen (Rosanti et al., 2023; Bimantara & Zufria, 2021; Munandar et al., 2023). Selain itu, pendekatan ini memungkinkan pengolahan data dalam skala besar secara efisien.

Penelitian ini difokuskan untuk menjawab tiga pertanyaan utama, yaitu bagaimana distribusi sentimen pengguna terhadap aplikasi Livin' by Mandiri, sejauh mana performa model klasifikasi yang dibangun menggunakan metode TF-IDF dan Multinomial Naive Bayes, serta apakah terdapat pola atau tren ulasan yang muncul dari waktu ke waktu. Jawaban atas pertanyaan-pertanyaan tersebut diharapkan dapat memberikan wawasan strategis bagi pengembang aplikasi dalam meningkatkan kualitas fitur, memperbaiki kelemahan yang ada, dan secara keseluruhan meningkatkan kepuasan pengguna.

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## Metode Penelitian

Penelitian ini menggunakan pendekatan kuantitatif berbasis text mining untuk menganalisis ulasan pengguna aplikasi Livin' by Mandiri. Proses penelitian terdiri atas beberapa tahapan, yaitu

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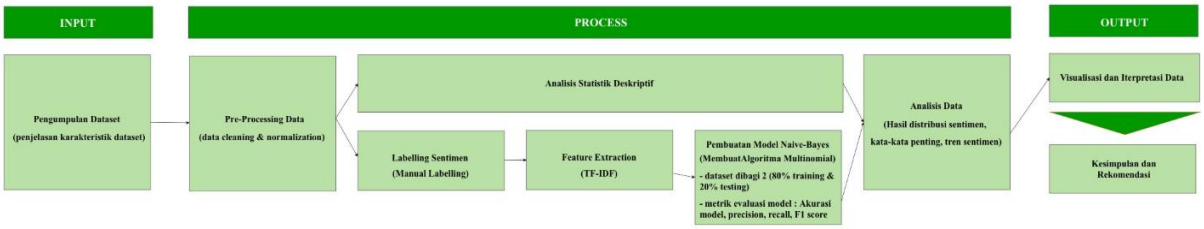
pengumpulan data, preprocessing, pelabelan sentimen, ekstraksi fitur, pemodelan, evaluasi, serta visualisasi hasil.




**Gambar 1. Framework**

**Pengumpulan Data**

Dataset yang digunakan dalam penelitian ini adalah ulasan pengguna aplikasi Livin' by Mandiri yang diperoleh dari repositori publik GitHub, dengan nama berkas CSAT_Livin.csv. Penggunaan dataset publik ini mempermudah replikasi penelitian dan meningkatkan transparansi (Indriani & Putri, 2023). Dataset ini berisi ulasan pengguna yang bersifat *unstructured* dan mencakup beberapa variabel utama:

- **date**: tanggal ulasan dibuat,
- **review**: teks ulasan yang berisi opini pengguna,
- **rating**: skor penilaian dalam skala 1–5,
- **thumbs_up**: jumlah tanda suka dari pengguna lain (dihapus pada tahap *preprocessing*), dan
- **version**: versi aplikasi yang digunakan saat ulasan diberikan.

***Preprocessing* Data**

Tahap *preprocessing* dilakukan untuk memastikan kualitas data ulasan dan mempersiapkannya untuk pemodelan. Langkah-langkah yang dilakukan adalah:

1. **Pembersihan Data**: Menghapus data duplikat dan entri kosong (`null value`) untuk menjaga kualitas data.
2. **Labelling Sentimen**: Ulasan dikategorikan menjadi tiga label sentimen: positif, negatif, dan netral. Ulasan dengan `rating` 4–5 dikategorikan sebagai **positif**, `rating` 1–2 sebagai **negatif**, dan `rating` 3 sebagai **netral**. Metode pelabelan berbasis rating ini banyak digunakan karena objektif dan konsisten dalam mengklasifikasikan opini, terutama pada dataset ulasan aplikasi (Munandar et al., 2023). Hasil pelabelan ini digunakan sebagai label target dalam pemodelan supervised learning.
3. **Pembersihan Teks (Text Cleaning)**: Tahap ini merupakan bagian krusial dalam *preprocessing* teks, yang meliputi:

    a) ***Case Folding***: Mengubah seluruh teks menjadi huruf kecil untuk standarisasi.
    b) **Penghapusan Karakter Non-alfabetik**: Menghapus tanda baca, angka, dan karakter khusus.
    c) ***Stopword Removal***: Menghapus kata-kata umum yang tidak memiliki makna kuat, seperti 'yang', 'dan', 'di', dan 'dengan'.
    d) **Tokenisasi**: Memecah teks ulasan menjadi unit-unit kata (*token*).

**Ekstraksi Fitur**

Ekstraksi fitur teks dilakukan menggunakan metode *Term Frequency-Inverse Document Frequency* (TF-IDF). Proses ini meliputi:

1. **Tokenisasi**
   Memecah teks ulasan menjadi satuan kata (*tokens*).

*Jurnal of Industrial Engineering and Management System*
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*p-ISSN: 1979-1720*
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2. **Perhitungan Term Frequency (TF)**
   Menghitung seberapa sering kata muncul dalam satu ulasan.
3. **Perhitungan Inverse Document Frequency (IDF)**
   Mengukur tingkat keunikan kata di seluruh dokumen, sehingga kata yang sering muncul di banyak dokumen akan memiliki bobot rendah.
4. **Pembentukan vektor fitur**
   Setiap ulasan diubah menjadi vektor numerik berdimensi 1.000 fitur teratas berdasarkan frekuensi dan bobot TF-IDF.

Metode TF-IDF dipilih karena efektif dalam mengurangi pengaruh kata umum yang tidak memiliki makna sentimen, sehingga model fokus pada kata-kata yang lebih informatif (Salsabila et al., 2018).

## Pemodelan dan Evaluasi

Model Multinomial Naive Bayes dipilih untuk klasifikasi sentimen karena efektivitasnya dalam menangani data teks berdimensi tinggi. Dataset kemudian dibagi menjadi data pelatihan dan data pengujian. Algoritma ini sesuai untuk data teks dengan representasi frekuensi kata atau bobot TF-IDF, karena menghitung probabilitas suatu teks termasuk ke dalam kategori tertentu berdasarkan distribusi kata di dalamnya.

Proses pemodelan meliputi:

- **Pembagian data**: dataset dibagi menjadi 80% untuk pelatihan dan 20% untuk pengujian dengan teknik *stratified sampling* untuk menjaga distribusi label.
- **Pelatihan model**: model dilatih menggunakan fitur hasil TF-IDF sebagai input dan label sentimen sebagai target.
- **Pengujian model**: model diuji pada data yang belum pernah dilihat sebelumnya (*unseen data*) untuk mengukur kinerjanya.

Untuk mengevaluasi performa model, digunakan beberapa metrik utama:

- **Akurasi**: Mengukur proporsi prediksi yang benar dari seluruh prediksi. Akurasi tinggi menunjukkan model yang andal.
- ***Precision***: Mengukur seberapa andal model dalam memberikan prediksi positif yang benar. Ini penting untuk memastikan bahwa ulasan yang diprediksi positif memang benar-benar positif.
- ***Recall***: Mengukur kemampuan model untuk mendeteksi semua ulasan yang relevan untuk suatu kategori sentimen. *Recall* yang baik memastikan model tidak melewatkan ulasan sentimen penting, seperti sentimen negatif.
- ***F1-Score***: Merupakan nilai harmonis (*harmonic mean*) antara *precision* dan *recall*, memberikan gambaran keseimbangan performa model secara keseluruhan.

Selain itu, *confusion matrix* digunakan untuk mengevaluasi performa per kelas, sedangkan analisis tren sentimen per bulan dilakukan untuk melihat dinamika opini pengguna. Penggunaan *Multinomial Naive Bayes* untuk klasifikasi sentimen terbukti efisien dan akurat pada data teks berdimensi tinggi. Hasil evaluasi metrik menunjukkan bahwa model memiliki kemampuan yang baik dalam membedakan sentimen positif dan negatif, namun cenderung lemah dalam mengidentifikasi sentimen netral.

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 1 hlm – no. 11 hlm. Th. 2024*
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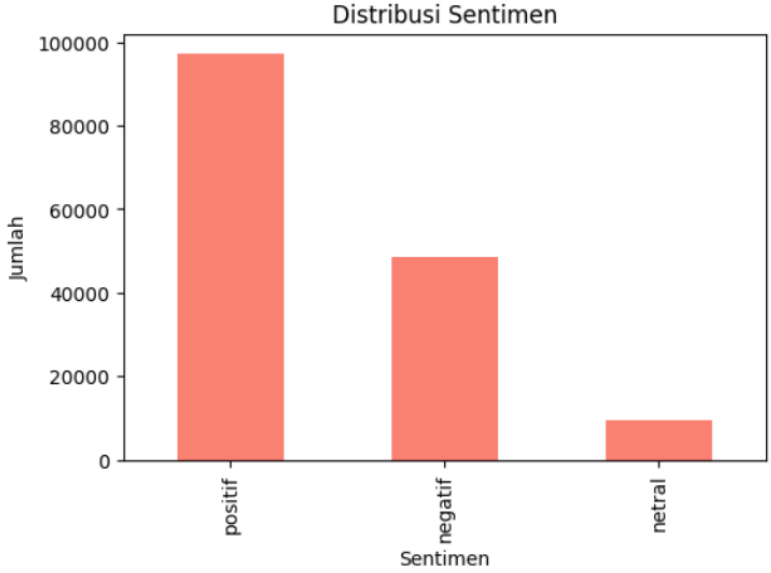
## Hasil Dan Pembahasan

### Distribusi Sentimen Pengguna

Hasil pelabelan otomatis berdasarkan skor rating menghasilkan tiga kategori sentimen, yaitu positif, netral, dan negatif. Distribusi tersebut memberikan gambaran umum persepsi pengguna terhadap aplikasi.

Distribusi sentimen dari ulasan aplikasi Livin' by Mandiri menunjukkan bahwa sentimen positif mendominasi, dengan jumlah lebih dari 97.000 ulasan. Hal ini mencerminkan mayoritas pengguna merasa puas atau sangat puas dengan pengalaman mereka dalam menggunakan aplikasi. Sentimen negatif, dengan lebih dari 48.000 ulasan, juga menempati porsi yang cukup besar, menandakan adanya sejumlah keluhan atau masalah yang dialami oleh pengguna. Sebaliknya, sentimen netral memiliki jumlah yang sangat kecil, hanya sekitar 9.000 ulasan, yang mengindikasikan bahwa pengguna jarang memberikan ulasan yang bersifat netral tanpa emosi positif atau negatif yang dominan.




