

**EXAMINING THE LINK BETWEEN DIGITAL MATURITY, PROFITABILITY,
SALES GROWTH, AND STOCK RETURNS IN INDONESIAN FAST MOVING
CONSUMER GOODS (FMCG) INDUSRTY**

FINAL PROJECT

By

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**UNDERGRADUATE PROGRAM
SCHOOL OF BUSINESS MANAGEMENT
INSTITUT TEKNOLOGI BANDUNG**

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2024
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ABSTRACT

This research investigates the impact of digital transformation on corporate stock return, analyzing the influence of digital maturity on stock returns within the Indonesian Fast-Moving Consumer Goods (FMCG) industry. The study is prompted by the increasing relevance of digital technologies in enhancing business processes and outcomes. Digital transformation, encompassing technologies such as Artificial Intelligence, Internet of Things (IoT), and data analytics, significantly affects financial performance and market perception. The research uses a quantitative approach, employing textual quantification methods to assess digital activity disclosed in annual reports. The sample consists of FMCG companies listed on the Indonesia Stock Exchange, covering 2019 to 2023 from the Kompas100 index. Key variables include measures of digital maturity, financial performance indicators like profitability and sales growth, and stock return data. Findings reveal a negative and insignificant correlation between digital maturity and stock returns, indicating that companies with higher digital maturity do not achieve better stock performance. This relationship is mediated by non-significant changes in financial performance metrics, suggesting that digital transformation does not necessarily enhance operational efficiency and market competitiveness. Additionally, the study highlights the varying impact of different digital technologies, with data analytics and process automation showing less significant effects. The implications of this research are multifaceted, offering valuable insights for corporate managers, investors, and policymakers. Managers are urged to reconsider investments in digital technologies to ensure they boost financial performance and shareholder value effectively. Investors can leverage digital maturity assessments cautiously in their decision-making, while policymakers might foster a more supportive environment for digital innovation.

Keywords: Digital Transformation, Corporate Valuation, Digital Maturity, Stock Returns, FMCG Industry

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**MEMERIKSA KAITAN ANTARA KEMATANGAN DIGITAL, PROFITABILITAS,
PERTUMBUHAN PENJUALAN, DAN PENGEMBALIAN SAHAM DI INDUSTRI
BARANG KONSUMSI BERGERAK CEPAT (FMCG) INDONESIA**

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ABSTRAKSI

Penelitian ini menyelidiki dampak transformasi digital terhadap pengembalian saham, menganalisis pengaruh kematangan digital terhadap pengembalian saham dalam industri barang konsumen cepat saji (FMCG) di Indonesia. Studi ini didorong oleh relevansi yang semakin meningkat dari teknologi digital dalam meningkatkan proses dan hasil bisnis. Transformasi digital, yang mencakup teknologi seperti Kecerdasan Buatan, Internet of Things (IoT), dan analitik data, secara signifikan mempengaruhi kinerja keuangan dan persepsi pasar. Penelitian ini menggunakan pendekatan kuantitatif, menggunakan metode kuantifikasi tekstual untuk menilai aktivitas digital yang diungkapkan dalam laporan tahunan. Sampel terdiri dari perusahaan FMCG yang terdaftar di Bursa Efek Indonesia, mencakup periode 2019 hingga 2023 dari indeks Kompas100. Variabel utama meliputi ukuran kematangan digital, indikator kinerja keuangan seperti profitabilitas dan pertumbuhan penjualan, serta data pengembalian saham. Temuan mengungkapkan korelasi negatif dan tidak signifikan antara kematangan digital dan pengembalian saham, menunjukkan bahwa perusahaan dengan kematangan digital yang lebih tinggi tidak mencapai kinerja saham yang lebih baik. Hubungan ini dimediasi oleh perubahan metrik kinerja keuangan yang tidak signifikan, yang menunjukkan bahwa transformasi digital tidak selalu meningkatkan efisiensi operasional dan daya saing pasar. Selain itu, studi ini menyoroti dampak beragam dari teknologi digital yang berbeda, dengan analitik data dan otomatisasi proses menunjukkan efek yang kurang signifikan. Implikasi dari penelitian ini bersifat multifaset, menawarkan wawasan berharga bagi manajer perusahaan, investor, dan pembuat kebijakan. Manajer didorong untuk mempertimbangkan kembali investasi dalam teknologi digital untuk memastikan peningkatan kinerja keuangan dan nilai pemegang saham secara efektif. Investor dapat memanfaatkan penilaian kematangan digital dengan hati-hati dalam pengambilan keputusan mereka, sementara pembuat kebijakan mungkin mendukung lingkungan yang lebih kondusif bagi inovasi digital.

Kata kunci: Transformasi Digital, Penilaian Perusahaan, Kematangan Digital, Pengembalian Saham, Industri FMCG

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APPROVAL PAGE

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CHAPTER I

INTRODUCTION

1.1. Research Background

The term "FMCG" (fast-moving consumer goods) refers to an industry that produces packaged foods, cosmetics, household goods, and other easily consumed things. It is also sometimes referred to as consumer-packaged goods. The primary features of this industry include a short shelf life, significant inventory turnover, and frequent consumer purchases. This industry is also known as the non-cyclical industries, or defensive industries. This is because they typically offer products and services that people need to purchase regularly, making them less susceptible to economic downturns. Since FMCG products are essential for daily living, the demand for these goods remains relatively stable, making the FMCG sector a non-cyclical industry.

The fast-moving consumer goods (FMCG) retail industry in Indonesia is highly attractive and continues to grow. According to Fortuneidn, the annual market value of FMCGs increased by 8.8% in Q3 2020 and 5.9% in Q3 2021. Despite a slower growth rate in 2020, Indonesia's FMCG growth rate surpassed the global average by 3.6% and was higher than in most Southeast Asian countries. Malaysia had a growth rate of 5.5%, while Vietnam and Thailand saw 3% and 5% growth, respectively. Indonesia's FMCG market growth also outperformed other Asian countries like South Korea (5.2%), China (3.1%), Saudi Arabia (4.3%), and the UAE, which experienced a decline of 7.1%. (Tanayastri, 2021). The fast-moving consumer goods (FMCG) industry in Indonesia stands as one of the largest and most rapidly expanding sectors in Southeast Asia. With an estimated market value exceeding USD 100 billion and projected compound annual growth rate (CAGR) of 7.6% from 2021 to 2025, the FMCG sector showcases immense potential for both domestic and international investors (Team, 2023).

However, amidst this promising outlook, the industry grapples with evolving consumer preferences, logistical challenges, and increasing competition, necessitating continual adaptation and innovation (Udokporo et al., 2020). Furthermore, according to a Business HSBC article from 2017, the Fast-Moving Consumer Goods (FMCG) market in Indonesia is regarded as one of the most appealing industries, with sales reaching USD 10 billion, driven by the country's increasing middle class. The FMCG industry was essential to the

nation's economic growth (Chauhan et al., 2019). The FMCG business has long been seen as a vital economic driver, and its data show great growth potential. Demand for consumer goods tends to remain steady even during economic downturns, making stocks in this sector generally more stable compared to other sectors (KAR, 2024). This sector (consumer goods/FMCG) does not experience investor sentiment on stock return, because it's generally stable whether the market is bullish or bearish (Huang et al., 2014).

FMCG also keeps up with times, including the existence of industry 4.0. The higher level of operational efficiency and productivity is one of the biggest goal for this industry era, especially the increased level of automation (Thames & Schaefer, 2016). The new wave of data-driven digital technologies, such as big data, data analytics, artificial intelligence, and machine learning, is changing how businesses organize, invest, and run their operations. MIT refers to this period as the "fourth era revolution," also known as the "fourth digital wave." (Chen & Srinivasan, 2023). Industry 4.0, on the other hand, is a value-adding & knowledge-management process in industries (Lu, 2017). Businesses are adopting digital transformation programs in order to maintain their competitiveness in the quickly changing market environment (CHRISTENSON JR., 2023, 58-67). According to Agarwal et al., (2021), In 2030, Indonesia, one of the world's most promising nations, is expected to have one of the biggest economies due to its ability to seize possibilities that would allow it to quickly embrace digitalization trends and keep bolstering its infrastructure development resilience. Moreover, digital transformation is a major theme of Indonesia's G20 Presidency 2022, with an emphasis on setting up the digital era as a new environment in anticipation of the new global economy's rapid digitization. Because these events acknowledge that digital technology exists as a vital resource for future companies and will soon become a shifting business trend, they suggest that digital transformation will have an impact on almost all organizations in Indonesia and throughout the world.

The Indonesian FMCG industry is increasingly turning towards digital transformation initiatives, particularly accelerated by the onset of the COVID-19 pandemic (Skha Management Consultant, 2022). currently, several FMCG businesses in Indonesia have taken gain of advances in digital generation to perform methods associated with the revenue cycle to be able to procedure the accounting facts machine starting with getting orders, product availability, product fees, product shipping until charge processing from customers (Yulisfan et al., 2021). This shift has compelled businesses to adopt digital technologies (big

data analytics) to ensure operational continuity and meet evolving consumer demands (Akter & Haque, 2022). The emergence of e-commerce platforms, mobile applications, and data analytics tools has fundamentally altered the operational framework of FMCG companies, reshaping how they interact with consumers and manage their supply chains. This transformation underscores the industry's recognition of the potential benefits offered by digitalization, including streamlining supply chain operations, expanded market reach, enabling data-driven decision-making, and deeper as well as enhancing consumer insights (rapidor, 2023).

Effective DMP can enable businesses to create economies of scale and strategic knowledge synergies at a distinct organizational level, supporting the exploitation of opportunities in challenging and powerful contexts, in line with (Aydiner et al., 2019) and (Inamdar et al., 2020). For example, forecasting market behaviour through sensory abilities to closely observe competitor actions, directing the receipt and assessment of customer feedback to improve control decisions, and assisting businesses in reconfiguring and transforming commercial enterprise techniques. In relation to the enabling technology, strategies, and equipment, enterprise 4.0 will improve product pleasantness and raise cost- and time-performance (Albers et al., 2016). From supply chain management to marketing and customer engagement, digitalization has permeated various aspects of FMCG operations. The industry's recognition of the need to comprehend the relationship between company financial performance and digital maturity and how it affects stock returns is shown in this deliberate embrace of digital technologies.

One of the critical aspects that needs to be transformed digitally in the FMCG industry is the revenue cycle, due to the tight market movements and intense competition. All processes will be integrated with the digitization system, enabling instantaneous receipt of market information. This will enable prompt decision-making based on the information stored in the company database, including details about customers, price and discount programs, current inventory levels, cash inflow that will be available the following day, the quantity of accounts receivable, and other data. (Yulisfan et al., 2021)

One of the biggest developing countries, Indonesia has a lot of potential when it comes to using digital technology. In fact, the nation has set a lofty goal to become the leader of ASEAN's digital economy by 2020 (Das et al., 2016). Understanding the dynamics of digital

transformation and its impact on company performance is critical for investors and stakeholders in Indonesia's FMCG business as they navigate the changing market environment and make educated strategic decisions. Investment in FMCG stocks is often viewed as appealing to investors seeking stable dividends and long-term growth. Companies that adeptly leverage digital technologies to enhance operational efficiency, optimize value chains, and deliver innovative products and services are better positioned to attract investors and achieve sustainable growth (Udokporo et al., 2020). McKinsey's report highlights the transformative impact of digitalization on consumer behavior, decision-making processes, and business models in Indonesia, emphasizing the critical role of digitalization in driving business competitiveness and value creation (McKinsey & Company, 2018, 8).

Corporate valuation practices are undergoing a paradigm shift in response to the pervasive digital transformation across industries, (Pastor & Veronesi, 2009) (Chen & Srinivasan, 2023) because investors typically put their money into businesses that completely embrace digital technology and carry out the digital transformation in the hopes that the best performance outcome will be obtained. Generally, investors usually pay attention to the financial performance of a company when making their investment decisions. Financial performance is the goal of an economic and social game that is crucial for businesses, indicating profitability and ensuring sustainable development (Hada, 2020). In addition, investors also have other assessment criteria. According to Nagy and Obenberger (1994), investors generally evaluate stock choices based on three main criteria: expected corporate earnings, diversification needs, and their perception of the firm's products and services. Moreover, classical wealth-maximization criteria are crucial to investors, even though they use a variety of criteria when selecting stocks. Investors also use several ratios to make their investment decisions. Elmerraji and Heller (2022) list these as valuation ratios, liquidity ratios, solvency ratios, and profitability ratios.

Not only from the ratios, investors also can obtain information from a variety of sources such as Yahoo! Finance, Google, Schwab, Bloomberg, MarketWatch, Nasdaq.com, as well as the company annual report (Versace & Hawkins, 2016, 246). Research found that a company annual report is capable of assuming a greater significance than it already does, with hints about the future (Day, 1986, 295-307). Having a comprehensive understanding of both the positive and negative external impacts a company generates can significantly alter decision-making processes. This includes influencing investors' voting choices, evaluations of

management's asset stewardship, customer purchasing decisions, as well as the company's internal operational and strategic choices. Ultimately, this holistic insight can greatly impact the company's valuation (Picard et al., 2023).