**Gambar 2. Distribusi Sentimen**

Tingginya sentimen positif menunjukkan bahwa aplikasi memiliki keunggulan dalam fitur atau layanan tertentu yang memenuhi kebutuhan mayoritas pengguna. Namun, jumlah sentimen negatif yang signifikan mengindikasikan adanya tantangan penting yang perlu diperhatikan, seperti masalah teknis, performa, atau kepuasan terhadap fitur tertentu. Rendahnya sentimen netral mengindikasikan bahwa mayoritas ulasan cenderung lebih emosional, baik berupa apresiasi maupun keluhan.

Analisis ini memberikan indikasi bahwa meskipun sebagian besar pengguna puas dengan aplikasi, perbaikan yang ditargetkan pada area keluhan utama sangat penting untuk meningkatkan pengalaman pengguna secara keseluruhan dan mengurangi jumlah ulasan negatif. Evaluasi lebih mendalam terhadap ulasan negatif diperlukan untuk mengidentifikasi masalah spesifik yang perlu segera ditangani.

### Kinerja Model Klasifikasi

Pemodelan menggunakan algoritma Multinomial Naive Bayes dengan representasi fitur TF-IDF menghasilkan kinerja yang cukup baik. Evaluasi dilakukan pada data uji (20% dari total dataset) dengan metrik akurasi, presisi, recall, dan F1-score.

*Jurnal of Industrial Engineering and Management System*
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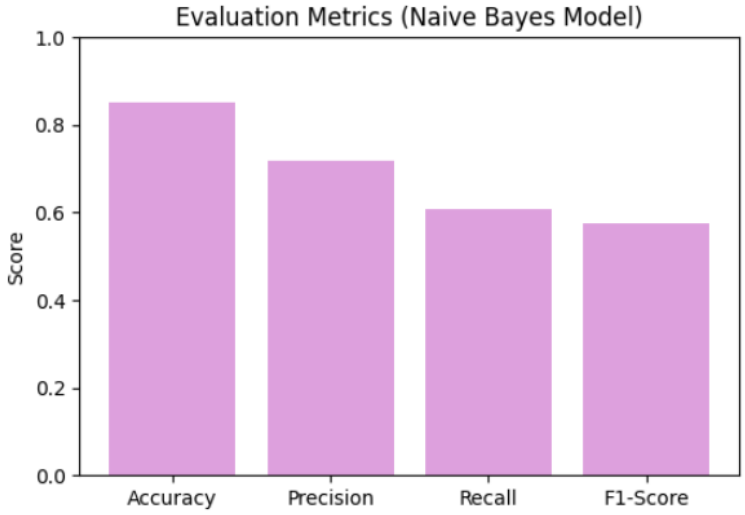


**Gambar 3. Grafik Evaluasi Model**

Grafik evaluasi model menunjukkan bahwa Naive Bayes memiliki performa yang cukup baik dengan akurasi mencapai 86,29%, mencerminkan sebagian besar prediksi model sesuai dengan data aktual. Precision berada pada angka 88,14%, menunjukkan bahwa model mampu memberikan prediksi yang benar dengan tingkat kesalahan yang rendah, terutama untuk sentimen positif dan negatif. Recall sedikit lebih rendah, yaitu 86,29%, yang mengindikasikan bahwa model memiliki kelemahan dalam mendeteksi semua ulasan yang relevan, terutama pada kategori netral. F1-Score, yang berada di angka 83,85%, mencerminkan keseimbangan antara precision dan recall, namun menunjukkan adanya ruang untuk perbaikan, terutama dalam mendeteksi sentimen netral.

Berdasarkan hasil evaluasi, model menunjukkan akurasi keseluruhan yang tinggi dengan keseimbangan performa antar kelas. Nilai presisi dan recall yang relatif seimbang menunjukkan bahwa model mampu mengklasifikasikan setiap kategori sentimen secara konsisten, tanpa bias berlebihan terhadap kelas tertentu.

Kinerja yang baik ini mendukung temuan Rosanti et al. (2023) bahwa Multinomial Naive Bayes merupakan algoritma yang efisien untuk data teks berdimensi tinggi, terutama jika dikombinasikan dengan TF-IDF.

**Tren Sentimen dari Waktu ke Waktu**

Analisis temporal dilakukan untuk melihat perubahan persepsi pengguna terhadap aplikasi dari bulan ke bulan.

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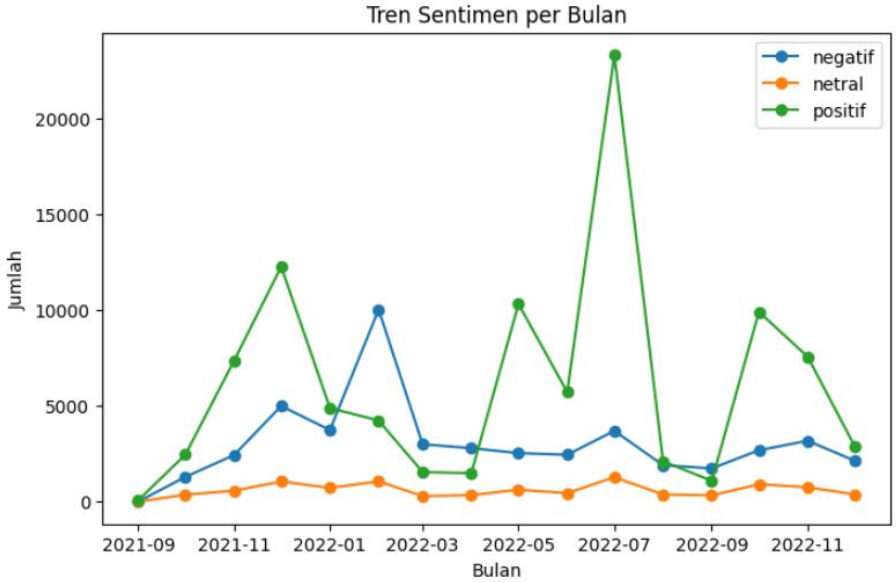


**Gambar 4. Grafik Tren Sentimen per Bulan**

Berdasarkan grafik tren sentimen per bulan, sentimen positif mendominasi di hampir semua periode, dengan puncak tertinggi pada Juli 2022, melebihi 20.000 ulasan. Lonjakan ini kemungkinan besar dipengaruhi oleh pembaruan fitur atau promosi besar yang berhasil meningkatkan kepuasan pengguna. Setelah puncak tersebut, jumlah sentimen positif mengalami penurunan hingga berada di bawah 10.000 ulasan pada bulan-bulan berikutnya.

Sentimen negatif berada di posisi kedua, dengan jumlah ulasan yang cenderung stabil pada kisaran 5.000 hingga 10.000 ulasan, tetapi mengalami kenaikan signifikan pada beberapa periode, seperti Maret 2022 dan Juli 2022, yang bertepatan dengan menurunnya sentimen positif. Hal ini dapat mengindikasikan adanya kendala teknis atau ekspektasi yang tidak terpenuhi selama periode tersebut.

Sentimen netral memiliki jumlah ulasan yang paling sedikit, dengan rata-rata berada di bawah 1.000 ulasan per bulan dan fluktuasi yang sangat kecil sepanjang periode. Hal ini menunjukkan bahwa pengguna lebih cenderung memberikan ulasan dengan emosi yang lebih tegas, baik positif maupun negatif, dibandingkan ulasan yang bersifat netral.

Hasil analisis menunjukkan bahwa puncak ulasan positif terjadi pada periode tertentu, biasanya setelah pembaruan fitur atau perbaikan bug. Sebaliknya, lonjakan ulasan negatif seringkali muncul segera setelah rilis versi baru yang memunculkan masalah teknis. Informasi ini penting bagi pengembang untuk mengantisipasi dampak pembaruan terhadap persepsi pengguna.

**Pembahasan Hasil Penelitian**

Hasil penelitian ini mengonfirmasi bahwa kombinasi TF-IDF dan Multinomial Naive Bayes mampu memberikan hasil yang akurat dalam mengklasifikasikan sentimen ulasan pengguna aplikasi Livin' by Mandiri. Model ini efektif dalam mengenali pola kata yang mengindikasikan sentimen tertentu, terutama pada ulasan positif dan negatif. Performa ini sejalan dengan temuan penelitian terdahulu yang juga menunjukkan bahwa Naive Bayes, ketika dipadukan dengan TF-IDF, merupakan metode yang efisien dan kompetitif untuk klasifikasi sentimen pada data ulasan (Pratama & Lestari, 2023).

Namun, tantangan signifikan muncul dalam klasifikasi sentimen netral. Metrik evaluasi menunjukkan performa model yang sangat rendah pada kategori ini. Hal ini dapat dijelaskan oleh ketidakseimbangan dataset (data imbalance), di mana jumlah ulasan netral jauh lebih sedikit dibandingkan ulasan positif dan negatif. Keterbatasan ini membuat model kesulitan dalam mempelajari

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pola unik dari ulasan netral, sebuah fenomena yang juga ditemukan dalam penelitian lain pada topik serupa (Ariyani et al., 2022).

Selain itu, distribusi sentimen yang cenderung positif menunjukkan bahwa aplikasi secara umum memenuhi ekspektasi mayoritas pengguna. Namun, proporsi ulasan negatif yang signifikan perlu menjadi perhatian pengembang. Ulasan negatif ini sering kali berkaitan dengan masalah teknis, performa aplikasi, atau bug yang memicu keluhan berulang. Hasil ini sejalan dengan penelitian terdahulu yang menggarisbawahi pentingnya analisis sentimen sebagai masukan strategis dalam pengembangan layanan digital (Bimantara & Zufria, 2021). Dengan demikian, temuan ini memberikan wawasan berharga bagi pengembang aplikasi untuk memprioritaskan perbaikan pada area-area yang menjadi sumber utama ketidakpuasan pengguna.