There is a growing acknowledgment of the necessity to integrate intangible assets like digital capabilities, data assets, and technological infrastructure into stock return methodologies. However, the precise relationship between digital maturity and corporate valuation remains relatively unexplored (WROBLEWSKI, 2018), particularly within the context of the Indonesian FMCG industry. The digital technology trends means that the company disclose the digital activity in the annual report or the other sources that can be quantified as a digital maturity (Eremina et al., 2019). Worldwide, there is a dearth of scholarly research on this subject. Prior studies have demonstrated that the existence of digital technology or digital maturity is essential due to the unpredictable nature of growth, particularly in embracing the emerging digital economy (Wroblewski, 2018). As a result, there is a chance to determine the most important element impacting stock return in the FMCG industry, particularly in Indonesia, because no previous research has been conducted on these issues. An empirical study would give many Indonesian investors a better understanding of how digital maturity and financial performance affect stock returns in technology companies and assist them in making more educated investment decisions.

1.2. Problem Identification

As we know, the fast-moving consumer goods (FMCG) industry has become a vital sector, especially in Indonesia. In Indonesia, the FMCG industry is one of the key sectors contributing significantly to national economic development (Skha Consulting, 2022). Companies in this industry provide essential products and services for daily needs across all demographics. This makes FMCG companies that have listed their shares on the stock exchange a very attractive option for investors. According to InvestinAsia, the consideration of choosing shares begins with selecting a company that we are familiar with, then evaluating its valuation and price, followed by other criteria. Apart from being a sector with products well known by the Indonesian people, the FMCG industry is also the largest in Indonesia (InvestinAsia Team, 2023).

Despite the industry's significance, the rapid growth of technology necessitates the inclusion of digital maturity in stock selection criteria, alongside traditional indicators such as stock

return performance. Nonetheless, scholarly investigations and empirical study on the relationship between digital maturity, profitability, and sales growth and stock returns in Indonesia's FMCG industry are noticeably lacking. This gap creates uncertainty for investors seeking to understand how digital transformation, technological advancements, profitability, and sales growth impact financial outcomes and investment appeal. Therefore, this research focuses on the critical intersection of digital transformation and corporate stock in the Indonesian FMCG industry, aiming to provide insights into how companies' digital strategies, technological advancements, and financial performance affect their stock returns. Furthermore, the study's findings can encourage investors to carefully assess financial performance before investing in technology companies based on their digital maturity.

1.3. Research Question

1. What is the relationship between the level of digital maturity have on stock returns in the Indonesian FMCG industry?
2. In what way does the relationship between profitability and stock returns in Indonesian FMCG companies?
3. How does the relationship between sales growth and stock returns in Indonesian FMCG companies?

1.4. Research Objective

1. To analyze the relationship of digital maturity on stock returns in the Indonesian FMCG industry, aiming to determine the extent to which digital strategies and technological advancements affect financial performance and investor returns.
2. To evaluate the relationship between profitability and stock returns in Indonesian FMCG companies, identifying how profitability metrics correlate with market performance and investor returns.
3. To investigate the relationship of sales growth on stock returns in Indonesian FMCG companies, assessing the significance of sales performance as a predictor of market returns and investor interest.

1.5. Scope and Limitations

This research will only focus on digital maturity and financial performance on stock returns. The sample for this study is drawn from the main or primary list of every publicly traded company in Indonesia's fast-moving consumer goods industry (non-cyclical), which has a

history of exceptional performance with high transaction values and a variety of products. These companies have the traits of large businesses. The sample is limited to FMCG companies that were always listed in the KOMPAS100 index for 2019-2023. To offer a dependable assessment of research challenges during that time frame, the level of research digital maturity is gauged using information extracted from yearly disclosure reports or corporate annual reports, while financial success is assessed through yearly stock performance. The research is also focusing exclusively on several variable influencing stock return, including profitability, sales growth, firm size, firm age, P/E ratio, and leverage.

1.6. Research Outline

Chapter 1 – Introduction

In the first chapter, the effects of digital maturity and financial performance on stock returns in Indonesian FMCG firms will be reviewed, along with their scope and limitations. The problem's background, problem statements, research questions, and research objectives will all be covered in brief.

Chapter 2 – Theoretical Foundation

In the second chapter, the most recent study on digital technology, financial performance, stock returns, correlation between variables, prior findings, research technique, and hypothesis building is thoroughly summarized.

Chapter 3 – Methodology

This chapter explains the population, temporal dimension, sample, operational variables, data collection procedure, data analysis, including test estimates and classical tests

Chapter 4 – Data Analysis

The research analysis is presented in the fourth chapter, starting with the estimate model and the traditional assumption test for panel data regression. A review of the findings and their management and investor implications is also included in this chapter.

Chapter 5 – Conclusions and Recommendations

The study's findings, suggestions for management and investors, and guidelines for additional research are all included in the final chapter.

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CHAPTER II

THEORETICAL FOUNDATIONS

The second chapter covers the foundations of digital technology, including the idea of digital maturity and its elements, and provides a thorough literature analysis based on preexisting concepts. It also keeps an eye on the usage trends of digital technology. To assess a company's financial performance, this chapter explains how financial data is obtained from disclosed consolidated financial statements. It also goes over the importance of earlier studies on methods for evaluating digital maturity based on annual disclosure reports. The chapter explores the relationship in greater detail between stock returns, financial performance, and digital maturity while offering a strong theoretical framework through a summary of anticipated study findings. The report concludes with a description of the conceptual framework and hypothesis development in addition to summarizing previous findings from related investigations.

2.1. Theoretical Foundations

2.1.1. Digital Transformation and Maturity

When discussing digital transformation and maturity, it is essential to understand the meaning of "digital." Digital encompasses a wide range of technologies that transform how information is collected and analyzed, greatly enhancing human capabilities (Thomas et al., 2014). The implementation of digital aspects has significantly impacted nearly every aspect of life, from individual activities to group and corporate operations. Businesses and individuals alike adopt these technologies to gain advantages in their applications. Embracing a digital ecosystem is vital for businesses as it opens new pathways for growth and innovation, broadens their customer base, and boosts sales opportunities (Weill & Woerner, 2015).

Companies can change the way they conduct business, implement marketing strategies, and alter some established business structures. These transformations, known as digital disruptions, drive companies toward new operational methods and the development of innovative products and services (Wroblewski, 2018). Naturally, any change will have impacts that affect certain parties, and digital disruption is no exception. This environmental turbulence, driven by technological innovation, highlights the concept of digital disruption,

which serves as a catalyst for fundamental changes across various organizational resources (Karimi & Walter, 2015; Skog et al., 2018).

Digital transformation, which involves the continuous adaptation to evolving digital technologies, accelerates product cycles and business processes, fostering new value creation (Jiang et al., 2022). We can observe the application of digital aspects in a business by examining its operational methods (business model), and most clearly, its organizational conditions. Successful digital transformation enhances customer experiences by refining products and services to meet changing demands (Fitzgerald et al., 2013b; Nambisan et al., 2019). Besides impacting the internal workings of a company, the direct effects of such implementation are most evident on investors and customers. As Ebert & Duarte (2016) noted, this implementation extends beyond the organizational sphere, affecting stakeholders and society as a whole.

With its increasing accessibility and cost efficiency, digital transformation offers opportunities to scale businesses and reshape consumer experiences and business models (Brynjolfsson et al., 2017; Westerman et al., 2014). For every initiative and activity a company undertakes to implement digital transformation for its sustainability and growth, there are methods to measure its effectiveness. This is where digital maturity comes in, serving as a systematic measurement tool for companies. Digital maturity, as defined by Rossman (2018), acts as an indicator of an organization's readiness and drive for digital transformation, assessing its progress in adapting to the digital landscape (Kane, 2017). Evaluating and measuring a company's digital activities provides insights into its digital maturity, enabling the development of informed strategies for further advancement (Eremina et al., 2019).

2.1.2. Element to Measure Digital Maturity

After establishing digital maturity, it is critical to identify and quantify the actions and projects that a company undertakes in this area by understanding the major factors that drive its calculation. Eremina et al. (2019) describe digital maturity as six elements: general technology (computers, programming, wireless networks, and servers), data analytics, the Internet of Things (IoT), artificial intelligence (AI), process automation, and online technologies.

2.1.2.1. General and Online Technology

Online technologies, also known as internet technologies, are a crucial dimension of digital technology in organizations (Eremina et al., 2019). However, their widespread use often leads to them being overlooked. Online technologies include social and computer networks, websites, e-commerce platforms, and the internet. They also include website services. According to Reid and Lorenz (2008), the internet is a worldwide, openly accessible network of networks connected by networking technologies that allows users to exchange data, resources, and services. Technologies such as websites, which are collections of pages and material denoted by domain names, are important components of the internet. E-commerce technologies, essential components of online technologies, allow businesses to conduct transactions over the web, enabling them to sell products or services and purchase raw materials. These technologies facilitate communication and collaboration, benefiting a company's stakeholders.

Internet technologies are very beneficial to commercial enterprises and society as a whole. Internet technologies are strategic resources that support businesses in promoting their goods and services and entering new markets, according to Berisha-Shaqiri et al. (2015). They also enhance business efficiency and establish competitive advantages. Additionally, online technologies bring significant economic and societal benefits by connecting people's needs and wants (Wilburn & Wilburn, 2018). Therefore, it is imperative for businesses to leverage internet and online technologies in the digital age. Internet technology plays a key role in digital transformation by improving customer experiences, streamlining operations, and creating new business models that help organizations manage digital transition successfully (Fitzgerald et al., 2013).

2.1.2.2. Data Analytics

Data has become integral to every sector and function in the global economy. Similar to essential production factors like physical assets and human capital, contemporary economic activities heavily rely on data, making many operations impossible without them (Bhatia, 2017). The examination of raw data to derive conclusions about the information is referred to as "Data Analysis" (Bhatia, 2017). Data analysis's main objective is to turn chaotic data into a format that is concise, intelligible, and decisive so that it can help in decision-making (Bhatia, 2017). According to various studies (Appelbaum, et al., 2018; Cao et al., 2015; Gashi and Saed, 2018; Georde, et al., 2018; Janssen et. al., 2017; Rembert, 2020; Sun, et al.,

2018), big data analytics is pivotal in conferring a significant competitive edge to institutions. It facilitates value creation, enhances decision-making rationality, fosters a holistic company perspective, aids in future strategic planning, enables the adoption of refined business strategies and roadmaps, enhances information quality and real-time accessibility, facilitates more efficient integrated reporting, and ensures the agility and accuracy of data utilized in reports compared to previous forecasts. Additionally, it improves risk management, identifies cost-saving opportunities, boosts company profits, enhances client service delivery, optimizes customer relationships, fosters innovation in processes and product development, promotes business intelligence, aids in future decision-making, and augments the efficiency and accuracy of predictive analytics, thereby illuminating hidden insights, forecasting future outcomes, and automating non-routine financial tasks, ultimately enhancing acquisition efficiency. Chen and colleagues (2012) describe big data as vast and intricate datasets necessitating specialized storage, management analysis, and visualization technologies. To handle such data, organizations employ analytical tools known as big data analytics, or simply data analytics. The objective of big data analytics is to enhance the efficiency of business processes within companies and improve the quality of products and services through information and communication technology systems (Majchrzak & Malhotra, 2013; Loebbecke & Picot, 2015; Spanos et al., 2002). In the fast-moving consumer goods (FMCG) sector, intensified competition prompts companies to enhance their market value through the introduction of new sales channels and the improvement of development prospects, all while bolstering supply chain efficiency. To remain competitive, FMCG firms must leverage business intelligence, technology, and effective management strategies to vie for market share (Mohammed, 2019). Throughout the entire product lifecycle, spanning manufacturing, delivery, and sales, FMCG companies face numerous challenging decisions, which can only be effectively made by relying on data (Mohammed, 2019). Furthermore, big data consumer analytics transforms marketing by offering unparalleled insights and dynamic capabilities utilizing physical, human, and organizational resources (Erevelles et al., 2016).

2.1.2.3. Internet of Things (IoT)

The term "Internet of Things" (IoT) describes a technology that links objects to the internet network by use of sensors or information sensing protocols (Patel et al., 2016). According to MIT digital expert Ashton (1999), the second iteration of the Internet of Things is a data integration intended for human use. IoT is defined as an intelligent and flexible network that

is prepared to react to changing conditions in another definition (Madakam et al., 2015). IoT technologies exhibit six fundamental traits, including connectivity, heterogeneity, services related to objects, interconnectivity, dynamic adaptability, enormous scale, and security (Patel et al., 2016). Additional features encompass connectivity, facilitating accessibility between networks by enabling data generation (Patel et al., 2016).