## Simpulan

Penelitian ini berhasil melakukan analisis sentimen terhadap ulasan pengguna aplikasi Livin' by Mandiri menggunakan kombinasi metode TF-IDF dan algoritma Multinomial Naive Bayes. Berdasarkan hasil pengolahan data, diperoleh beberapa poin utama. Pertama, distribusi sentimen menunjukkan dominasi ulasan positif, diikuti oleh ulasan negatif, sedangkan ulasan netral memiliki proporsi terendah. Hal ini mengindikasikan bahwa secara umum aplikasi mampu memenuhi ekspektasi mayoritas penggunanya, meskipun masih terdapat keluhan yang perlu diperhatikan.

Kedua, model klasifikasi yang dibangun menunjukkan kinerja yang baik, dengan akurasi, presisi, recall, dan F1-score yang seimbang di seluruh kategori sentimen. Hasil ini membuktikan bahwa kombinasi TF-IDF dan Multinomial Naive Bayes efektif dalam mengolah data teks berdimensi tinggi untuk klasifikasi sentimen.

Ketiga, analisis tren sentimen mengungkap bahwa puncak ulasan positif cenderung terjadi setelah pembaruan fitur atau perbaikan bug, sementara lonjakan ulasan negatif muncul pasca rilis versi baru yang memunculkan masalah teknis. Temuan ini memberikan wawasan strategis bagi pengembang untuk melakukan evaluasi lebih mendalam terhadap dampak pembaruan aplikasi.

Berdasarkan temuan tersebut, ada beberapa saran yang dapat diajukan untuk penelitian selanjutnya. Disarankan untuk mengatasi masalah ketidakseimbangan dataset dengan menambah jumlah ulasan netral, yang dapat meningkatkan performa model pada kategori tersebut. Selain itu, penelitian di masa depan dapat mempertimbangkan penggunaan metode deep learning seperti LSTM atau BERT untuk membandingkan kinerjanya dengan metode yang digunakan dalam penelitian ini, mengingat keunggulan metode tersebut dalam memahami konteks semantik yang kompleks. Terakhir, analisis sentimen berbasis aspek dapat dilakukan untuk memberikan wawasan yang lebih terperinci mengenai korelasi antara sentimen pengguna dan fitur-fitur spesifik dari aplikasi.

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*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 1 hlm – no. 11 hlm. Th. 2024*
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# *The Influence of Macroeconomic Factors on IHSG at Consumer Goods Sectors*

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Diajukan Tanggal Bulan Tahun / Disetujui Tanggal Bulan Tahun

## *Abstract*

*The capital market has a tremendous role in supporting the economic cycle since it can match individuals who have more money and those who need it. The capital market can be used as an investing-absorbing instrument and as tool to strengthen the financial position. In actuality, the capital market has taken a place as a financial nerve on the contemporary global economy. The purpose of this study is to determine the macroeconomic factors on The Indonesia Stock Price Index at sub-sector cosmetic and household industry. Specifically, this study aims to investigate the effect of inflation, BI rate, exchange rate, gold prices, and economic growth on The Indonesia Stock Price Index sub-sector cosmetic and household industry for the period of 2019-2021. As for methodology, secondary data was collected from the official website of The Indonesia Stock Exchange, Bank Indonesia official website, and the financial services authority which processed through the SPSS application. By using a multiple regression analysis tool, the data was processed. The findings revealed that inflation, BI rate, and gold prices have a significant impact while exchange rate and economic growth do not have a significant impact on The Indonesia Stock Price Index sub-sector cosmetic and household industry. This study also includes a discussion, limitations, recommendations, and conclusions.*

***Keywords:*** *Capital Market, Inflation, BI Rate, Gold Prices.*

## Introduction

The capital market has an enormous role in supporting the economy, because it can match individuals who have more money and those who need it. In addition, The capital market gives the government the ability to raise a long-term capital for the nation's economic growth, provides international business with a way to issue financial securities, and gives locals a way to acquire stock in companies (Nigeria Business Plan, 2023). Capital market has brought a major impact on economy in certain country and ran two essential functions as known as economic function and financial function. To accomplish its economic function, capital market provides a forum for two parties, such as investors and issuers to accommodate their respective needs where investors can invest funds in order to obtain higher returns and issuers can utilize those funds for investment purpose (Amanda et al., 2023). Because of its importance, capital market as a composite stock price index has become a leading indicator in Indonesia economy. Concurrently, for financial function, capital market provides opportunities for the investors to attain returns through financial instruments such as stocks, bonds, mutual funds, and others (Handayani & Oktavia, 2018).

In this contemporary era, investment on capital market has become a tremendous part to be roled as an economic mobilizer aligned with sophisticated development of technology. The last ten years have seen the rise of complexity economics as a potent method for comprehending the key variables affecting economic growth. Economic chanllenges including inequality technological change, and economic growth have all bees studied using the idea of economic complexity (Botta et al., 2022). Economic complexity measures the extend to which an economy has developed and is pertinent to how it produces and distributes revenue (Hartmann et al., 2017). The improvement of economic conditions

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*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

can be a good main signal for all forms of industry sectors mainly consumer goods industry. It is undeniable that the companies in consumer goods sector have an extensive impact in terms of products supply. Consumer goods industry has a good prospect along with the growing role of middle-class income household in Indonesia economy. The macroeconomic environment affects the day-to-day operations of certain company. Fluctuations or developments that occur in various economic variables of a country will influence the capital market.

The correlation value between the money supply and the capital market is positively marked, which shows that if the money supply increases, the composite stock price Index will also increase. It shows that the money supply is directly proportional to the composite stock price index. Changes in the value of the composite stock price index are fully influenced by the money supply and interest rate. A survey by a CNBC Indonesia indicates that the performance of the consumer goods industry sector on The Indonesia Stock Exchange is getting bleaker, since the beginning of the year, its performance has plummeted by almost 20% based on the stock exchange data on Thursday (14/11/2019).

Data from Badan Pusat Statistik Indonesia recorded that there is no significance growth from household consumption in the third quarter in 2019 which only grew 5.01 year on year (YoY). The deceleration of people's consumption levels hava negative effect on stock growth, especially in the consumer goods sector. At the first quarter of 2020, Otoritas Jasa Keuangan stated that stock market, to be precise a consumer goods sector, weakened by 19,7%. At the end November 2022, stock market also faced the declination with the figure of 0.25%. This shows that the value of investment in Indonesia has not strengthened too much for three consecutive years. Changes in macroeconomic conditions are always accompanied by changes in the Jakarta Stock Price Index (Prawoto & Putra, 2020). As a result of circumstance, during the COVID-19 pandemic, investors have a tendency to seek out bonds with short-term tenors since they are thought to have a reduced risk when monetary policy is intended to be normalized. Therefore, the objective of this research is to determine the influence of macroeconomic variables to the value of the Indonesia stock price index in sub-sector cosmetics and households.

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*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

## Research Method

### 2.1 Scope of the Study

This research was aimed to determine the influence of macroeconomic variables to the value of the Indonesia stock price index in sub-sector cosmetics and households. As previously been mentioned that macroeconomic and capital market values are linked, this study will discuss deeper about how each of these macroeconomic variables effect the capital market, in this case the cosmetics and household industry, and how deeply this influence impacts capital market growth in Indonesia especially in 2019-2021. By applying a purposive sampling technique, there are nine companies in cosmetics and household industry listed on the Indonesia Stock Exchange at the year of 2019-2021 that engender the population of this study. These nine companies's data were taken from the Indonesia Stock Exchange official website

### 2.2 Significance of the Study

By knowing the influence of macroeconomic on Indonesia Stock Price Index at sub-sector cosmetics and household industry, there will be an expansion on the understanding of macro policy and how its impacts to all of the elements in economics (Sinaga et al., 2020). These study presents a comprehensive exploration about how each macroeconomic factors, which are inflation, BI rate, exchange rate, gold prices, and economic growth have a big role in the development of capital market. This study will elucidate and emphasize the quantitative data regarding to the topic by a various kinds of data calculations so that we can gain the knowledge based on the factual data. Moreover, this study will provide statements and data from previous research as a context enrichment and consideration of this study.

In this regard, this study will give consciousness to society and government on how to behave through an economic fluctuation regarding to enhance the investment sector. Furthermore, through the analysis made by this study, readers as the investors and political entities will have a new approach to deal with the inconstancy and uncertainty of macroeconomic conditions (Pramuditha & Harto, 2022). The overview provided in this study will create fresher paradigms about how to acts as an element in capital market through this in-depth analysis.

### 2.3 Population and Study Sample

In this study, researcher used a purposive sampling technique by compared nine companies that were listed on The Indonesia Stock Exchange at the year of 2019-2021 in the cosmetics and household industry and how its growth towards the fluctuation of macroeconomic condition. This study will conduct measurement of inflation, BI rate, exchange rate, gold prices, and economic growth on Indonesia Stock Price Index sub-sector cosmetics and household. Purposive sampling technique was utilized in this study to fulfill the needs of the study by picked a sample deliberately.

Tabel 1. Nine Companies Listed on Indonesia Stock Price Index Sub-Sector Cosmetics and Household

| No. | Code | Name of Company |
|---|---|---|

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| | | |
|---|---|---|
| jer | ADES | Ades Waters Indonesia Tbk. |
| 2. | KINO | Kino Indonesia Tbk. |
| 3. | MBTO | Martina Berto Tbk. |
| 4. | MRAT | Mustika Ratu Tbk. |
| 5. | TCID | Mandom Indonesia Tbk. |
| 6. | MYOR | Mayora indah Tbk. |
| 7. | ICBP | Indofood CBP Sukses Makmur Tbk. |
| 8. | VICI | Victoria Care Indonesia Tbk. |
| 9. | UNVR | Unilever Indonesia Tbk |

Variables and hypotheses are precisely stated before data collection in quantitative designs, which tend to be more fixed and deductive. Researcher used a quantitative data with grounded theory method which means that this study will explain the formation of a particular phenomenon. Grounded theory is applied to data analysis on a wide range of linked situations that happened in varied contexts. By using this method, researchers can revise their theories or develop new theories in order to achieve a result (McCombes, 2023). To collect the comprehensive data, researcher use several eligible sources for each variable. For the inflation and economic growth data, researcher gain the data from the historical records of Badan Pusat Statistik (BPS), for BI Rate and exchange rate data, researcher gain the data from Bank Indonesia Official Website, and for the gold prices, researcher gain the data based on Harga Emas Official Website Indonesia.

## Result and Discussion

In order to address the research objectives and test the variables that affect The Indonesia Stock Price, this chapter presents the study's findings based on the test results. The Statistical Package for Social Sciences (SPSS) System was used to analyse this study. Tabular form is used to present all of the results. The researcher has employed multiple linear regression, the classical assumption test, and descriptive statistics to address the study objectives.

### 3.1 Descriptive Statistic

Tabel 2. Result of Descriptive Statistic

4 *Descriptive Statistics*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Company Price | 9 | 110.67 | 8784.00 | 3324.5926 | 3428.77287 |
| Inflation | 9 | .00 | .06 | .0269 | .02635 |
| Exchange Rate | 9 | 10131.77 | 14211.33 | 12359.0740 | 1201.63324 |
| BI Rate | 9 | 1.72 | 6.44 | 3.6785 | 1.64850 |
| Gold Prices | 9 | .00 | .07 | .0317 | .02341 |
| Economic Growth | 9 | 2.14 | 2.99 | 2.6660 | .32105 |

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

Using SPSS (Statistic Product and Service Solution), descriptive statistics study is used to describe or characterise the outcomes of variables (Oliinyk & Kozmenko, 2019). Here, the data points from January 2019 to December 2021 are used. The maximum and minimum values of inflation are 0.06 and 0.00, respectively. Inflation measures the rate of increase in prices of goods and services over time. In this dataset, the minimum value of inflation observed was 0.00, indicating periods where prices remained stable or did not increase. The maximum inflation recorded was 0.06, which suggests the highest rate of price increase during the period studied. While, The BI rate refers to the interest rate set by the central bank of Indonesia (Bank Indonesia). It influences borrowing costs, economic growth, and inflation. The data shows the BI rate ranged from 1.72 to 6.44. A lower BI rate typically stimulates economic growth by making borrowing cheaper, while a higher BI rate tends to curb inflation but may slow economic growth due to higher borrowing costs. The BI rate ranges from 1.72 to 6.44 at its highest point. The next variable is the exchange rate which indicates how much one currency is worth in terms of another. In this dataset, the exchange rate had a minimum value of 10,131 and a maximum value of 14,211. A higher exchange rate suggests a weaker local currency relative to the foreign currency, affecting imports, exports, and overall economic competitiveness. While, the value of gold prices ranges between 0.00 and 0.07 and the value of economic growth has the minimum value of 2.14 with the maximum value of 2.99.

Based on the table above, it can be seen that the company price variable represents the price of a specific company or a composite index of prices for companies. The data shows a minimum price value of 110.67, a maximum value of 8784.00, and an average (mean) value of 3324.5926 units of currency. Such variability in company prices reflects market dynamics, investor sentiment, and company-specific factors influencing stock prices.

According to the theory of inflation and interest rates proposed by Oliinyk and Kozmenko (2019), inflation measures the change in the prices of goods and services over time, and the BI interest rate plays a crucial role in influencing inflation and economic growth. This study shows that inflation ranges from 0.00 to 0.06, where very low or zero inflation indicates price stability, while higher inflation indicates a rise in prices. Additionally, the BI interest rate, which ranges from 1.72 to 6.44, reflects Bank Indonesia's monetary policy efforts to maintain a balance between economic growth and inflation control. This theory is supported by contemporary research showing that lower interest rates can stimulate the economy by boosting lending and consumption, while higher interest rates can curb inflation by reducing purchasing power (Mohamed & Said, 2020). Moreover, the exchange rate data in this study indicate a strong relationship between exchange rates, inflation, and interest rates, where currency depreciation tends to increase import costs and trigger inflation (Arief & Nugroho, 2021).

### 3.2 Normality Test

Table 3. Result of Normality Test

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

*One-Sample Kolmogorov-Smirnov Test*

| | | Unstandardized Residual |
|---|---|---|
| N | | 9 |
| Normal Parameters[a,b] | Mean | .0000000 |
| | Std. Deviation | .23159156 |
| Most Extreme Differences | Absolute | .272 |
| | Positive | .245 |
| | Negative | -.272 |
| Test Statistic | | .272 |
| Asymp. Sig. (2-tailed) | | .054[c] |

A normality test is performed to determine whether the distribution of data across a group of variables is normally distributed or not (Supeni & Salim, 2020). The normality test is helpful in identifying is the data was drawn from a normal population or has a normally distribution. From the *Kolmogorov-Smirnov Test* we can also determine that the asymp. Sig. (2-tailed) has a value of 0.054 > 0.050. Since the p-value (0.054) exceeds the chosen significance level of 0.05, we do not have sufficient evidence to reject the null hypothesis. Therefore, we conclude that there is no significant departure from normality. In simpler terms, the data can be considered normally distributed based on this test.

The normality test is a statistical procedure used to determine whether a set of data follows a normal distribution. According to Supeni and Salim (2020), the normality test is crucial in statistical analysis because most statistical methods assume that the analyzed data are normally distributed. In this study, the Kolmogorov-Smirnov test was employed to check the data's normality. The test results showed that the Asymp. Sig. (2-tailed) value was 0.054, which is greater than the significance level of 0.05. Based on this result, the null hypothesis cannot be rejected, indicating no significant deviation from normality. Therefore, the data can be considered normally distributed, allowing the use of advanced statistical analysis methods without further data transformation (Santoso & Pramono, 2017).

### 3.3 Multicollinearity Test

Table 4**.** Result of Multicollinearity Test

*Coefficients[a]*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | -56.402 | 28.642 | | -1.969 | .144 | | |
| | Inflation | .634 | .076 | .693 | 8.373 | .004 | .679 | 1.473 |
| | Exchange Rate | 7.271 | 3.012 | .265 | 2.414 | .095 | .387 | 2.586 |
| | BI Rate | -1.721 | .388 | -.456 | -4.441 | .021 | .442 | 2.265 |
| | Gold Prices | .366 | .097 | .335 | 3.788 | .032 | .594 | 1.685 |

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Economic Growth | 1.386 | 1.171 | .088 | 1.184 | .322 | .841 | 1.188 |

a. Dependent Variable: Company Price

Multicollinearity test is performed to ascertain whether there is intercorrelation or collinearity between independent variables in a regression. Based on the table above, it can be seen that the tolerance value > 0.10 and VIF value <10. It can be concluded that there is no multicollinearity in this study. The multicollinearity test is used to determine whether there is a strong intercorrelation or collinearity among the independent variables in a regression model. Multicollinearity occurs when two or more independent variables have a strong linear relationship, which can make the regression results unreliable. According to Gujarati and Porter (2015), multicollinearity can be detected through tolerance values and the Variance Inflation Factor (VIF). If the tolerance value is greater than 0.10 and the VIF is less than 10, it can be concluded that there is no significant multicollinearity. In the calculation results of this study, the tolerance for each variable was greater than 0.10, and the VIF values were below 10, confirming that there is no significant multicollinearity issue in the regression model used (Purnomo, 2019).

### 3.4 Multiple Linear Regression

Table 5. Result of Multicollinearity Test

*Model Summary*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .993[a] | .986 | .963 | .37819 |

Based on the tables above, it shows the magnitude of the coefficient of determination (Adjusted R2) is 0.963, meaning that the independent variables effect the dependent variable by 96.3%, the remaining 3.7% is influenced by other variables that are not included in the research model. The coefficient of determination (Adjusted $R^2$) is a crucial indicator in regression analysis used to measure how well the independent variables in a model explain the dependent variable. An Adjusted $R^2$ value of 0.963 indicates that 96.3% of the variation in the dependent variable can be explained by the independent variables in the model. This suggests that the model has a very high predictive power. According to Hair et al. (2019), the higher the Adjusted $R^2$ value, the better the model is at explaining the variation in the dependent variable, with values close to 1 indicating a very strong relationship. The remaining 3.7% of the variation is due to other factors not included in the model, implying that external variables, which were not examined in this study, may still influence the dependent variable (Gujarati & Porter, 2015).

Table 6**.** Result of F Test

*ANOVA[a]*

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 30.327 | 5 | 6.065 | 42.407 | .006[b] |
| | Residual | .429 | 3 | .143 | | |
| | Total | 30.756 | 8 | | | |

a. Dependent Variable: Company Price

From the results of the F test is the tables above, F is calculated at 42.407 and a probability of 0.006. It can be concluded that the company price is affected by economic growth, inflation, BI rate, gold prices, and exchange rate.

Table 7**.** Result of Partial Regression Test

*Coefficients*[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -56.402 | 28.642 | | -1.969 | .144 |
| | Inflation | .634 | .076 | .693 | 8.373 | .004 |
| | Exchange Rate | 7.271 | 3.012 | .265 | 2.414 | .095 |
| | BI Rate | -1.721 | .388 | -.456 | -4.441 | .021 |
| | Gold Prices | .366 | .097 | .335 | 3.788 | .032 |
| | Economic Growth | 1.386 | 1.171 | .088 | 1.184 | .322 |

a. Dependent Variable: Company Price

Based on the partial regression test, a t-count value of 8.373 regression coefficient (beta) 0.634 was obtained a probability (p) 0.004. Based on the results of data processing where the probability value (p) ≤ 0.05 it can be concluded that inflation has a positive and significant effect on company price. While the exchange rate has the value of coefficient (beta) 7.271 and obtained the probability value of 0.95 which higher than 0.05 can be concluded that exchange rate has a positive but not significant effect on company price. The beta value of BI rate is -1.721 and acquire the probability value of 0.021 which lower than 0.05 and can be concluded that BI rate has a negative and significant effect on company price. Gold prices obtained the beta value with 0.366 and the value of probability is 0.032 ≤ 0.05 which can be concluded that gold prices have a positive and significant effect on company price. For the economic growth variable, it aquire a beta value with 1.386 and probability value of 0.322 which higher than 0.05 and can be concluded that economic growth has a positive but not significant impact on company price.