IoT is anticipated to bring about numerous benefits, such as technological advancements, enhanced consumer engagement, improved data aggregation, and waste reduction. Moreover, IoT's presence is expected to revolutionize various aspects of human life by providing facilities for artificial intelligence development that adapt to diverse environments (Ramasamy & Kadry, 2021). By applying business models to many stakeholders, including companies, consumers, and governments, it has a substantial impact on a variety of industries, including healthcare, education, and others, with the goal of improving daily ease and comfort (Angelova et al., 2017). IoT is also thought to provide macroenvironmental advantages, like raising quality of life by making daily tasks more comfortable, creating new IoT-focused business opportunities to boost employment and economic growth, and reducing environmental effects by saving resources (Soumyalatha & Hegde, 2016). While most FMCGs have initiated digital adaptation within their systems, there remains a considerable journey ahead in terms of fully embracing data-driven practices for targeting user groups (Kelly et al., 2018).

2.1.2.4. Artificial Intelligence and Process Automation

Within the field of information technology, artificial intelligence (AI) includes a number of ideas, such as computing, software development, and data transfer (Mohammad, 2020). Underpinning ideas like machine learning, deep learning, robotics, computer vision, the internet, recommender systems, and natural language processing, it is a fundamental component of computer science and technology (Ashley, 2017; Jackson, 2019). Defined as the capacity of machines to learn and understand like humans and respond to specific behaviors (Alsedrah, 2017), AI is adept at analyzing its own actions and those of opponents (Maridakis, 2017). Robotics, an offshoot of AI, involves the creation of intelligent machines capable of performing human tasks (Patil, 2016; Dirican, 2015). Machine learning, an AI application, facilitates system automation (Alpaydin, 2020; Marsland, 2015), aiding in data analysis and fraud detection within information systems (Dirican, 2015). AI is anticipated to increasingly drive customer interactions in business (Habeeb, 2017) and is integral to process

automation, enabling swift, tireless, and accurate execution of repetitive tasks (Kumar, 2018). Future trends suggest a focus on plant optimization, integrating automation systems with production and enterprise-level information systems (Kuukka, 2004). In bulk industries, optimizing assets, including initial capital, plant operation, and product distribution, will be paramount, with process control playing a pivotal role (Jamsa-Jounela, 2007).

2.1.3. Annual Report

Firms commonly convey their past performance, grasp of the external landscape, strategies, and near-future plans through annual reports (Srinivasan & R., 2015). Serving as a distinguishing tool among businesses, the annual report communicates a company's financial standing to stakeholders (Lusk, 1973). It comprises the Chairman's address, director's report, detailed discussions on operations, accompanying notes, and audited financial statements (EDT et al., 2018). These documents articulate the firm's prior performance and future prospects in easily comprehensible terms for interested parties (Gyasi & Owusu-Ansah, 2018). Typically adorned with graphics, photos, and narrative, the front section of the report encapsulates the company's activities from the past year and may offer forecasts (Hayes, 2024). Analysts and shareholders meticulously examine year-end financial details, focusing on developments from the previous year and forthcoming projects (Ho & Wong, 2004). The published annual report information holds value relevance for metrics like growth and market penetration (Amir & Lev, 1996). Additionally, textual analysis aids investor decision-making and predictions of earnings and returns (Chakraborty & Bhattacharjee, 2020), serving as a method to ascertain the value relevance of corporate information disclosure (Stemler, 2015).

2.1.3.1. Corporate Disclosure Value

Companies' annual reports clearly demonstrate value relevance, which helps evaluate indicators like growth and market penetration (Amir & Lev, 1996). Textual analysis methods vary; a qualitative approach was employed in a prior study, utilizing text queries to assess the digital maturity in information disclosure (Eremina et al., 2019). Additionally, textual analysis has been shown to inform investor decision-making and predictions of earnings and returns (Chakraborty & Bhattacharjee, 2020). Corporate disclosure with available information enables the determination of digital maturity, as evidenced by the relevance of technology-related terms to stock prices (Yen & Wang, 2019). In order to maintain flexibility and alternatives in rapidly changing digital environments, organizations need to improve

their digital strategy (Kane et al., 2017). In order to improve competitiveness and advance digital maturity and perhaps increase company value and financial performance, executives must align with digital investment plans and put strategies into action (Byrd et al., 2006; Mithas & Rust, 2016). The current measurement is based on previous evaluations since, despite the fact that digital activities contribute to corporate values, there is a delay in communicating these to stakeholders (Chen & Srinivasan, 2020). Prior research has evaluated digital activities using annual reports and text analysis techniques to determine the value relevance (Chen & Srinivasan, 2020; Eremina et al., 2019; Jiang et al., 2022; Ricci et al., 2020; Wu et al., 2022; Yen & Wang, 2019). Some research found that digital transformation lowers the probability of stock market collapses by using a quantitative keyword method based on annual reports as a proxy (Jiang et al., 2022; Wu et al., 2022). In order to reduce noise in panel data regression, Chen & Srinivasan (2020) developed a textual proxy for evaluating digital activities. They did this by classifying digital maturity into terciles, which produced accurate results. In the coding system, a designation of 0 denotes the absence of digital activity, while subsequent codes of 1, 2, and 3 indicate increasing levels of activity throughout the year, progressing from lowest to highest.

2.1.4. Financial Performance

2.1.4.1. Profitability

It's evident that every business strives to turn a profit. The primary dimension of financial performance, profitability, aligns with the fundamental goal of businesses (Nimalathasan, 2009). This assertion finds support in various studies affirming profitability as a key determinant of financial performance (Amato & Wilder, 1990; Bothwell et al., 1984; Berger & Ofek, 1995; Hall & Weiss, 1967; Dalton & Penn, 1976; Shepherd, 1972). Profitability reflects a company's capacity to generate revenue, with higher profitability correlating to greater growth potential (Lakonishok et al., 1994). For managers and stakeholders alike, evaluating profitability ratios is routine, offering insight into the company's ability to generate returns on investments and maximize shareholder wealth. Profitable firms typically yield superior returns compared to unprofitable ones, with profitability playing a significant role in enhancing the efficacy of value strategies (Novy-Marx, 2013). Profitability analysis encompasses various metrics categorized into margin ratios and return ratios (Bellucco, 2024). These ratios serve as indicators of a company's growth potential. Notably, profitability metrics such as Net Profit Margin, Return on Assets, and Earnings Per Share positively influence stock prices in Indonesian companies (Jayanti, 2021). Earnings Per

Share can significantly impact the profitability landscape when comparing firms, given its reliance on outstanding ordinary shares (Cudia & Manaligod, 2011). A comparison of a financial year's net income after taxes and the total number of shares issued is called earnings per share, or EPS. The profit given to shareholders increases with an increase in Earnings Per Share (EPS). An indication of high earnings per share (EPS) can be found in the form of information that is highly beneficial to investors. EPS information can be used to forecast a company's earnings going forward (Januar et al., 2022).

2.1.4.2. Sales Growth

According to Tarmidi & Sormin (2020), sales growth serves as a crucial indicator of a company's performance, measuring its ability to increase sales annually. Sales turnover is deemed fundamental for any company, with sales growth reflecting its vitality. Essentially, without sales, there is no business. Positive sales growth, particularly exceeding industry averages, signifies successful market share attainment. This success signals past investment efficacy and serves as a predictor of future stock price increases, thereby attracting investors and further bolstering sales growth (Tarmidi & Sormin, 2020). These findings align with Signaling Theory, indicating that sales growth and profitability positively impact firm value, signaling to investors the company's robust condition and prompting share purchases (Tri Putri & Rahyuda, 2020).

A growing company demonstrates the ability to increase sales to drive future profits. Sales growth, as a metric, gauges a company's capacity to expand sales progressively through internal enhancements and external business development (Penrose, 1995). Internal variables that have a major impact on sales growth include labour productivity, labour intensity, and capital intensity. Creating these conditions can lead to extraordinary growth (Machek & Machek, 2014). Gupta et al. (2013) classify sales growth as either opportunistic or unpredictable, suggesting that a company's growth might be steady or necessitate overcoming challenges. Growth is influenced by various internal and external factors, with each stage presenting unique challenges (Gupta et al., 2020).

While a company's external elements include sociocultural, political, regulatory, economic, and demographic situations, its internal factors include its strategy and its operational, marketing, and financial capabilities. Because internal elements react to external influences, strategic alignment is therefore necessary to seize opportunities (Gupta et al., 2013). Sales

growth is influenced by several determinants, including leverage, company age, size, and management capacity, indicating its susceptibility to these variables (Bahadir et al., 2009; Dabla-Norris & Inchauste, 2007).

2.1.5. Stock

A stock serves as a broad term encompassing ownership certificates across companies, whereas a share specifically denotes ownership in a singular company, thereby conferring shareholder status (The Economic Times, 2024). Stocks represent securities indicating fractional ownership in a corporation, with individual units termed "shares" (Deshmukh et al., 2019). Ang (1997) defines stocks as evidence of inclusion or ownership within a company for individuals or institutions. Previous research, such as that by Itzkowitz & Itzkowitz (2017) and Kubilay & Bayrakdaroglu (2016), has employed diverse theories and models to evaluate the risks and returns associated with stock investments. However, investing in stocks entails complexity, especially influenced by stock market dynamics (Zahera & Bansal, 2018). Investment decisions by investors are influenced by a blend of financial and non-financial information, with corporate reputation often mediating this interplay (Naveed et al., 2020). Ailev's study (2022) highlights external factors and fundamental indicators as pivotal considerations when predicting fluctuations in stock prices. In an efficient market, stock prices predominantly reflect fundamentals, specifically earnings per share (EPS) and price-to-earnings (P/E) ratio (Harper & Catalano, 2024).

2.1.5.1. Stock Return

Stock market return represents the annual average growth rate of the stock market index (The World Bank, 2024). Understanding the behavior of stock returns is vital for investors, as it helps in assessing risk, evaluating investment performance, and validating financial models (Hsu, 1984). By buying stocks at discounted prices and speculatively selling them at higher ones, investors hope to generate large returns (Ang, 1997). Additionally, investors anticipate capital gains and dividend payments from their investments in shares (Acheampong et al., 2014). Prior research has indicated a positive relationship between the growth potential of businesses with high degrees of digital maturity and stock returns, as well as profitability as indicated by return-on-equity (ROE) and return-on-assets (ROA) ratios. (Jun, 2019; Soekarno & Erlangga, 2022). According to Simanjuntak (2019), stock returns represent the future profits investors gain based on their invested funds. Furthermore, fundamental factors influence stock returns or volatility (Thampanya et al., 2020).

2.1.6. Relationship and Impact of Digital Maturity on Stock Returns

The emergence of data-driven technologies, such as artificial intelligence, machine learning, big data, data analytics, and process automation, has a substantial impact on how businesses are structured, funded, and run their operations (Chen & Srinivasan, 2020). Assessing the elements of digital maturity within a company and measuring its level can have profound effects on its business model, activities, and expansion of opportunities. This, in turn, enhances management decision-making, value creation, and the development of better products or services (Jiang et al., 2022). Investors can estimate earnings and stock returns by measuring a company's digital maturity level and how it correlates with stock price performance. This is because digital maturity measures demand and helps businesses adjust to changing conditions (Chakraborty & Bhattacharjee, 2020). The stock market is a commercial and economic venue where different kinds of investors can fund public firms' operations (Husnan, 2005). Capital market investors receive incentives in the form of stock returns, which represent their profits from capital market investments (Jogiyanto, 2013). Diverse conclusions have been drawn from earlier research on the relationship between digital maturity and stock returns. Wu et al. (2022) found that stock price risk for Chinese enterprises is influenced by the degree of digital maturity as indicated by a proxy indicator of digital transformation. On the other hand, Chen and Srinivasan (2020) discovered that digital maturity has a major impact on US non-tech stock values. Furthermore, Italian companies' attempts to achieve digital maturity are a factor in the rise in stock market valuation that is driven by corporate sustainability (Ricci et al., 2020). Wroblewski (2018), however, found no conclusive evidence linking digitization to stock returns. Dana Arta's (2022) research also found no evidence linking digital maturity to stock returns. In a similar vein, Eremina et al. (2019) discovered no connection at all between stock returns in the Baltic states and digital maturity. Moreover, empirical data indicates that stock values may be positively impacted by technical innovation as determined by R&D expenditure (Hirshleifer et al., 2013). Higher levels of digital technology adoption in process industries lead to more radical product and service innovations, resulting in higher returns on sales for radical product innovations, but not for service innovations (Blichfeldt & Faullant, 2021). Therefore, businesses with high levels of digital maturity and strong indicators of these variables are likely to gain an advantage, positively impacting stock price returns for the organization.