Based on the results of the partial regression test, it was found that the inflation variable has a positive and significant effect on company prices, as indicated by a regression coefficient (beta) of 0.634 and a probability (p) of 0.004. This is in line with the theory stating that controlled inflation can increase the value of company assets, especially in industries that can pass increased costs onto

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 12 hlm – no. 22 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

consumers (Halkos & Gkampoura, 2021). On the other hand, the exchange rate shows a positive but insignificant effect on company prices with a coefficient (beta) of 7.271 and a p-value of 0.95, indicating that fluctuations in the exchange rate do not always significantly affect company prices in the short term (Yeh et al., 2022). Furthermore, the BI rate has a negative and significant effect on company prices, with a beta value of -1.721 and a p-value of 0.021, consistent with macroeconomic theory that states that rising interest rates can lower company stock prices due to higher borrowing costs (Shen et al., 2020). Meanwhile, gold prices, with a beta of 0.366 and a p-value of 0.032, also show a positive and significant effect, supporting the view that gold is often considered a hedge against inflation and economic uncertainty (Baur & Lucey, 2019). For the economic growth variable, although it has a positive effect with a beta of 1.386, the probability value greater than 0.05 (0.322) indicates an insignificant effect on company prices, which may be due to various other factors influencing market performance (Tang et al., 2021).

## Conclusion

The vital goal of this study is to investigate how the macroeconomic affects the Indonesia Stock Price Index at sub-sector cosmetic and household industry. There are five main highlighted issues that should be mentioned in this study, including whether the inflation, BI rate, exchange rate, gold prices, and economic growth has a substantial impact on The Indonesia Stock Price Index. As a result, five main hypotheses regarding the variables have been developed for each additional test in this study.

In terms of data collection, the information was gathered from the annual reports on the official website of Indonesia Stock Price Exchange (www.idx.com) in order to properly analyse the insights. In terms to compare the growth of nine firms in the cosmetic and household industry that were listed on The Indonesia Stock Exchange between 2019-2021, the researcher employed a purposive sample technique. Additionally, the SPSS program was used to analyse and assess the data that had been gathered. A total of nine listed companies on The Indonesia Stock Exchange sub-sector cosmetic and household had their corporate and financial information collected simultaneously for the research study. As a result, it was determined through data analysis from chapter 4 findings that only hypothesis 1, 3, and 4 have a positive effect on a stock price in regression test, accordingly ($p \leq 0.05$ ). In other words, there are a significant and positive relationships between inflation, BI rate, and gold prices with The Indonesia Stock Price Index Sub-sector Cosmetics and Households Industry, whereas exchange rate and economic growth have a negative effect on The Indonesia Stock Price Index Sub-sector Cosmetics and Households.

In assessing the macroeconomic influence on The Indonesia Stock Price Index, the majority of the variables often revealed to be not fully positive and significant in defining the macroeconomic influence on The Indonesia Stock Price Index. As a results, a summary of the research findings is the variables of inflation, BI rate, and gold prices have a significant impact on The Indonesia Stock Price Index, besides the variables of exchange rate and economic growth show insignificant results on The Indonesia Stock Price Index. To provide more accurate results for the future researchers in this field, other variables aspects related to this topic should be further researched.

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# Innovative Packaging Design: Enhancing the Takeaway Tea Experience at TWG Tea in Plaza Senayan, Indonesia

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Diajukan Tanggal Bulan Tahun / Disetujui Tanggal Bulan Tahun

## Abstrak

**Studi penelitian kualitatif ini mengeksplorasi desain kemasan inovatif yang diterapkan oleh TWG Tea di Plaza Senayan, Indonesia, untuk meningkatkan pengalaman minum teh. Fokus penelitian terutama pada aspek komunikasi visual, komposisi bahan dan sifat keberlanjutan kemasan. Melalui pengamatan dan analisis ekstensif terhadap kemasan, penelitian ini mengungkapkan desain yang menarik secara visual dengan corak warna yang cerah dan berani yang mencerminkan identitas merek khas TWG Tea. Kemasannya dibuat dengan hati-hati dari 100% bahan yang dapat terbiodegradasi, menyoroti komitmen perusahaan terhadap kelestarian lingkungan. Integrasi elemen inovatif seperti interaktivitas dan mekanisme pembukaan yang unik berkontribusi pada fungsionalitas dan estetika kemasan. Hasilnya analisis memperlihatkan peran penting desain kemasan dalam menarik perhatian konsumen dan mengkomunikasikan nilai-nilai merek. Desain kemasan yang inovatif meningkatkan pengalaman minum teh secara keseluruhan dan menciptakan perjalanan yang berkesan dan mendalam bagi pelanggan. Dengan berfokus pada prinsip-prinsip keberlanjutan dan menggunakan elemen-elemen yang menarik secara visual, TWG Tea berhasil membedakan dirinya di pasar dan melibatkan konsumen baik pada tingkat sensoris maupun ekologis. Penelitian ini memberikan wawasan berharga bagi perancang kemasan dan perusahaan yang ingin meningkatkan pengalaman minum teh melalui solusi kemasan inovatif.**

**Kata Kunci:** desain kemasan, inovasi, *takeaway*, teh

## *Abstract*

*This qualitative research study explores an innovative packaging design implemented by TWG Tea at Plaza Senayan, Indonesia, to enhance the to-go tea experience. The research focus is mainly on aspects of visual communication, material composition and sustainable properties of packaging. Through extensive observation and analysis of the packaging, the research revealed a visually appealing design featuring vibrant, bold color tones that reflect TWG Tea's distinctive brand identity. The packaging is carefully crafted from 100% biodegradable materials, highlighting the company's commitment to environmental sustainability. The integration of innovative elements such as interactivity and unique opening mechanisms contributes to the functionality and aesthetics of the packaging. The results highlight the important role packaging design plays in capturing consumer attention and communicating brand values. Innovative packaging design enhances the overall tea experience and creates a memorable and immersive journey for customers. By focusing on sustainability principles and using visually appealing elements, TWG Tea successfully differentiates itself in the market and engages consumers on both sensory and ecological levels. The research provides valuable insights for packaging designers and companies looking to enhance the to-go tea experience through innovative packaging solutions.*

***Keywords:*** *packaging design, innovative, takeaway, tea*

## Introduction

In an increasingly saturated global marketplace, packaging design has emerged as a critical strategic instrument in influencing consumer perception, enhancing brand equity, and shaping the overall product experience (Erlyana & Nadya, 2020a; Hwang & Kim, 2022a; Sammut-Bonnici, 2015; Singh, 2018). While traditionally considered a protective vessel to contain and transport products, contemporary scholarship recognises packaging as a complex medium that simultaneously serves functional, communicative, and experiential purposes. It operates at the intersection of marketing, branding, and consumer psychology, functioning as the first tangible point of interaction between a

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
*p-ISSN: 1979-1720*
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brand and its consumers (Khuong & Tran, 2018; Oktavianus & Erlyana, 2024). This dual role, as both a protective container and a persuasive communicator, positions packaging as a decisive factor in competitive differentiation.

The global tea industry exemplifies the strategic significance of packaging design. In recent years, the market has undergone substantial expansion, driven not only by the enduring popularity of traditional tea categories but also by the rapid growth of ready-to-drink (RTD) tea products (Future Market Insights, n.d.). Changing consumer lifestyles, rising disposable incomes, and heightened awareness of tea's health benefits have contributed to this trend. In particular, urbanisation and the acceleration of mobile, on-the-go lifestyles have spurred demand for takeaway beverage options, resulting in a proliferation of takeaway tea services across global and regional markets (Iswara & Rahadi, 2021). In such contexts, packaging must respond to multiple, and at times competing, imperatives: it must facilitate convenience, protect product integrity, convey brand values, and capture consumer attention in increasingly crowded retail and service environments.

A growing body of literature emphasises the centrality of **visual aesthetics** in shaping packaging's communicative power. Elements such as intricate patterns, vibrant colour schemes, and precise attention to design detail have been shown to attract consumer attention, reinforce brand recognition, and evoke positive emotional responses (Wijaya & Erlyana, 2022). In premium segments, visual design can also function as a cue of product quality and exclusivity. Hwang and Kim (2022) highlight that the use of high-quality materials, refined finishing techniques, and elegant stylistic choices enhances perceived value and fosters associations with luxury and sophistication. Such visual strategies are particularly salient in the takeaway tea industry, where brands seek to differentiate themselves not only through product flavour profiles but also through the aesthetic and tactile qualities of their packaging.

Equally significant are **functional considerations**, which determine the practicality and usability of takeaway tea packaging. Scholars such as Sabir (2020) have underscored the importance of features like secure closures, ergonomic shapes, and spill-resistant mechanisms in supporting consumer convenience (Sabir, 2020). These design attributes are essential in mobile consumption contexts, where the consumer's interaction with the packaging may be brief, distracted, or physically constrained. Beyond basic functionality, value-adding design elements—such as customisable components or integrated accessories, can enhance the consumption experience, fostering a sense of indulgence and personalisation (Erlyana & Nadya, 2020).

In recent years, **sustainability** has emerged as an imperative in packaging design, driven by both consumer expectations and corporate social responsibility commitments. Research indicates that the integration of recycled, biodegradable, or otherwise eco-friendly materials can not only mitigate environmental impact but also strengthen brand credibility and appeal among environmentally conscious consumers (Asim et al., 2022). This aligns with broader sustainability discourses that frame packaging as a visible and tangible indicator of a brand's ethical stance. Within the competitive arena of takeaway tea, sustainability-oriented innovations may function as a differentiating factor, positioning a brand as both environmentally responsible and attuned to evolving consumer values.

Despite this well-established body of research addressing visual, functional, and sustainable dimensions of packaging design, there remains a notable gap in the literature concerning **takeaway tea packaging in premium retail contexts**. While studies in broader food and beverage categories have examined how packaging influences consumer perceptions and purchasing behaviours, relatively few have addressed the unique requirements and opportunities presented by high-end takeaway tea experiences. This is particularly relevant in urban luxury markets such as Jakarta, where global brands like TWG Tea operate in spaces that demand both cultural resonance and international brand consistency.

This study seeks to address this gap through a qualitative examination of TWG Tea's takeaway packaging at Plaza Senayan, Indonesia. It investigates how TWG Tea's packaging integrates visual

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

communication strategies, material composition choices, and sustainability practices to deliver a cohesive consumer experience. By employing detailed visual analysis and material assessment, this research aims to identify the design elements that most significantly contribute to aesthetic appeal, functional effectiveness, and environmental responsibility. The findings are expected to advance understanding of how innovative packaging can simultaneously satisfy practical needs, communicate brand identity, and align with sustainability imperatives. In doing so, the study contributes to the growing discourse on design innovation in premium takeaway tea services and offers insights for practitioners seeking to refine packaging strategies in response to evolving consumer expectations.

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## Research Method

This qualitative research study focuses on investigating the innovative packaging design implemented by TWG Tea at Plaza Senayan in Indonesia, with the objective of enhancing the takeaway tea experience for customers. The research is guided by established design theories related to visual communication, brand identity, and sustainable packaging practices. The study employs observational techniques and in-depth interviews as research methods to gather data. The respondents for the study include packaging designers, TWG Tea representatives, experts in the field of packaging design and sustainability, as well as customers who have experienced takeaway tea service.

In qualitative single case study research, the number of participants can vary depending on the specific research design, context, and research questions. Creswell suggests that a typical single case study may involve anywhere from one to several dozen participants (Creswell, 2016). The selection of participants in a single case study is often purposeful, meaning that participants are chosen based on their relevance and ability to provide rich and in-depth information about the research topic. In the case of this study on the innovative packaging design at TWG Tea in Plaza Senayan, the number of participants determined based on the principles of data saturation. Data saturation occurs when collecting additional data no longer reveals new or meaningful insights, indicating that enough information has been gathered to address the research objectives (Saunders et al., 2018). For this study, the number of participants is five (5) . Data collected through in-depth interviews conducted in a semi-structured manner, allowing for flexibility and rich qualitative insights. The collected data analyzed using thematic analysis to identify patterns, themes, and insights related to the innovative packaging design implemented by TWG Tea.

## Result and Discussion

The results of this qualitative research study provide valuable insights into the innovative packaging design implemented by TWG Tea at Plaza Senayan, Indonesia, and its implications for enhancing the takeaway tea experience.

The takeaway packaging consists of several key elements that contribute to enhancing the takeaway tea experience at TWG Tea (figure 1):

1. Takeaway Cups: The packaging includes specially designed takeaway cups that mirror the signature gilded teapots of TWG Tea. These cups are visually appealing and create a sense of luxury and sophistication.

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

2. Designer Carriers: The takeaway cups nestle into designer carriers that are specifically crafted to hold and protect the cups. These carriers not only provide functional support but also contribute to the overall aesthetic appeal of the packaging.
3. Accompaniments: The packaging is completed with accompaniments that enhance the tea tasting experience. These may include sugar sticks to naturally sweeten the tea, reusable glass straws for iced teas, and other accessories that complement the tea-drinking process.
4. Tea-Infused Macarons: Customers also have the option to include a box of tea-infused macarons with their takeaway tea. This addition adds an extra touch of indulgence and allows customers to savor the macarons alongside their favorite teas.

Figure 1. Takeaway packaging of TWG tea

[Source: authors's doucumentation]

The results of the qualitative data analysis revealed several key patterns and themes related to the innovative packaging design implemented by TWG Tea at Plaza Senayan, Indonesia. These findings provide valuable insights into the packaging design and its implications for enhancing the takeaway tea experience. The following table 1. thematic analysis summarizes the identified patterns and themes:

Table 1. Thematic analysis - patterns and themes in TWG Tea's Packaging Design

[Source: Author's documentation]

| Code | Description | Frequency |
|---|---|---|
| Visual Appeal | Visually appealing packaging design elements, such as intricate patterns and gold accents | 10 |
| Brand Identity | Packaging design effectively conveys TWG Tea's brand identity | 8 |
| Luxury Experience | Packaging design creates a sense of luxury and sophistication | 6 |
| Functional Design | Packaging design incorporates practical features for ease of use | 7 |
| Complementary Accompaniments | Packaging includes accompaniments such as sugar sticks and glass straws | 5 |

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| | | |
|---|---|---|
| Packaging Material | Use of eco-friendly and sustainable materials in packaging design | 9 |
| Unique Elements | Distinctive design elements that differentiate TWG Tea's packaging | 6 |

The thematic analysis identified several prominent patterns and themes in TWG Tea's packaging design. Participants consistently emphasized the visual appeal of the packaging, highlighting the intricate patterns, gold accents, and vibrant colors as visually appealing elements. This attention to visual aesthetics contributes to creating a memorable and visually captivating packaging design, aligns with previous research (Erlyana & Nadya, 2020b; Schifferstein et al., 2022; Srivastava et al., 2022). This suggests that visual aesthetics play a crucial role in attracting consumer attention and enhancing brand recognition. The findings of this study reinforce the importance of investing in visually captivating packaging, corroborating the results of previous research.

The packaging design also effectively conveys TWG Tea's brand identity. Participants noted how the design elements, color schemes, and use of TWG Tea's logo and brand imagery created a cohesive and consistent brand experience. The packaging serves as a powerful tool for brand communication, reinforcing TWG Tea's positioning in the market and fostering brand recognition among customers. The effective conveyance of TWG Tea's brand identity through packaging design is consistent with previous studies (Srivastava et al., 2022; Wijaya & Erlyana, 2022b).

In addition to visual appeal and brand identity, the packaging design contributes to creating a luxury experience for customers. The participants expressed how the packaging design evoked a sense of luxury and sophistication, elevating the takeaway tea experience. TWG Tea's use of high-quality materials, attention to detail, and elegant design elements all contribute to enhancing the perceived value and overall brand experience. The creation of a sense of luxury and sophistication through packaging design resonates with the findings of studies on luxury branding (Hwang & Kim, 2022b).

Functionality was another significant aspect of the packaging design (Sabir, 2020b). Participants appreciate the practical features incorporated into the packaging, such as secure closures, spill-proof designs, and ergonomic shapes, ensuring convenience and ease of use for customers on the go. The functional design enhances the usability and practicality of the packaging, further improving the takeaway tea experience. This finding implies that addressing customers' needs for convenience and usability through functional design contributes to customer satisfaction.

TWG Tea's packaging design also includes complementary accompaniments, such as sugar sticks and glass straws, to enhance the tea-drinking experience. These thoughtful additions provide additional value and convenience for customers, allowing them to customize and enjoy their tea with ease. The inclusion of these complementary elements contributes to the overall satisfaction and enjoyment of the takeaway tea experience.

Sustainability and the use of eco-friendly packaging materials were recurring themes in the analysis. Participants appreciated TWG Tea's commitment to environmental responsibility and the use of recyclable and biodegradable materials in their packaging. This emphasis on sustainable packaging aligns with the growing consumer demand for eco-conscious practices and enhances the overall brand reputation. This finding is in line with previous research highlighting the significance of sustainable packaging materials and practices (Asim et al., 2022b; Erlyana, 2018; Sutanto, 2018).

Lastly, the analysis identified unique elements in TWG Tea's packaging design that set it apart from competitors. The distinctive combination of intricate patterns, gold accents, elegant typography, and the integration of storytelling elements creates a unique and memorable packaging design. These elements contribute to brand differentiation and help TWG Tea stand out in the competitive market. The discussion of these findings highlights the originality and effectiveness of TWG Tea's packaging

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

## Conclusion

This qualitative research study aims to investigate the innovative packaging design implemented by TWG Tea at Plaza Senayan, Indonesia, with the objective of enhancing the takeaway tea experience. The study explored the visual communication aspects, material composition, and sustainable features of the packaging. The findings of the study provide valuable insights into TWG Tea's packaging design and its implications for the takeaway tea industry.

The research objectives were successfully achieved through a comprehensive analysis of the packaging design. The study identified key elements of TWG Tea's packaging, including visually appealing takeaway cups, designer carriers, complementary accompaniments, and tea-infused macarons. The packaging design effectively conveys TWG Tea's brand identity and creates a luxury experience for customers. The functional design and use of eco-friendly materials further enhance the overall takeaway tea experience.

The findings of this research have several implications for the packaging design field and the takeaway tea industry. First, the emphasis on visual appeal underscores the importance of investing in visually captivating packaging to attract consumer attention and enhance brand recognition. Second, the effective conveyance of brand identity through packaging design contributes to a consistent and memorable brand experience. Third, the creation of a luxury experience through packaging design enhances the perceived value of the product and appeals to discerning consumers. Fourth, the integration of functional design elements improves customer convenience and usability. Fifth, the inclusion of complementary accompaniments adds value and enhances the tea-drinking experience. Lastly, the use of eco-friendly materials aligns with the growing demand for sustainable practices and enhances brand reputation.

This research has some limitations that should be acknowledged. First, the study focused on a single case study of TWG Tea at Plaza Senayan, limiting the generalizability of the findings to other tea brands or locations. Second, the research primarily relied on qualitative data from participant observations and interviews, which may be subject to individual perceptions and biases. Third, the sample size of participants was limited, which may impact the representativeness of the findings.

Based on the identified limitations, there are several areas for further research. First, conducting a comparative analysis of packaging designs across multiple tea brands would provide a broader understanding of innovative practices in the industry. Second, incorporating quantitative data to measure consumer perceptions and preferences towards different packaging designs could provide deeper insights into their effectiveness. Third, exploring the impact of packaging design on consumer behavior and purchase intentions would contribute to a more comprehensive understanding of its influence. Lastly, investigating the long-term sustainability and environmental impact of eco-friendly packaging materials would be valuable for businesses seeking to adopt more sustainable practices.