2.1.7. Relationship and Impact of Financial Performance on Stock Returns

Investors should take into account a company's financial performance in addition to its use of digital technology, since it is probable that the latter will strive to increase profitability and growth in order to optimize its earnings and attract capital. Assessing the financial performance of an organization is essential to determining its overall success (Sarda, S., and Nasrullah, N., 2022). Financial performance holds a significant role for companies, particularly public ones, whose operational activities rely on investor funding through capital utilization (Tuni Lasa & Mustafa, 2023). Furthermore, assessing financial performance through historical data provides insights into how effectively the company generates profits to enhance shareholder wealth. Financial analysis aims to validate a company's performance over a specific period, encompassing factors such as assets, liabilities, and equity. Profitability ratios gauge a company's capacity to generate profit and offer insights into its managerial effectiveness, reflecting profitability derived from sales and investment income (Nasrallah et al., 2023). Several studies have explored the relationship between financial performance, measured by profitability and sales growth, and stock returns, uncovering correlations between these variables. Tuni Lasa & Mustafa (2023) discovered relationships between various financial performance metrics and stock returns among Indonesian consumer goods companies. Similarly, Januar et.al (2022) observed a decline in stock returns during the pandemic, influenced by the company's financial performance. Additionally, studies by Dwinanda & Hendriyani (2022), Sahlan & Syaroni (2020), Gunawan and Jati (2012), and Riyanti (2012) revealed that earnings per share (EPS) significantly impacts stock returns. Especially in the FMCG industry (Yuniawati, 2022, 1007-1017)

2.1.8. Relationship and Impact of Sales Growth on Stock Returns

The Growth Ratio, according to Kasmir (2008), is a statistic that shows how well a business can sustain its financial position both within its industry and in the face of economic growth. Companies can optimize their resources by comparing sales from the previous year to the current year, thus, measuring sales growth can reflect the level of growth in a company's sales effectively (Cynthia & Salim, 2020). Furthermore, a relationship has been observed in Indonesia between the development of sales and stock prices. Sales growth can be used as a prediction of future growth because it shows how well investments performed in the previous period. These findings suggest that sales growth positively influences fluctuations in stock prices (Pranata & Pujiati, 2015). Additionally, Ajizah and Biduri (2021) found similar results, showing that sales growth affects a company's stock returns. In their research, Bintara

(2020) and Lutfi & Sunardi (2019) also revealed that higher sales growth corresponds to higher stock prices for the company. Significant revenue growth announcements in financial statements were found to be highly connected with abnormal changes in stock prices in Jegadeesh's (2002) study. Yantri et al.'s (2023) analysis, which concentrated more on Indonesian companies, discovered that stock returns were less significantly impacted by sales growth. This is in contrast to a number of previous studies (Maramis et al., 2021; Arma, 2023) that discovered a positive and significant relationship between sales growth and stock returns. It follows that an increase in sales must affect stock returns.

2.2. Previous Findings

Chen and Srinivasan (2020) demonstrate how a non-technology firm's firm value is impacted by its degree of digital maturity when it comes to technology adoption and investment. Furthermore, several factors have an impact on stock returns depending on the firm's financial performance, which indicates the health of the organization. As a result, it may potentially yield various outcomes for businesses operating in the FMCG sector

Table 2.1. Table of Previous Findings

No	Title	Author(s)	Objective	Variables	Results
1.	Firms' digitalization and stock price crash risk	Kangqi Jiang, Xinyi Du, Zhongfei Chen	To understand how digital transformation initiatives influence the likelihood of stock price crashes.	<p>Independent Variable: Digitalization index (measured by the intensity of digital technology adoption).</p> <p>Dependent Variable: Stock price crash risk (measured by the frequency and magnitude of negative stock price jumps).</p> <p>Control Variables: Firm size, leverage, market-to-book ratio, profitability, and industry impact.</p>	The study reveals that increased levels of digitalization are linked to a notable decrease in the risk of stock price crashes. Firms that are more digitalized typically exhibit enhanced transparency and information disclosure practices, which helps to reduce information asymmetry and speculative trading.
2.	Going Digital: Implications for Firm Value and Performance	Wilbur Chen & Suraj Srinivasan	Assessing non-tech organizations by utilizing a text query to evaluate the activity of the digital index, which may be tested as a methodology to determine the influence of digital adoption on financial performance, firm value, and stock performance.	<p>Independent Variable: Digital Initiatives and Industry Characteristic</p> <p>Dependent Variable: Firm Value (stock price, market capitalization, other financial factors) and Performance Metrics (revenue growth, profitability, efficiency improvements, and other KPIs)</p>	Firm value, as measured by the market-to-book ratio, is significantly influenced by digital activities. Additionally, the analysis shows that asset turnover has a considerable impact on digital activities, whereas margin and sales growth do not.

No	Title	Author(s)	Objective	Variables	Results
3.	Digital Maturity and Corporate Performance: The Case of the Baltic States	Yulia Eremina, Natia Lace, & Julija Bistrova	Assess the company's performance based on its capacity to adapt to the digitalization trend. The study also creates a text query-based mechanism for assessing digital maturity.	Independent Variable: Digital Maturity and Firm Characteristic Dependent Variable: Corporate Performance through financial metrics (ROA, ROE), sales growth, EPS growth, Gross profit per asset, gross profit margin, operating profit margin, net profit margin, and stocks return.	The correlation between sales growth and digital maturity is good. However, it is too early to predict whether these findings will have a significant impact on the company's stock performance. The study's findings, based on the ratio used, reveal a weak link. This shows that the relationship between financial performance and digital maturity is still not entirely evident.
4.	The Digital Advantage: How Digital Leaders Outperform Their Peers in Every Industry	G. Westerman, D. Bonnet, & A. McAfee (2014)	To demonstrate how companies that effectively adopt and integrate digital technologies outperform their competitors in terms of financial and operational metrics.	Independent Variables: Digital leadership practices (measured by the extent of digital adoption and integration in business processes). Dependent Variables: Firm performance (measured by revenue growth, profitability, market share, and customer satisfaction). Moderating Variables: Industry type, organizational culture, and market dynamics	The study finds that digital leaders significantly outperform their peers by achieving higher revenue growth, increased profitability, and enhanced customer satisfaction. Key practices include fostering a digital culture, investing in digital skills, and aligning digital strategies with business goals.
5.	Digitalization and Firm Performance: Are Digitally	Julian B. Wroblewski	The primary objective of the study is to determine whether digitally mature	Independent Variables: Digital Maturity: The extent to which a firm has adopted and integrated digital technologies. This is measured through various indicators such as	The study concludes that digital maturity is a significant predictor of superior firm performance. It highlights the importance of investing in digital

No	Title	Author(s)	Objective	Variables	Results
	Mature Firms Outperforming Their Peers?		firms—those that have fully integrated digital technologies into their operations and business models—outperform their peers in terms of financial and operational performance. The study aims to provide empirical evidence on the benefits of digital transformation and to identify key factors that contribute to the success of digitally mature firms.	digital infrastructure, digital strategy, and digital skills. Industry: The specific sector in which the firm operates. Firm Size: The size of the firm, typically measured by the number of employees or revenue. Dependent Variables: Financial Performance: Metrics such as revenue growth, profitability, return on assets (ROA), and return on equity (ROE). Operational Performance: Measures including efficiency, productivity, innovation capacity, and customer satisfaction.	technologies and fostering a culture that supports continuous digital innovation. The findings suggest that firms that are lagging in digital adoption should prioritize digital transformation initiatives to remain competitive in an increasingly digital economy.
6.	Analysis of Factors that Affect the Stock Price of Consumer Goods Industry	Rizqy Aiddha Yuniawati	To identify and analyze fundamental and technical factors that impact stock prices in the consumer goods sector.	Independent Variables: Earnings Per Share (EPS), Debt to Equity Ratio (DER), Inflation Rate, Interest Rate, Foreign Exchange Rate, Stock Trading Volume, Previous Share Price. Dependent Variable: Stock price of consumer goods companies.	According to the study, EPS, interest rates, foreign exchange rates, and historical share prices have a substantial impact on stock prices, whereas DER, inflation rate, and stock trading volume do not.

No	Title	Author(s)	Objective	Variables	Results
7	The Effect of Company Size, Sales Growth, Profitability and Leverage on Stock Returns in Food and Beverage Companies Listed on the Indonesia Stock Exchange for the 2015-2019 Period	Nurul Ajizah & Sarwenda Biduri	Finding out how firm size, sales growth, profitability, and leverage affect stock returns of food and beverage companies listed on the IDX is the main goal of the study. The purpose of the study is to shed light on how these financial factors affect stock performance in this particular industry.	Independent Variables: Company Size, Sales Growth, Profitability, and Leverage Dependent Variable: Stock Returns	Company size, sales growth, and profitability for a company's stock return are all positively correlated. Meanwhile, the relationship between leverage and stock returns was more complex. This study of the literature emphasizes how crucial it is to take into account a variety of financial factors in order to comprehend how they affect stock returns as a whole, particularly when evaluating a particular industry.

2.3. Hypothesis Development

Previous studies suggest that companies leveraging digital technology tend to enjoy greater public support due to their ability to offer superior products and services compared to their competitors (Fitzgerald et al., 2013; Wroblewski, 2018). Furthermore, consumer goods are in consistent demand due to their transactional convenience, suggesting that improving customer value may result in higher firm value and profitable returns for shareholders (Hirshleifer et al., 2013). Though there are signs that investing in technology can raise stock values, the relationship between digital maturity and stock returns is still uncertain (Eremina et al., 2019; Wroblewski, 2018). Thus, it is plausible to predict that companies exhibiting high levels of digital maturity, as indicated by the aforementioned characteristics, would likely have a positive influence on stock price returns.

H1: Digital maturity has a positive impact on stock returns within Indonesian FMCG companies.

Profitability ratios are critical performance metrics for evaluating businesses and important markers of a company's expansion. These ratios are frequently used by investors to assess a company's capacity to turn a profit and increase shareholder value. According to Anish et al. (2021), the implementation of machine learning for sales forecasting in the fast-moving consumer goods (FMCG) industry improves inventory management, ensures product availability, and enhances profitability. Additionally, research by Fama and French (2006) suggests that more profitable companies typically generate higher expected stock returns. Profitable firms typically yield superior returns compared to unprofitable ones, with profitability playing a significant role in enhancing the efficacy of value strategies (Novy-Marx, 2013). Moreover, Prabandaru Adhe Kusuma and Denies Priantinah (2012) contend that EPS positively affects stock returns. According to Riyanti's (2012) analysis, EPS had a beneficial impact on stock returns after she looked at the association between EPS and post-IPO stock returns. backed up by Putra and Kindangen (2016) in terms of how stock returns are impacted by earnings per share (EPS).

Therefore, it is expected that profitability in FMCG firms will lead to positive stock returns.

H2: Profitability has a positive influence on stock returns within Indonesian FMCG companies.

In his 2002 study, Jegadeesh found a significant relationship between increased stock price volatility and financial reports announcing significant revenue increases. Furthermore, according to Rasyidi, M. (2022), sales growth significantly influences a company's stock returns. Additionally, studies on Indonesian stocks conducted by Arma (2023), Maramis et al. (2021), and Yantri et al. (2023) found that sales growth positively affects stock returns. Consequently, it is reasonable to anticipate that companies experiencing high levels of sales growth will positively impact their stock price returns.

H3: Sales growth positively impacts stock returns within Indonesian FMCG companies

2.4. Conceptual Framework

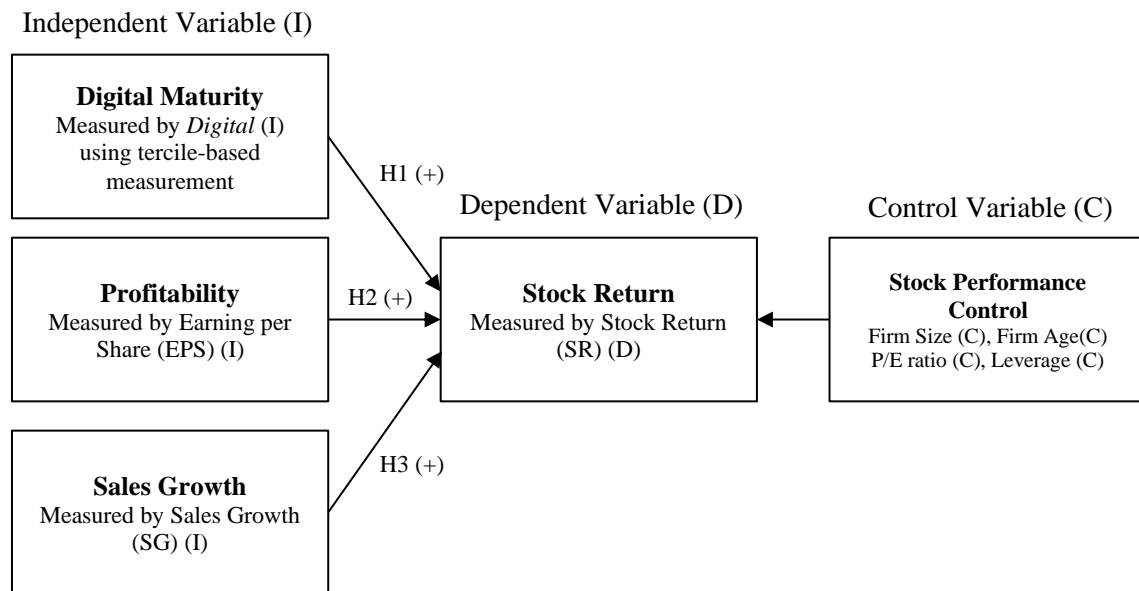


Figure 2.1. Conceptual Framework

CHAPTER III

RESEARCH METHODOLOGY

The third chapter is dedicated to outlining the research methodology, including the tools employed to analyze the impact of digital maturity on financial performance in Indonesia. It begins by detailing how the study was conducted, reiterating the identified problem, and offering insights into the population and sample selection. Furthermore, it presents a comprehensive overview of the proxies used to measure digital maturity, describes the empirical models devised for testing, and outlines the variables under examination. This chapter further clarifies the techniques used in this study for data gathering and analysis.