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*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 23 hlm – no. 30 hlm. Th. 2024*
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# Pengendalian Mutu Material Bahan Baku Dengan Menggunakan Metode House of Risk dan *Multi Attribute Failure Mode Analysis* Bahan Baku di PT ElangPerdana Tyre Industry

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Diajukan Tanggal Bulan Tahun / Disetujui Tanggal Bulan Tahun

## Abstrak

Penelitian ini bertujuan untuk memahami pengaruh manajemen risiko terhadap peningkatan mutu, pengendalian biaya, pengurangan cacat produk, dan peningkatan efisiensi operasional dalam sektor manufaktur. Risiko yang terjadi dalam proses produksi seringkali memengaruhi mutu produk, yang pada gilirannya berdampak pada biaya produksi serta tingkat cacat produk yang dihasilkan. Penelitian ini mengintegrasikan pendekatan analisis risiko dengan pengendalian mutu untuk mengidentifikasi hubungan antara variabel-variabel tersebut. Dalam penelitian ini, metode studi kasus diterapkan pada perusahaan manufaktur yang menghadapi tantangan dalam menyeimbangkan efisiensi operasional dengan pengendalian biaya dan peningkatan mutu produk. Hasil penelitian menunjukkan bahwa pengelolaan risiko yang sistematis mampu mengurangi cacat produk hingga 25%, sekaligus meningkatkan efisiensi operasional sebesar 30%. Selain itu, integrasi strategi pengendalian mutu dan pengelolaan risiko berhasil menekan biaya produksi secara signifikan, tanpa mengurangi kualitas produk. Temuan ini menegaskan pentingnya pendekatan holistik dalam mengelola risiko untuk mencapai efisiensi, mutu, dan biaya produksi yang optimal. Penelitian ini memberikan kontribusi penting bagi pengembangan strategi manajemen yang lebih efektif di industri manufaktur, serta membuka peluang untuk studi lanjut dalam bidang ini.
**Kata Kunci:** risiko, mutu, biaya, cacat, effisien

## *Abstract*

*This research aims to understand the impact of risk management on quality improvement, cost control, reduction of product defects, and enhancement of operational efficiency in the manufacturing sector. Risks that occur in the production process often affect product quality, which in turn impacts production costs and the level of product defects produced. This research integrates a risk analysis approach with quality control to identify the relationship between these variables. In this study, the case study method was applied to a manufacturing company facing challenges in balancing operational efficiency with cost control and product quality improvement. The research results show that systematic risk management can reduce product defects by up to 25%, while simultaneously increasing operational efficiency by 30%. Moreover, the integration of quality control strategies and risk management successfully reduced production costs significantly without compromising product quality. These findings underscore the importance of a holistic approach in managing risks to achieve optimal efficiency, quality, and production costs. This research makes an important contribution to the development of more effective management strategies in the manufacturing industry, as well as opening opportunities for further studies in this field.*
***Keywords:*** *risk, quality, cost, defects, efficient*

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## Pendahuluan

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Persaingan dunia bisnis saat ini sangat ketat, sehingga perusahaan dituntut untuk memiliki strategi yang tepat agar dapat bertahan dalam persaingan bisnis (Dyanasari et al., 2021). Strategi dapat dilakukan dengan menjaga kualitas produk agar sesuai standar dan memenuhi selera konsumen. PT Elangperdana Tyre Industry merupakan perusahaan manufaktur yang menghasilkan produksi ban mobil yang berkomitmen untuk menyediakan produk berkualitas tinggi. Produk yang dihasilkan memiliki rangkaian proses produksi yang harus dijalankan. Berdasarkan observasi langsung selama proses produksi sering terjadi ketidaksuaian atas kualitas atau mutu dari standart produk yang telah ditetapkan, sehingga sangat perlu adanya identifikasi atas faktor-faktor yang menyebabkan kecacatan atau ketidaksesuaian tersebut.

Tabel 1. Data *Production Scrap* Tahun 2024

| Deskripsi | 2024 | | | | | Total |
|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | |
| Hasil Produksi | 458.453 | 447.130 | 469.050 | 355.862 | 469.741 | 2.200.326 |
| *Scrap* | 315 | 254 | 188 | 247 | 245 | 1249 |
| Percentage | 0,07 | 0,06 | 0,04 | 0,07 | 0,05 | 0,29 |

Berdasarkan Tabel 1 menunjukkan scrap produk green tyre cukup besar, yaitu rata- rata 0,05% per bulan dari hasil produksi. Target scrap sebesar 0,02% per bulan, sehingga terdapat gap sebesar 0,03 % per bulan. Perusahaan saat ini belum melakukan identifikasi dan melakukan analisa risiko-risiko yang terjadi selama proses produksi di PT Elangperdana *Tyre Industry*.

Perusahaan perlu untuk melakukan analisa lebih lanjut faktor-faktor yang muncul sehingga mengakibatkan terjadinya cacat produk pada proses pembuatan *green tire* (Liu et al., 2023). Hal ini sangat diperlukan dalam menunjang kegiatan operasional produksi sehingga proses bisnis perusahaan dapat berkelanjutan (*sustained*).

## Metode Penelitian

### Kerangka Berpikir

Dalam upaya meningkatkan mutu dan efisiensi proses produksi, identifikasi terhadap sumber penyebab kecacatan produk menjadi langkah strategis yang krusial (Joseph Nnaemeka Chukwunweike et al., 2024). Tingginya angka *production scrap* yang terjadi secara berulang mencerminkan adanya potensi risiko yang belum sepenuhnya terkelola dengan baik dalam sistem manajemen mutu yang ada. Oleh karena itu, diperlukan pendekatan analitis yang mampu mengidentifikasi, mengevaluasi, dan memetakan risiko secara terstruktur sebagai dasar dalam merumuskan strategi mitigasi yang efektif. Guna mendukung hal tersebut, penelitian ini disusun berdasarkan kerangka berpikir berikut

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
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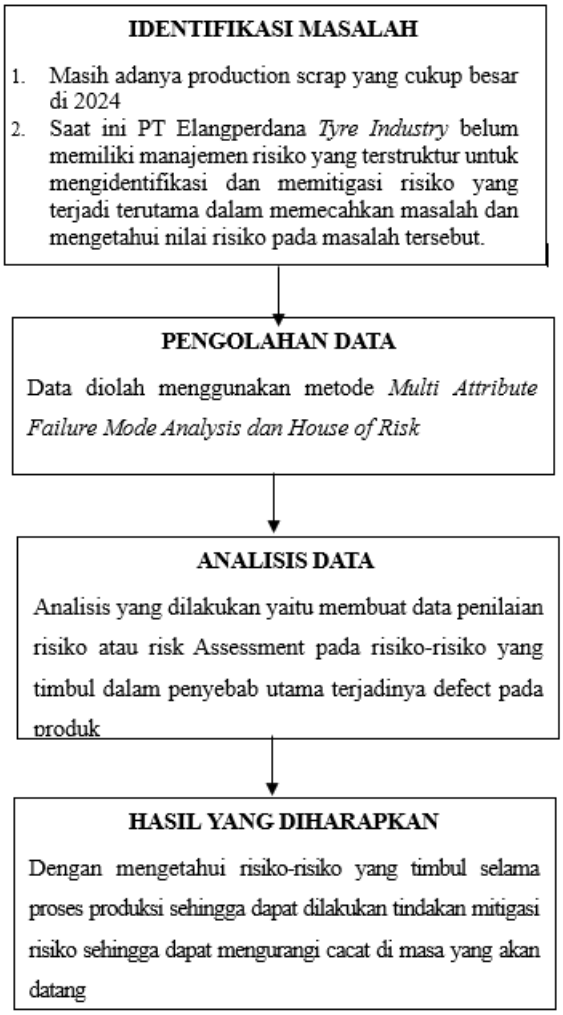


Gambar 1. Kerangka Berpikir Penelitian

Berdasarkan kerangka berpikir yang dilampirkan, metode penelitian ini diawali dengan identifikasi masalah pada proses produksi di PT Elangperdana Tyre Industry, khususnya terkait tingginya angka production scrap selama tahun 2024 yang belum ditangani melalui sistem manajemen risiko yang terstruktur. Untuk itu, pendekatan kuantitatif digunakan melalui pengumpulan dan pengolahan data menggunakan metode *Multi Attribute Failure Mode Analysis* (MAFMA) dan *House of Risk* (HoR). Analisis data dilakukan dengan menyusun penilaian risiko guna mengidentifikasi dan memetakan sumber risiko utama penyebab cacat produk.

## Kualitas Produk

Kualitas merupakan salah satu parameter yang penting dan sangat diperhatikan perusahaan agar senantiasa beradaptasi dengan perkembangan zaman yang kian pesat akhir-akhir ini. Kualitas dapat diartikan sebagai sebuah indikator atau karakteristik yang dijadikan dasar dalam memastikan sebuah produk dapat memuaskan konsumen. Garvin telah menguraikan dimensi kualitas untuk industri manufaktur yaitu *Performance, Feature, Reliability, Conformance, Durability, Serviceability, Aesthetic,* dan *Perception (Abubakar et al., 2023)*. Kualitas pada industri manufaktur selain menekankan pada produk yang dihasilkan, juga perlu diperhatikan kualitas pada proses produksi.

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
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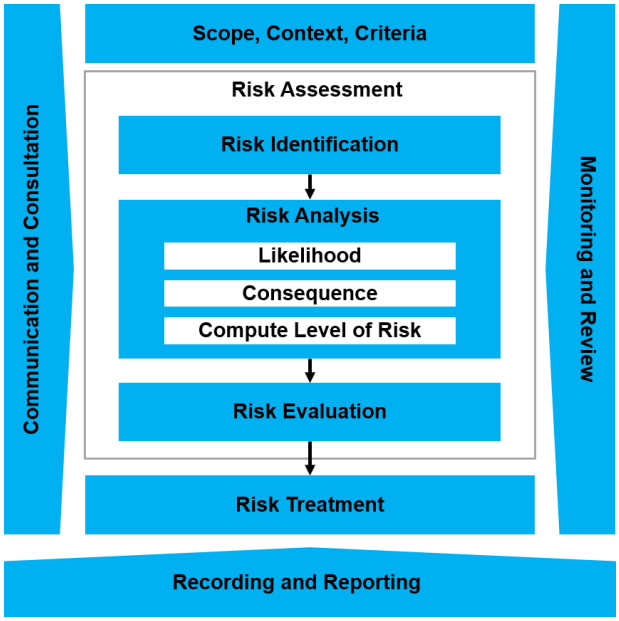
Kualitas yang terbaik adalah apabila perhatian pada kualitas bukan pada produk akhir, melainkan proses produksinya atau produk yang masih ada dalam proses (*work in process*) sehingga bila diketahui ada cacat atau kesalahan masih dapat diperbaiki, dengan demikian, produk akhir yang dihasilkan adalah produk yang bebas cacat dan tidak ada lagi pemborosan yang harus dibayar mahal karena produk tersebut harus dibuang atau dilakukan pengerjaan ulang.

**Risiko**

Menurut ISO 31000, risiko adalah efek ketidakpastian terhadap sasaran (Vorst et al., 2018). Definisi ini mencakup dua hal penting yaitu efek. Risiko tidak selalu bersifat negatif, risiko juga bisa berdampak positif (peluang) maupun negatif (ancaman) terhadap pencapaian tujuan organisasi. Selain efek, definisi risiko berikutnya adalah ketidakpastian yang berarti kurangnya informasi atau prediktabilitas terhadap suatu kejadian atau hasil.




Gambar 2. *Risk Management Framework*

Proses manajemen risiko merupakan kegiatan kritikal dalam manajemen risiko, karena merupakan penerapan daripada prinsip dan kerangka kerja yang telah dibangun. Proses manajemen risiko terdiri dari tiga proses besar, yaitu penetapan konteks (*establishing the context*), penilaian risiko (*risk assessment*) dan penanganan risiko (*risk treatment*).