3.1. Research Design

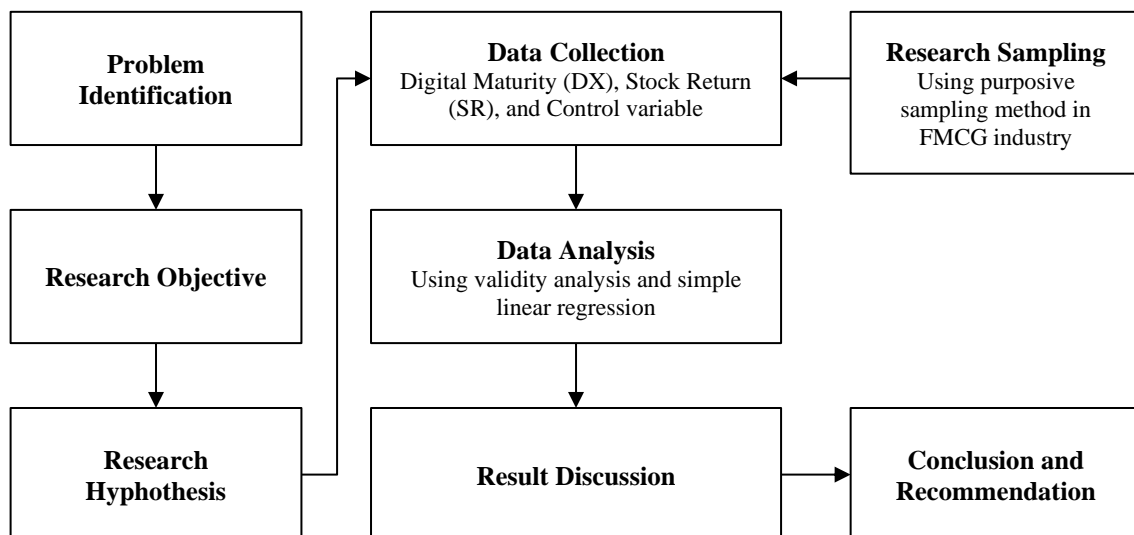


Figure 3.1. Research Design

3.2. Research Data

3.2.1. Research Population and Time Dimension

This research encompasses all fast-moving consumer goods (FMCG) firms listed on the Indonesian Stock Exchange (IDX) that integrate digital technology into their operations and offer accessible disclosure information for evaluating digital maturity. The population consists of Indonesian FMCG publicly traded companies utilizing digital technology in their business operations. The study investigates the influence of digital maturity and financial performance on stock returns spanning a five-year duration, from 2019 to 2023, with the aim of providing dependable data for analyzing the correlation between digital maturity, financial performance, and stock returns.

3.2.2. Research Sample

This study aims to examine samples of Fast-Moving Consumer Goods (FMCG) companies listed in the KOMPAS100 Index in Indonesia from 2019 to 2023, utilizing the purposive sampling method, which selectively selects sample firms based on specific criteria. The KOMPAS100 Index is chosen due to its reliability, as it comprises companies with high transactional value and has been listed for more than three months. This index is utilized as it serves as an indicator of stock price movements, guiding investors in their stock investments. The selected issuers included in the KOMPAS100 index are companies with high liquidity, substantial market capitalization, and strong fundamentals and performance (Renaldo et al., 2021).

The KOMPAS100 Index has stringent filters compared to other indices. According to Alhikmah (2011), the criteria include:

- a. The stocks need to have been listed for at least three months on the Indonesia Stock Exchange (BEI).
- b. The stocks are factored into the Composite Stock Price Index (IHSG) computation.
- c. The BEI may choose to include the stocks in the process of producing the index of the top 100 stocks based on evaluations of the company's basic factors and trading patterns on the exchange.
- d. Over the previous 12 months, the stocks rank among the top 150 stocks on the Regular Market in terms of market capitalization, transaction value, and frequency.
- e. Based on the largest transaction value, the selection process reduces the 150 equities to 60 stocks.
- f. From the remaining 90 stocks, 40 stocks are then selected based on performance criteria: trading days and transaction frequency, as well as market capitalization on the regular market, with the following process:
 - i. Of the 90 stocks that are still available, 75 stocks will be chosen based on regular market trading days.
 - ii. Of these 75 equities, 60 stocks will be chosen in accordance with how frequently they are traded in the regular market.
 - iii. Based on market capitalization, 40 equities will be chosen from this group of 60 stocks.

- iv. The list of stocks derived from the computations described in item (e) and the list of stocks derived from the calculations described in item (f) are added to produce the list of 100 stocks.
- v. The stocks that are part of the KOMPAS 100 list will be changed every six months, in February and August.

The KOMPAS100 index comprises two corporate sectors: the banking sector and the non-banking sector. This study focuses solely on companies from the non-banking sector, specifically the FMCG sector. This decision is made because the financial performance of the banking and non-banking sectors cannot be generalized due to the different nature of their operations, particularly regarding the management of third-party funds. Additionally, companies listed on the KOMPAS100 index significantly influence the IDX, making it a viable option for analysis. Moreover, the credibility of stock selection is based on the companies' activities and decisions monitored by the Indonesia Stock Exchange, indicating their listing on the main board. The main board is a listing board provided by the IDX for large companies with strong financial performance, considered as major players in their respective sectors (Indonesia Stock Exchange, 2018).

Table 3.1. Selected FMCG Companies

No.	Ticker	Company Name	Frequency	Papan Pencatatan
1	AALI	Astra Agro Lestari Tbk.	10	Utama
2	CPIN	Charoen Pokphand Indonesia Tbk.	10	Utama
3	GGRM	Gudang Garam Tbk.	10	Utama
4	HMSP	H. M. Sampoerna Tbk.	10	Utama
5	ICBP	Indofood CBP Sukses Makmur Tbk.	10	Utama
6	INDF	Indofood Sukses Makmur Tbk.	10	Utama
7	JPFA	Japfa Comfeed Indonesia Tbk.	10	Utama
8	LSIP	PP London Sumatra Indonesia Tbk.	10	Utama
9	UNVR	Unilever Indonesia Tbk.	10	Utama

3.3. Data Collection

This study necessitates two categories of data obtained from the disclosures of selected companies within the Indonesian FMCG sector listed in the KOMPAS100 Index from 2019 to 2023 for analysis: textual data and financial data.

3.3.1. Textual Quantification Method or Query of Digital Activity Disclosed in Annual Report

To gauge digital maturity, this study relies on textual data extracted from annual reports of companies listed on the Indonesia Stock Exchange (IDX) spanning from 2019 to 2023. These reports are chosen for their formal and legally mandated nature, which helps mitigate potential biases. Drawing from the Value Relevance of Disclosure Theory (Chen & Srinivasan, 2019; Eremina et al., 2019; Yen & Wang, 2019), annual reports are considered credible and trustworthy sources for assessing a company's digital maturity.

Text mining techniques are employed using the NVIVO 14 application to extract pertinent data from these annual reports. NVIVO 14 efficiently identifies words related to digital technology dimensions mentioned in the reports and retrieves associated phrases, ensuring a comprehensive analysis while minimizing potential biases stemming from varying terminologies used by different companies.

Annual reports offer detailed insights into a company's activities over a defined period, making them ideal for evaluating digital initiatives. This approach enables the tracking of digital maturity progression from 2019 to 2023. By scrutinizing the text within these reports, NVIVO 14 quantifies mentions of digital technology elements, providing a thorough and unbiased assessment of digital maturity. This method not only captures specific terms but also encompasses related phrases, accommodating variations in language usage across different companies. Consequently, the data collected through this approach is robust and accurate, laying a dependable groundwork for evaluating the digital maturity of FMCG companies.

3.3.2. Annual Stock Return

To assess financial performance, this study collects data from reliable sources, namely the Annual Consolidated Financial Statements found within the annual reports of companies listed on the Indonesia Stock Exchange (IDX). These reports cover the years 2019 to 2023

and are obtained from both the IDX and the respective company investor relation websites. Financial performance analysis involves computing values for various variables, including dependent variables like profitability ratios, sales growth, and stock performance, as well as control variables, which will be elaborated on in the subsequent section of this chapter.

3.4. Operation Variable

3.4.1. Independent Variables

The model tests three types of independent variables: digital maturity, profitability, and sales growth. These variables align with the study's proposed hypotheses.

3.4.1.1. Digital Maturity

The variable labelled "Digital," or the digital maturity score, functions as an independent variable, according to the research hypothesis. The number of digital terms used to characterize a business's digital operations determines this score. A query text model with digital maturity measuring elements is used in this word calculation. The digital maturity meter was developed by Eremina et al. (2019) to evaluate the digital operations of businesses in the Baltic States. Analyzing the word count in the annual report is one way to measure a company's digital activities, and it has proven to be a trustworthy tool. The Internet of Things, artificial intelligence, process automation, big data and data science, and 35 general and internet technologies are among these components.

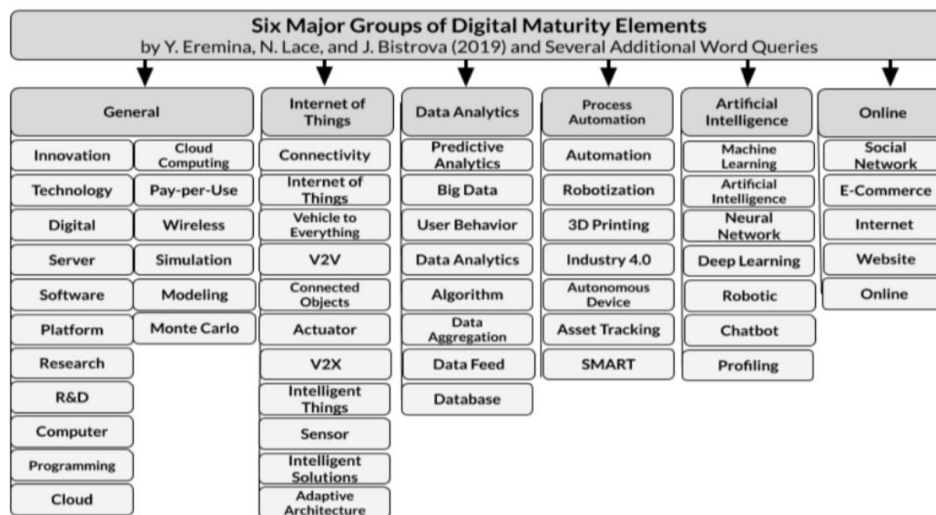


Figure 3.2. Text Queries Made by Eremina et al., 2019

The digital maturity score variable, or Digital, is an independent variable, according to the research hypothesis. A company's digital operations are described in as many digital words as possible, which determines the score. A query text model with features for measuring

digital maturity is used in this word calculation. In order to evaluate the digital operations of Baltic State companies, Eremina et al. (2019) developed the digital maturity meter. By examining the word count in the yearly report, this approach has proven to be accurate in gauging a business's digital activities. The Internet of Things, big data and data science, artificial intelligence, process automation, and 35 general and internet technologies are some of these components.

Table 3.2. Classification of Digital Maturity Index

Index	Description
0	The company's disclosures do not include any references to digital activities.
1	The company's mentions of digital terms are in the lowest third compared to other companies throughout the year
2	The company's mentions of digital terms are in the middle third compared to other companies throughout the year
3	The company's mentions of digital terms are in the highest third compared to other companies throughout the year

Those characteristics that have been taken out of text queries over a given amount of time are what make up this index. According to Chen and Srinivasan (2020), this coding has proven to be effective and valid in preventing noise and bias in measures of digital activity.