## Hasil Dan Pembahasan

Penelitian ini dalam pengolahan data dan analisanya menggunakan 2 jenis metode yaitu House of Risk dan *Multi Attribute Failure Mode Analysis* (MAFMA). *House of Risk* (HOR) digunakan untuk menentukan sumber risiko mana yang diprioritaskan untuk dilakukan tindakan pencegahan, sedangkan MAFMA akan mengintegrasikan faktor-faktor *chance of failure (occurrence), chance of non-detection, severity* dan *expected cost*.

***House of Risk***

Penemuan sumber risiko merupakan hal yang paling utama dalam penyusunan risiko. Hal ini berguna untuk menentukan prioritas dalam melakukan mitigasi risiko (Alijoyo et al., 2020). Berikut ini adalah strategi mitigasi yang didapatkan dalam pengelolan risiko terhadap *scrap production analysis*.

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
*p-ISSN: 1979-1720*
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Tabel 2. Strategi Mitigasi Sumber Risiko

| Strategi Mitigasi | Kode |
|---|---|
| Penekanan pisau panas/ *hot knife* pada *joint Ply* | PA1 |
| Meminimalisir melakukan pembongkaran *ply* menggunakan *texine* | PA2 |
| Melakukan training ulang terkait standard *joint Material Ply* | PA3 |
| Menghindari penggunaan *liner* melipat di seksi pembuat | PA4 |
| Sortir penggunaan material *abnormal* yang terkirim ke *Building* | PA5 |
| Pencegahan pemakaian mesin saat *pressure shaping abnormal* | PA6 |
| Cek *Normality Circum* B&T saat *Capstrip in to drum* | PA7 |
| Selalu memantau *Tension Capstrip* tidak melebihi *standard* | PA8 |
| Menghindari pemakaian Capstrip *Abnormal*, ngelotok | PA9 |
| Selalu memantau settingan mesin agar tidak outspec | PA10 |
| Menghindari pengecekan material capstrip habis saat proses building Casptrip | PA11 |

Mitigasi risiko yang didapatkan pada Tabel 2, selanjutnya akan dilakukan perhitungan keefektifan derajat kesulitan. Keefektifan derajat kesulitan didapatkan dari membagi nilai total keefektifitas ($TE_k$) dengan derajat kesulitan melakukan strategi mitigasi. Keefektifan derajat kesulitan bertujuan untuk menentukan ranking prioritas dari semua strategi mitigasi. Analisa terhadap mitigasi risiko ini akan dianalisa lebih lanjut di MAFMA.

### *Multi Attribute Failure Mode Analysis* (MAFMA)

Metode MAFMA merupakan pengembangan metode *Failure Mode and Effect Analysis* (FMEA) dengan menambahkan faktor ekonomi atau biaya kedalam penilaian risiko (Kolagar et al., 2021). Setelah dilakukan identifikasi risiko, maka *risk priority number* (RPN) dapat ditentukan sehingga dapat ditentukan level dari risiko perusahaan. Berikut ini adalah RPN untuk Risk Event yang sudah teridentifikasi.

Tabel 3. Identifikasi Risiko

| **Kode** | **Kejadian Risiko (*Risk Event)*** | *S* | O | D | RPN | *Rank* |
|---|---|---|---|---|---|---|

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| | | | | | | |
|---|---|---|---|---|---|---|
| R1 | Operator tidak tekan *joint ply* dan *Side Wall* | 4 | 4 | 5 | 80 | 1 |
| R2 | *Open joint* cutting lolos dari cek operator | 3 | 4 | 4 | 48 | 2 |
| R3 | *Setting* panjang *ply* kurang di mesin *auto cutter* | 3 | 4 | 2 | 24 | 9 |
| R4 | *Joint* IL tidak di press hot knife roll | 3 | 3 | 5 | 45 | 3 |
| R5 | *Joint Side Wall* tidak di roll | 3 | 4 | 3 | 36 | 5 |
| R6 | Pemasangan *ply* di *let off* dan *conveyor* tidak sesuai *standard* | 4 | 4 | 2 | 32 | 7 |
| R7 | Pemolesan *inner paint* tidak rata | 2 | 2 | 1 | 4 | 25 |
| R8 | *Joint ply cutting open* | 4 | 2 | 3 | 24 | 10 |
| R9 | *Venting ply* terlalu besar | 3 | 2 | 2 | 12 | 16 |
| R10 | *Ply* melipat | 2 | 4 | 5 | 40 | 4 |
| R11 | Lajur *capstrip* keluar jalur | 2 | 4 | 2 | 16 | 14 |
| R12 | *Ply* tidak lengket | 2 | 3 | 1 | 6 | 23 |
| R13 | *Spread chords* | 2 | 3 | 5 | 30 | 8 |
| R14 | Sensor panjang IL di mesin *abnormal* | 3 | 1 | 3 | 9 | 19 |
| R15 | *Conveyor* atau *free roll ply abnormal* | 3 | 3 | 3 | 27 | 9 |
| R16 | *sensor looping ply abnormal* sehingga *ply* tertarik | 3 | 3 | 2 | 18 | 13 |
| R17 | *Pressure shaping* terlalu besar | 2 | 4 | 2 | 16 | 15 |
| R18 | Operator kurang teliti | 3 | 4 | 3 | 36 | 6 |
| R19 | *Side Wall* tidak lengket | 2 | 3 | 1 | 6 | 24 |
| R20 | Tarikan *tension* CS tidak sama | 2 | 4 | 3 | 24 | 11 |
| R21 | *Speed drum* tidak sinkron | 3 | 3 | 1 | 9 | 20 |
| R22 | Benang keluar | 3 | 2 | 2 | 12 | 17 |
| R23 | *Joint* putus | 2 | 3 | 1 | 6 | 24 |
| R24 | *Capstrip* tidak lengket | 2 | 3 | 2 | 12 | 18 |
| R25 | *Free roll tread* macet | 2 | 2 | 2 | 8 | 21 |

Selanjutnya penelitian ini akan memberikan urutan berdasarkan level risk yang sudah didapatkan dari risk event pada Tabel 3.

Tabel 4. *Level Risk Event*

| *Risk Event* | *Global Priority* | | | | *Total Risk* |
|---|---|---|---|---|---|
| | S | O | D | Ec | |
| R1 | 0,01 | 0,01 | 0,02 | 0,02 | 0,063 |
| R2 | 0,01 | 0,01 | 0,02 | 0,01 | 0,053 |
| R3 | 0,01 | 0,01 | 0,01 | 0,01 | 0,042 |
| R4 | 0,01 | 0,01 | 0,02 | 0,01 | 0,053 |

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
*p-ISSN: 1979-1720*
*e-ISSN: 2579-8154*

| *Risk Event* | *Global Priority* | | | | *Total Risk* |
|---|---|---|---|---|---|
| | S | O | D | Ec | |
| R5 | 0,01 | 0,01 | 0,01 | 0,01 | 0,047 |
| R6 | 0,01 | 0,01 | 0,01 | 0,01 | 0,047 |
| R7 | 0,01 | 0,01 | 0,00 | 0,01 | 0,024 |
| R8 | 0,01 | 0,01 | 0,01 | 0,01 | 0,044 |
| R9 | 0,01 | 0,01 | 0,01 | 0,01 | 0,034 |
| R10 | 0,01 | 0,01 | 0,02 | 0,01 | 0,053 |
| R11 | 0,01 | 0,01 | 0,01 | 0,01 | 0,037 |
| R12 | 0,01 | 0,01 | 0,00 | 0,01 | 0,028 |
| R13 | 0,01 | 0,01 | 0,02 | 0,01 | 0,048 |
| R14 | 0,01 | 0,00 | 0,01 | 0,01 | 0,035 |
| R15 | 0,01 | 0,01 | 0,01 | 0,01 | 0,043 |
| R16 | 0,01 | 0,01 | 0,01 | 0,01 | 0,038 |
| R17 | 0,01 | 0,01 | 0,01 | 0,01 | 0,037 |
| R18 | 0,01 | 0,01 | 0,01 | 0,01 | 0,047 |
| R19 | 0,01 | 0,01 | 0,00 | 0,01 | 0,028 |
| R20 | 0,01 | 0,01 | 0,01 | 0,01 | 0,042 |
| R21 | 0,01 | 0,01 | 0,00 | 0,01 | 0,033 |
| R22 | 0,01 | 0,01 | 0,01 | 0,01 | 0,034 |
| R23 | 0,01 | 0,01 | 0,00 | 0,01 | 0,028 |
| R24 | 0,01 | 0,01 | 0,01 | 0,01 | 0,033 |
| R25 | 0,01 | 0,01 | 0,01 | 0,01 | 0,029 |

Berdasarkan Tabel 4 diatas, terdapat 25 kejadian risiko dan agen risiko yang mungkin terjadi pada proses pembuatan *green tyre*. Strategi mitigasi yang harus dilakukan untuk menangani prioritas agen risiko tersebut adalah meminimalisir melakukan pembongkaran *ply* dengan texine sehingga berpotensi tinggi *scrap open cord* (OPC) dan sortir penggunaan material *abnormal*.

## Simpulan

Setalah dilakukan perhitungan dan analisa dengan menggunakan *House of Risk* (HOR) dan *Multi Attribute Failure Mode Analysis* (MAFMA) di PT Elangperdana Tyre Industry terdapat 25 kejadian risiko dan agen risiko yang mungkin terjadi pada proses produksi *green tyre* yang menyebabkan *green tyre* rusak atau cacat. Strategi mitigasi yang harus dilakukan untuk menangani prioritas agen risiko tersebut adalah meminimalisir melakukan pembongkaran *ply* dengan texine sehingga berpotensi tinggi *scrap opeMasalah yang dominan untuk diprioritaskan dari risk event yang ada pada hasil metode MAFMA adalah Operator tidak tekan joint ply dan Side Wall (R1) dan Joint ply tidak di press hot knife (R4) karena merupakan risiko yang tergolong dalam 20% dengan dampak terbesarn cord* (OPC) dan sortir penggunaan material *abnormal* yang dikirim ke *departemen Building*.

*Jurnal of Industrial Engineering and Management System*
*Vol. 17(No. 1): no. 31 hlm – no. 38 hlm. Th. 2024*
*p-ISSN: 1979-1720*
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