3.4.1.2. Earning per Share (EPS)

The profitability of a company's financial performance is evaluated using this ratio. By dividing profit or return by total assets, one may compute earnings per share (EPS), which shows how much return a business makes on its assets over the course of a year. Stockbrokers and investors use earnings per share (EPS) as a statistic to assess the market value of equity shares (Bhatt & JK, 2012). The calculation of EPS offers investors a reference point for analyzing a company before making investment decisions (Ramadhan et al., 2019). It has been concluded that factors such as EPS contribute to fluctuations in the share prices of FMCG companies (Dharia & Kakadia, 2015)

$$Earning\ per\ Share = \frac{Net\ Income - Preferred\ Dividends}{Weighted\ Average\ of\ Common\ Shares\ Outstanding} \quad (F1)$$

3.4.1.3. Sales Growth

Businesses evaluate their total performance by considering sales growth in addition to financial performance. Although it can be impacted by outside causes, sales growth is the overall rise in sales over a specific time period (Gupta et al., 2013). Numerous research has found a strong correlation between stock returns and sales growth, despite this sensitivity (Ajizah & Biduri, 2021; Nursiam & Rahayu, 2019; Okta & Hariasih, 2021; Pranata & Pujiati, 2015). The following formula is used to compute this ratio:

$$\text{Sales Growth} = \frac{\text{Total Revenue}_t - \text{Total Revenue}_{t-1}}{\text{Total Revenue}_{t-1}} \quad (\text{F2})$$

3.4.2. Dependent Variable

Based on studies assessing the effects of digital maturity and financial performance on stock returns, stock return (SR) is utilized as the dependent variable for hypothesis testing (Chen & Srinivasan, 2020; Erlangga & Soekarno, 2020; Dana Arta & Soekarno, 2022). The term "stock return" describes the increase in value that an investor gets from a company in relation to the stock's initial purchase price over a given time frame. Stock return takes into account capital gains or losses, in contrast to nominal return, which solely tracks price fluctuations. Investors must determine if they are able to bear the risk involved in the actual return on an investment. The following formula is used to compute this ratio:

$$\text{Stock Return} = \frac{P_t + \text{Dividends} - P_{t-1}}{P_{t-1}} \quad (\text{F3})$$

3.4.3. Control Variable

Control factors were included to stock return models because of several earlier research that demonstrated improvements in these models. Company Size (SIZE), Leverage (LEV), Age (AGE), and Earnings-to-Price Ratio (EP) are some of the control variables. Taking these control factors into consideration can modify the regression model and enhance the study's conclusions.

3.4.3.1. Firm Size

A common control variable when assessing financial performance is firm size (Pervan et al., 2017; Salim & Yadav, 2012; Chen & Srinivasan, 2019; Wroblewski, 2018). This is determined by calculating the natural logarithm of the company's total assets, as shown in the formula:

$$\text{Firm Size} = \ln(\text{Total Asset}) \quad (\text{F4})$$

This research expects that SIZE to have no significant effect on the ROA and NPM of the company adhering to the fact that companies do not consider their assets too much in generating profits (Niresh & Velnampy, 2014), and this applies to Indonesian public companies (Kartikasari & Merianti, 2016). Whereas SIZE is expected to have a positive significant effect on SG adhering to the previous literature (Bentzen al., 2012). This research is also expected to have positive effects towards the stock return of the company (Suhadak et al., 2019).

3.4.3.2. Firm Age

The age of the company is determined by taking the natural logarithm of its age or by deducting the years of the present period from the year of its founding. Stock returns and AGE are expected to be significantly correlated (Wijaya & Kim, 2023; Chen & Srinivasan, 2020; Jiang et al., 2022). The following formula is used to compute this ratio

$$Firm\ Age = \ln(\text{Number of Years since Founded}) \quad (F5)$$

3.4.3.3. Leverage

Leverage, which refers to the debt ratio, has been used as a control variable in prior studies on digital maturity (Chen and Srinivasan, 2019). It is measured using the following formula:

$$Leverage = \frac{\text{Total Debt}}{\text{Total Assets}} \quad (F6)$$

According to the pecking-order theory, LEV (leverage) is expected to negatively impact a company's profitability, as internal financing is preferred for achieving higher profitability. However, for sales growth (SG) and stock return (SR), LEV is expected to have no effect (Dey et al., 2018). Additionally, there is a very strong relationship between financial leverage and profitability (Rahmawati et al., 2023).

3.4.3.4. Price to Earnings Ratio

The ratio of a company's share price to its earnings per share (EPS) is called the price-to-earnings, or P/E. The P/E ratio, often known as the price or earnings multiple, is a helpful metric for assessing the stock value of a business. It helps when evaluating a company's valuation in relation to past performance, other businesses in the same sector, or the market (Fernando, 2024). The following formula can be used to determine the P/E ratio:

$$P/E\ ratio = \frac{\text{Stock Price}}{\text{Earning per Share}} \quad (F7)$$

Factors such as the P/E ratio contribute to the fluctuations in the share prices of different companies, and the share prices of all FMCG companies are not identical (Dharia & Kakadia, 2015). More broadly, the P/E ratio can determine stock returns (Yanti, 2012).

3.5. Data Analysis

To evaluate the hypotheses, this study utilizes panel data regression analysis. This approach involves conducting an Estimation Model Test to ascertain the suitability of the data for the intended model, determining whether Fixed, Common, or Random Effects are appropriate. Subsequently, Classical Assumption Tests are conducted to assess normality, autocorrelation, multicollinearity, and heteroscedasticity. These tests ensure the model provides the most accurate output for assessing the impact of digital maturity and financial performance on stock returns.

3.5.1. Estimation Model Test

To evaluate whether the data are suitable for the planned model and to determine whether Fixed, Common, or Random Effects are the most appropriate, an Estimation Model Test is required. Numerous tests, including the Hausman, Lagrange Multiplier, and Chow tests, are performed to identify the best-fit model. Every test is carried out using EViews 13.

3.5.1.1. Chow Test

To ascertain whether a model is better suited for use with fixed-effect or common-effect panel data models, the Chow Test is utilized. The following hypothesis is used to determine the most suitable technique for panel data estimation in this test.

*H*₀: The model tends to favor the Common Effect Model (CEM), as indicated by ($P > 0.05$).

*H*₁: The model tends to favor the Fixed Effect Model (FEM), as indicated by ($P \leq 0.05$).

The P-Value is below the 5% significance level if the fixed effect model (FEM) is identified by the Chow Test. On the other hand, the Hausman Test is carried out if the results of the Chow Test point to the Common Effect Model. The Hausman Test is used if the Chow Test points to a fixed effect model; the Lagrange Multiplier Test is used if the Chow Test points to a common effect model.

3.5.1.2. Hausman Test

When the Chow Test reveals that a Fixed Effect Model (FEM) is the outcome, the Hausman Test is carried out. The purpose of this test is to determine which type of model—fixed-effect or random effect—is more appropriate for use with REMs. The test determines the best technique for estimating panel data based on the following hypotheses.

H0: The model tends to favor the Random Effect Model (REM), as indicated by ($P > 0.05$).

H1: The model tends to favor the Fixed Effect Model (FEM), as indicated by ($P \leq 0.05$).

The null hypothesis is rejected if the Hausman Test results show that the fixed effect model (FEM) was selected because the P-Value is less than the significance level of 5%. On the other hand, the P-Value would be higher than 5% if the Hausman Test supports the random effect model. If the results show a tendency toward the Random Effect Model, the Lagrange Multiplier Test can be performed after the Hausman Test. On the other hand, the Lagrange Multiplier Test need not be carried out if the Hausman Test indicates that the Fixed Effect Model should be used.

3.5.1.3. The Lagrange Multiplier Test

When the Hausman Test yields a Random Effect Model result, the Lagrange Multiplier (LM) Test is employed (REM). Thus, the purpose of this test is to ascertain if the model under evaluation is better suited for use with Random Effect Models (REM) or Common-effect Models. The following hypothesis is used in this test to determine the most acceptable approach for panel data estimation.

H0: The model tends to favor the Common Effect Model (CEM), as indicated by ($P > 0.05$).

H1: The model tends to favor the Random Effect Model (REM), as indicated by ($P \leq 0.05$).

The null hypothesis is rejected if the Random effect model (REM) is chosen using the Lagrange Multiplier Test and the PValue is less than the 5% significance level. And the other way around. The best appropriate model to utilize is indicated by the outcome of the LM Test. Which way does it lean—the Common Effect Model or the Random Effect Model.

3.5.2. Classical Assumption Test

To ensure that the resulting model produces a BLUE (Best Linear Unbiased Estimator) estimate, it is necessary to evaluate the classical assumptions prior to constructing the regression model. Normality, autocorrelation, multicollinearity, and heteroscedasticity are among the traditional assumption tests. EViews 13 is used for these assumption tests in order to determine how robust the model is.

3.5.2.1. Normality Test

To ensure that the residuals obtained from the data meet the requirements for a normal distribution, a normality test is essential. The variance between the expected value and the regression is represented by the residual value. The Jarque-Bera (JB) test is used in the normalcy test via EViews 13. The following theories serve as a guide for making decisions.

H0: The model indicates a normal distribution, evidenced by ($P > 0.05$).

H1: The model indicates a non-normal distribution, evidenced by ($P < 0.05$).

But sometimes there are differences in the residual model, which doesn't matter in the panel data regression model. The Central Limit Theorem (CLT) allows the model to proceed even in cases when the residuals are not normally distributed, especially as it includes both time series and cross-sectional data. Additionally, normality is assumed to be met when there are more than 30 observations and the data consists of panel data (McClave et al., 2015). The Autocorrelation Test can now be applied to the data.

3.5.2.2. Autocorrelation Test

According to Ghozali (2013, p. 138), the autocorrelation test aims to examine whether there is a correlation between residual errors in a linear regression model between period t and the preceding period, $t-1$. If such correlation exists, it indicates the presence of autocorrelation issues. The Durbin-Watson test is used in the regression model. The decision-making process regarding the presence of autocorrelation (Ghozali, 2013:138) is as follows:

- a. If the DW statistic is located between the upper bound (du) and $(4-du)$, the autocorrelation coefficient is 0, which indicates that there is no autocorrelation.
- b. An autocorrelation coefficient greater than zero indicates positive autocorrelation when the DW statistic is less than the lower bound (dl).

- c. If the DW statistic is more than $(4-dl)$, the autocorrelation coefficient is less than zero, indicating negative autocorrelation.
- d. If the DW statistic falls between the upper bound (du) and the lower bound (dl) , or between $(4-dl)$, the results cannot be determined with certainty.

Autocorrelation test with Durbin-Watson method using EViews 13 application. After finding the results of the auto-correlation test, it can be continued with the multicollinearity test

3.5.2.3. Multicollinearity Test

A multicollinearity test was performed on all independent and control variables utilized in the panel data model to make sure there was no linkage among the independent variables while evaluating stock returns or the dependent variable. When predictor variables show correlation, multicollinearity happens (Jensen & Ramirez, 2013). The interpretation of the relationship between independent and dependent variables may be muddled by strong correlations between the independent variables. Consequently, if the correlation coefficient is less than 0.8 and the variance inflation factor (VIF) is less than 10, the multicollinearity test evaluates this. The regression variables that will be employed in the model are deemed valid if these requirements are satisfied.

3.5.2.4. Heteroscedasticity Test

A scenario known as heteroscedasticity occurs when two variables have different variations. This test demonstrates that the residuals are independent of the residuals of previous observations and have a consistent variance. The technique used to look whether or not or now not heteroscedasticity in the version in this look at is the Glejser take a look at. Glejser (1969) proposed a check statistic for becoming an auxiliary regression version wherein the reaction variable is absolutely the residual from the unique model and the layout matrix $Z'Z$ consists of one or extra exogenous variables which are suspected of being associated with the error variance. The check is achieved by means of comparing the significance of the test with alpha at 5% level. If the importance price is above 5%, then we conclude that it does not arise heteroscedasticity within the studies version. The significance value of all variables used in this observation is above 0.05 ($\alpha = 5\%$).

3.5.3. Research Model

By using panel data regression analysis, the research model seeks to answer all research questions. This study specifically aims to assess the impact of sales growth, profitability, and

digital maturity on stock returns. Because the data are cross-sectional and time-series in nature, panel data regression analysis utilizing ordinary least squares is used for data analysis. These evaluations are carried out using the EViews 13 program.

Based on the estimation tests, the Random Effect Model is identified as the most suitable choice for the model. Consequently, a single model is constructed to examine the impact of various independent variables on stock returns. The model is formulated as follows:

$$SR_{it} = \beta_0 + \beta_1 Digital_{it} + \beta_2 EPS_{it} + \beta_3 SG_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 AGE_{it} + \beta_7 PE_{it} \quad (F8)$$

The formula uses the independent variable *Digital_{it}* to reflect digital maturity, the dependent variable for stock return (*SR_{it}*) to represent earning per share (*RPS_{it}*), and the dependent variable for sales growth (*SG_{it}*). The control variables that come next are: *EP_{it}* (earnings to price), *AGE_{it}* (firm age), *LEV_{it}* (leverage), and *SIZE_{it}* (firm size).

The formula is derived from the operational variable's ratio described earlier. β represents the relative movement between the independent and dependent variables, while ε denotes the error term. Subsequently, the findings of the panel data regression can be analyzed in relation to the anticipated outcomes of the hypotheses and the findings of previous studies. Moreover, a reconciliation of results will be conducted if discrepancies arise between the findings and those of previous research.

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CHAPTER IV

DATA ANALYSIS

The data analysis resulting from the methodology covered in the preceding chapter is presented in the fourth chapter, which comes after the research design. The results of the hypothesis testing will be described in detail in this section. In addition to the standard assumption tests, it will offer estimation tests and descriptive analysis to assess how well the model fits the panel regression data. These protocols are designed to guarantee dependable data analysis outcomes that are in line with the study goal of employing panel data regression to test hypotheses.

4.1. Descriptive Statistic

This research looks at 45 observations from 2019 to 2023 that involve 9 different companies. Descriptive statistics will give readers a thorough understanding of the variables included in this investigation.

Table 4.1. Descriptive statistics of the data

List of Variables	N	Mean	Median	Max	Min	SD
<i>SR</i>	45	-9.86%	-11.73%	24.73%	-47.32%	0.171
<i>DIGITAL</i>	45	2	2	3	1	0.825
<i>EPS</i>	45	671.54	220.82	5654.99	37.21	1105.79
<i>SG</i>	45	4.82%	4.36%	29.32%	-21.23%	11.00%
<i>SIZE</i>	45	31.372	31.199	32.860	29.956	0.812
<i>LEV</i>	45	18.13%	17.72%	39.90%	0.00%	13.55%
<i>AGE</i>	45	3.917	3.932	4.762	2.303	0.686
<i>EP</i>	45	20.811	15.450	132.870	6.680	19.866

The mean, median, maximum value, lowest value, and standard deviation for each variable used in the regression analysis are displayed in the table. The data used to create these figures came from a sample of nine different organizations between 2019 and 2023.

Based on the provided table, a descriptive analysis of each research variable has been conducted. The dependent variable, Stock Return (SR), shows an average value of -9.86%, with a median of -11.73%. The stock returns range from a maximum of 24.73% to a minimum of -47.32%, and a standard deviation of 0.171 suggests significant variability in stock returns among the sample companies. The independent variable Digital Maturity (DIGITAL) has an average score of 2, a median of 2, with values ranging between 1 and 3. The standard deviation of 0.825 indicates moderate variability in digital maturity levels among the companies. The Earnings Per Share (EPS) variable presents an average value of 671.54 and a median of 220.82, with EPS values ranging from a minimum of 37.21 to a maximum of 5654.99. The high standard deviation of 1105.79 suggests considerable dispersion in profitability among the companies. The Sales Growth (SG) variable has an average growth of 4.82%, a median of 4.36%, and ranges from -21.23% to 29.32%. A standard deviation of 11.00 indicates significant variability in sales performance.

Among the control variables, Firm Size (SIZE) has an average value of 31.372, a median of 31.199, with values ranging from 29.956 to 32.860, and a standard deviation of 0.812, indicating moderate variation in the size of the companies. Leverage (LEV) has an average ratio of 18.13%, with a median of 17.72%. The leverage values range from 0.00% to 39.90%, and a standard deviation of 13.55 reflects substantial differences in the use of debt among the companies. Firm Age (AGE) shows an average of 3.917 years, a median of 3.932, with ages ranging from 2.303 to 4.762 years, and a standard deviation of 0.686, indicating some variation in the age of the companies. Lastly, the Earnings to Price Ratio (EP) has an average value of 20.811, a median of 15.450, with values ranging from 6.680 to 132.870. The standard deviation of 19.866 indicates substantial variability in the earnings to price ratios among the companies.

4.2. Estimation Model Test

The best method for panel data regression estimation is ascertained through three tests. To ascertain whether to use the fixed-effect approach or the common effect, the first test—the fixed effect significance test, or Chow test—was applied. The Hausman test then establishes if an effect is random or fixed. Finally, a general effect was separated from a random effect using the Lagrange Multiplier (LM) test. Every test was conducted using EViews 13.

4.2.1. Chow Test

The Chow test determines whether model is better suited for the regression model: the fixed effect model or the common effect model. The null hypothesis is accepted if the Cross-section F probability value is greater than 0.05, indicating that the panel data regression model with the common effect model is a better fit than the model with the fixed effect. On the other hand, the null hypothesis is rejected if the Cross-section F probability value is less than 0.05, suggesting that the fixed effect panel data regression model is better than the common effect model.

Table 4.2. Chow Test Result from EVIEWS13

Redundant Fixed Effect Test Test cross-section Fixed Effect			
Effect Test	Statistic	d.f.	Prob.
Cross-section	10.721880	8	0.2180

The Chow test indicates that the probability value (p-value) of the Cross-section F in the panel data regression model is greater than the 5% significance threshold (0.05) based on the above table. These results support the validity of the null hypothesis, which shows that the common effect model performs better than the fixed effect model. The Hausman test was used to compare the fixed effect and random effect techniques once the Chow test was finished.

4.2.2. Hausman Test

For panel data regression, the Hausman test is used to determine whether to use a fixed effect or random effect model. The data gathered from the test outcomes shows the following:

Table 4.3. Hausman Test Result from EVIEWS13

Correlated Random Effects - Hausman Test Test cross-section Random Effect			
Effect Test	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.537931	7	0.3751

The following table shows that the random cross-section p-value in the panel data regression model is greater than the 5% significance level (0.05). These results support the null hypothesis, which states that the random effect model outperforms the fixed effect model.

After the Hausman test is complete, the Lagrange Multiplier test is performed to evaluate the common effect and random effect techniques.

4.2.3. Lagrange Multiplier Test

To choose between using a random effect or common effect model for the panel data regression, the Lagrange Multiplier test is employed. The data obtained from the examination outcomes suggests the following:

Table 4.4. LM Test Result from EVIEWS13

Lagrange Multiplier Test for Random Effects Alternative Hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives			
Effect Test	Statistic	d.f.	Prob.
Cross-section	3.024328	8	0.0820

The probability value (p-value) of the Breusch-Pagan test from the regression model is greater than the 5% significance level, according to the Lagrange Multiplier test results displayed in the table. This suggests acceptance of the null hypothesis. These results imply that the common effect model outperforms the random effect model in terms of effectiveness. Therefore, it has been determined that the common effects approach is the recommended way for the panel data regression model, considering the results of the Chow test, Hausman test, and Lagrange multiplier test.

4.3. Classical Assumption Test

4.3.1. Normality

Testing for normality of the data is essential to verify that the residuals conform to the assumption of normal distribution. This study employs the Jarque-Bera (JB) test using EVIEWS13 for this purpose.

Table 4.5. Normality Test Result from EVIEWS13

Panel Data	Jarque-Berra	Prob.	Alpha	Decision
Stock Return	0.56480	0.75392	0.05	Normal

SR model: Independent variables are Digital EPS SG, and Control variables are SIZE LEV AGE EP.

When the probability value of the model is greater than alpha 5% (0.05), the normality test conducted with the Jarque-Bera method indicates that either the null hypothesis is accepted, or the residual data is normally distributed.

4.3.2. Autocorrelation

Table 4.6. Autocorrelation Test Result from EViews13

Panel Data	Durbin-Watson stat	Decision
Stock Return Model	2.302129	Normal

Number of Independent variables: 3

Number of Sample: 45

To determine the acceptable range of the Durbin-Watson statistic, one must first find the upper limit (Du) based on the number of independent variables and the sample size used in the model (Ghozali, 2013:138). For instance, if there are 3 independent variables and 45 samples, the upper limit Du is calculated to be 1.48. Subsequently, the upper and lower bounds for the DW statistic suitable for this model are identified as 1.48 to 2.52. Since the Durbin-Watson statistic for this model falls within this range, it indicates that the model does not exhibit autocorrelation (AKHMAD.COM, 2024).

4.3.3. Multicollinearity

A multicollinearity test was performed on all independent and control variables utilized in the panel data model to make sure there is no linkage between them while evaluating stock returns.

Table 4.7. Multicollinearity Test Result from EViews13

List of Variables	DIGITAL	EPS	SG	SIZE	LEV	AGE	PE	VIF
DIGITAL	1	-0.42	-0.06	-0.03	0.01	0.21	-0.09	1.409
EPS		1	0.12	0.35	0.03	-0.04	-0.22	1.564
SG			1	0.23	0.30	-0.28	-0.28	1.235
SIZE				1	0.41	-0.38	-0.23	2.055
LEV					1	-0.67	-0.02	2.084
AGE						1	-0.05	2.386
PE							1	1.280

The Variance Inflation Factor (VIF) values suggest that none of the variables exhibit significant multicollinearity, based on the findings of the multicollinearity test. Since the VIF values are less than 10 and the probability for each pair of variables is less than 0.8, it is possible that the correlations between the variables are not overly high (usually, a VIF of less than 10 is deemed acceptable). As a result, the model is regarded as trustworthy and free of multicollinearity problems. At this point, the analysis can evaluate heteroscedasticity.

4.3.4. Heteroscedasticity

To determine whether the panel data regression model has heteroscedasticity issues, the Glejser test is utilized in the heteroscedasticity test.

Table 4.8. Heteroscedasticity Test Result from EVIEWS13

Panel Data	Prob.	Decision
DIGITAL	0.0798	Normal
EPS	0.4718	Normal
SG	0.6117	Normal
AGE	0.8281	Normal
LEV	0.6465	Normal
PE	0.5406	Normal
SIZE	0.8319	Normal

It is evident from the probability results above that there aren't any values that are less than 0.05. Thus, it may be said that the multiple regression model's homoscedasticity assumption has not been broken. Additionally, the results of the tests indicate that the data is error-free and trustworthy for additional analysis, making it possible to assess the panel regression data based on the traditional assumption tests.

4.4. Panel Data Regression

Panel data regression will be utilized to investigate the impact of Digital Maturity, Profitability, and Sales Growth on stock returns. The data quality will be verified by a traditional assumption test. The computation results are based on whether the estimate test is adequate, and in order to produce trustworthy findings, the common effect model is specially used.

Three independent factors make up the stock return model: sales growth (SG), profitability as determined by earnings per share (EPS), and digital maturity (Digital). The model also includes control variables to improve the robustness of the panel data regression model utilized in this study, such as firm age (AGE), leverage (LEV), size of the firm (SIZE), and earnings to price (EP) ratio.

Table 4.9. Panel Data Regression Result from EVIEWS13

Variables	Stock Return (SR)		
	Coefficient	t-statistic	Prob
Constant	-0.022038	-0.019126	0.9848
Independent Variable			
DIGITAL	-0.038264	-1.103953	0.2767
EPS	-5.59E-05	-2.084371	0.0441**
SG	0.507228	2.111044	0.0416**
Control Variable			
SIZE	0.008018	0.226867	0.8218
LEV	-0.031592	-0.125540	0.9008
AGE	-0.057347	-1.124467	0.2681
PE	-0.000394	-0.296594	0.7684
Statistic			
R Squared	0.289469		
Adjusted R-Squared	0.155044		
F-Statistic	2.153386		
Prob (F-Statistic)	0.061699*		

The table shows panel regression result where $p < 0.1^*$, $< 0.05^{**}$, $< 0.001^{***}$. The coefficient and probabilities of each variable are represented in the cells of each variable. Digital stands for digital maturity, EPS for Earning per Share, SG for Sales Growth, and the control variables SIZE for company size, LEV for leverage, AGE for company age, and EP for Earnings to Price.

According to the above table, the following are the results of the model's panel data regression equation:

$$\text{SR} = -0.0220377217714 - 0.0382640286368 \cdot \text{DIGITAL} - 5.58953164858 \times 10^{-5} \cdot \text{EPS} + 0.507228030898 \cdot \text{SG} - 0.0573470075794 \cdot \text{AGE} - 0.0315924355609 \cdot \text{LEV} - 0.000394246647139 \cdot \text{PE} + 0.00801833672933 \cdot \text{SIZE} + \text{it}$$

Based on the results shown in the table and the equation:

1. Constant: The constant term in the regression model is -0.022038 with a t-statistic of -0.019126 and a probability value of 0.9848, which indicates that it is not statistically significant.
2. Independent Variables
 - a. Digital Maturity (DIGITAL): The coefficient for DIGITAL is -0.038264, with a t-statistic of -1.103953 and a probability value of 0.2767. This implies that DIGITAL has a negative effect on Stock Return (SR), but this effect is not statistically significant at the 1%, 5%, or 10% significance levels.
 - b. Earnings per Share (EPS): The coefficient for EPS is -5.59×10^{-5} , with a t-statistic of -2.084371 and a probability value of 0.0441. This indicates that EPS has a negative and statistically significant impact on Stock Return at the 5% significance level.
 - c. Sales Growth (SG): The coefficient for SG is 0.507228, with a t-statistic of 2.111044 and a probability value of 0.0416. This suggests that SG has a positive and statistically significant effect on Stock Return at the 5% significance level.
3. Control Variables
 - a. Firm Size (SIZE): The coefficient for SIZE is 0.008018, with a t-statistic of 0.226867 and a probability value of 0.8218. This indicates that SIZE has no statistically significant effect on Stock Return.
 - b. Leverage (LEV): The coefficient for LEV is -0.031592, with a t-statistic of -0.125540 and a probability value of 0.9008, showing that LEV does not have a statistically significant effect on Stock Return.
 - c. Firm Age (AGE): The coefficient for AGE is -0.057347, with a t-statistic of -1.124467 and a probability value of 0.2681. This implies that AGE does not have a statistically significant effect on Stock Return.

- d. Price-to-Earnings (PE) Ratio: The coefficient for PE is -0.000394, with a t-statistic of -0.296594 and a probability value of 0.7684, indicating that PE does not have a statistically significant effect on Stock Return.

4. Model Statistics

- a. R Squared: The R-squared value is 0.289469, suggesting that approximately 28.95% of the variability in Stock Return can be explained by the model.
- b. Adjusted R-Squared: The adjusted R-squared value is 0.155044, which adjusts the R-squared value for the number of predictors in the model.
- c. F-Statistic: The F-statistic value is 2.153386 with a probability (F-Statistic) of 0.061699. This indicates that the overall model is statistically significant at a level slightly above the conventional 5% threshold, more precisely at 10%. Suggesting that the independent and control variables combined have a significant explanatory power on Stock Return.

In conclusion, the regression analysis indicates that while some variables such as Sales Growth (SG) and Earnings per Share (EPS) show significant relationships with Stock Return, others like Digital Maturity (DIGITAL), Firm Size (SIZE), Leverage (LEV), Firm Age (AGE), and Price-to-Earnings (PE) Ratio do not demonstrate statistically significant effects within this model. The overall model explains about 28.95% of the variance in Stock Return, and the significant F-statistic suggests the model is a good fit for the data.

4.5. Result Discussion

The panel data regression is finished, and then the findings about how sales growth, profitability, and digital maturity affect stock returns are discussed. The accompanying table provides a summary of the analysis results. Furthermore, a thorough explanation of how sales growth, profitability, and digital maturity affect stock returns will be given.

Table 4.10. Summary of Result Discussion

Independent Variables	Expected Effect on Stock Return	Result of This Study
Digital Maturity (<i>Digital</i>)	Positive	Insignificant Negative
Profitability (<i>EPS</i>)	Positive	Significantly Negative
Sales Growth (<i>SG</i>)	Positive	Significantly Positive

4.6. The Effect Digital Maturity on Stock Return

The results of the panel data regression show that there is no statistically significant correlation between stock returns and digital maturity. Therefore, the premise that digital maturity has a major impact on FMCG companies' stock returns is not supported by these findings. Moreover, this result runs counter to other studies that claim a high level of digital maturity improves a company's profitability, efficiency, and stock returns (Chen & Srinivasan, 2020; Hirshleifer et al., 2013). This discrepancy could be due to the annual reports, which contain keywords for digital maturity, being accessible only one year later. Consequently, many relevant factors may have been overlooked, and other considerations may have arisen during that period. Previous research (Chen & Srinivasan, 2020) supports this by showing that the disclosure of digital operations is somewhat sluggish, postponing the reflection of these activities in the performance results of the organization. Furthermore, because they do not place a strong priority on disclosing their digital operations in the annual report, FMCG companies with high levels of digital maturity may not notice an influence on firm value as determined by stock returns. Rather, they concentrate on how digital maturity affects more productive corporate processes. Consequently, there is no discernible relationship between these companies' stock returns and their level of digital maturity.

4.7. The Effect Profitability on Stock Return

It is clear from the panel data regression results that EPS, which is a measure of profitability, significantly affects stock returns. With a significance level of 5%, the results demonstrate that EPS has a negative effect, suggesting that EPS will significantly lower stock returns in FMCG companies. This backs up other research that discovered EPS has a big impact on stock returns (Dharia & Kakadia, 2015; Riyanti, 2012; Ashe Kusuma & Denies Priantinah, 2012; Putra & Kindangen, 2016). This indicates that investors and stockbrokers utilize earnings per share (EPS) as a criterion to ascertain the market value of equity shares (Bhatt & JK, 2012). The findings of this investigation, however, also run counter to certain earlier findings that suggested EPS positively affects stock returns. Given that EPS has a negative impact on stock returns, it is possible that investors do not always receive higher stock returns even when the quantity of money created per outstanding common share rises (Sinambela, 2013). If the study had been done on different industries, years, policies, and types of companies, different conclusions might have been reached.

4.8. The Effect Sales Growth on Stock Return

At a significant level of 5%, Sales Growth (SG) exhibits a positive effect and yields distinct results. Given that sales growth is a key factor in determining a company's worth, this suggests that higher sales growth greatly increases stock returns in FMCG companies. This result supports earlier research that found a significant increase in sales causes stock values to climb (Ajizah & Biduri, 2021; Jegadeesh, 2002; Nursiam & Rahayu, 2019; Okta & Hariasih, 2021; Pranata & Pujiati, 2015). But given that sales growth is a delicate variable impacted by both internal and external business factors, this finding needs more consideration. (Gupta et al., 2020). Economic, societal, political, regulatory, and demographic variables are examples of external forces. Because internal and external forces influence each other, a proper plan is necessary to capitalize on opportunities. (Gupta et al., 2013).

4.9. Research Implication

The findings from the results carry several implications for both Indonesian firms' management and their investors concerning the level of digital maturity evaluated through digital activity disclosure among companies listed in the KOMPAS100 index. Initially, from a managerial standpoint, the upward trend in digital maturity among Indonesian firms suggests a broadening acceptance and integration of digital technologies over the years. Corporate management and investors can draw conclusions about the relationship between corporate returns and digital activities, particularly with regard to digital maturity, profitability, and sales growth in Indonesian technology companies, based on the analysis and discussion conducted.

Given that sales growth significantly impacts company returns, management can more effectively consider factors sensitive to sales. Additionally, these factors may be influenced by internal and external elements affecting business growth, such as external factors including investor sentiment towards changes in earnings per share. This can impact stock returns for investors and subsequently affect the company's image and valuation, especially in the FMCG industry. Moreover, because growth happens gradually, there are a lot of obstacles to overcome at every stage (Gupta et al., 2020). These difficulties include outside variables like sociocultural, political, regulatory, economic, and demographic circumstances. Consequently, leveraging possibilities requires a suitable approach, acknowledging that external dynamics impact internal aspects (Gupta et al., 2013).

Based on the research findings, it can also be implied that sales growth and earnings per share (EPS) should be prioritized due to their significant effects on company stock value measured by stock returns in the FMCG industry. Furthermore, looking ahead, with advanced technology and rapid information dissemination, digital activity disclosure is poised to become a matrix that investors consider and evaluate. As noted by Chen & Srinivasan (2020), a company's performance results may be delayed if its digital operations are disclosed at a relatively sluggish pace. Therefore, investors are advised to exercise caution when selecting stocks from companies that are likely to develop and provide greater benefits in the future.

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This study centers on FMCG (Fast-Moving Consumer Goods) companies, analyzing how digital maturity, financial performance (measured by EPS), and sales growth from 2019 to 2023 influence their stock returns. The descriptive analysis reveals a diverse range of conditions and risks related to stock returns in the FMCG sector. By incorporating elements from previous research techniques, such as those by Eremina et al. (2019), and applying a noise minimization method in digital activity coding using the tercile-based approach developed by Chen & Srinivasan (2020) to measure the digital maturity index, the study employs panel data regression to analyze the data.

RQ 1: What is the relationship between the level of digital maturity have on stock returns in the Indonesian FMCG industry?

The findings indicate that the disclosure of digital activities in annual reports does not have a significant relationship with the stock returns. This suggests that, although digital transformation is crucial, it does not directly translate to immediate financial benefits in terms of stock returns within the FMCG sector. Companies with higher digital maturity do not necessarily achieve better stock performance. Thus, companies must consider additional factors and strategies to realize the full potential of their digital investments.

RQ 2: In what way does the relationship between profitability and stock returns in Indonesian FMCG companies?

Profitability, measured through earnings per share (EPS), presents mixed results. The analysis shows that EPS has a significant relationship on stock returns, which contrasts with some previous studies. While traditionally higher profitability is expected to lead to better stock performance, this negative correlation might stem from varying investment behaviors across industries, timeframes, and other distinct factors (Statman, 1995). It highlights the complexity of profitability's role in influencing stock returns and suggests that factors beyond simple profitability metrics must be considered to understand stock performance fully.

RQ 3: How does the relationship between sales growth and stock returns in Indonesian FMCG companies?

Sales growth, on the other hand, demonstrates a significant and positive relationship on stock returns. The study confirms that robust sales growth is a fundamental driver of a company's operations, geared towards revenue generation and profitability. Companies that exhibit strong sales growth are perceived as having solid market positions and future growth potential, making them attractive to investors. This positive relationship underscores the importance of maintaining and enhancing sales performance to boost investor confidence and stock market performance.

In summary, the study offers critical insights into the factors influencing stock returns in the Indonesian FMCG industry. While digital maturity alone does not significantly impact stock returns, it remains a vital component of a comprehensive strategy that includes robust sales growth and careful consideration of profitability measures. The findings suggest that companies need to adopt a holistic approach, integrating digital transformation with traditional financial and operational strategies, to achieve sustainable stock performance. Investors and stakeholders should consider a multifaceted view when evaluating the potential of FMCG companies, considering the intricate interplay between digital activities, profitability, and sales growth.

5.2. Recommendation

5.2.1. Theoretical

The findings of this study highlight the complex and often non-linear relationship between digital maturity and stock returns in the Indonesian FMCG industry. Future research should delve deeper into understanding the underlying mechanisms and contextual factors that influence this relationship. Scholars are encouraged to explore longitudinal studies that track the long-term impacts of digital transformation on financial performance and market perception. Additionally, incorporating qualitative methods, such as case studies and expert interviews, could provide richer insights into the strategic and operational challenges companies face during their digital transformation journeys. Further theoretical development is needed to refine the constructs of digital maturity and to identify more precise metrics that capture the multifaceted nature of digital transformation.

5.2.2. Practical

Investors should exercise caution when evaluating the digital maturity of FMCG companies as a sole criterion for investment decisions. The study reveals that higher digital maturity does not necessarily translate into better stock performance. Investors are advised to adopt a holistic approach by considering a combination of financial performance indicators, such as profitability and sales growth, along with digital maturity. Diversifying investment portfolios and conducting thorough due diligence on how companies integrate and leverage digital technologies in their core operations can help mitigate risks. Moreover, investors should stay informed about industry trends and regulatory changes that might affect the digital landscape and, consequently, investment outcomes.

5.2.3. Managerial

For corporate managers in the FMCG sector, this study underscores the importance of aligning digital transformation initiatives with broader business goals. Companies should not only invest in advanced technologies but also focus on enhancing their operational efficiency and market competitiveness. It is crucial to integrate digital strategies into the overall corporate strategy to ensure that digital investments contribute meaningfully to financial performance. Managers are encouraged to foster a culture of innovation and continuous improvement, enabling the organization to adapt swiftly to technological changes. Additionally, providing training and development programs to enhance employees' digital skills can maximize the benefits of digital transformation initiatives. Regularly assessing and refining digital strategies based on performance metrics and market feedback will be essential in maintaining a competitive edge in the industry.

5.3. Opportunities for Future Studies

As a result, companies in Indonesia, particularly in the FMCG sector, are still in a growth phase. Additionally, this research is constrained by several factors, notably the limited number of observations and the temporal dimension due to data availability, primarily derived from annual reports which typically cover a five-year period. Moreover, the measurement of digital maturity relies heavily on the annual report disclosures of companies, using terminology consistent with previous research. This approach carries risks as each year may introduce new technologies, expanding the lexicon available for use. Therefore, future studies could broaden the scope by increasing the number of observations through a larger sample size that includes companies beyond those listed in the KOMPAS100 Index and

potentially extends into neighboring countries. Furthermore, expanding data sources to include social media, press releases, and news could provide a more comprehensive view, considering the increasing prevalence of discussions on digital technologies in various forms of disclosure.

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APPENDIX 1 WORD QUERIES

Text Queries Made by Eremina et al., 2019

General	Internet of Things	Data Analytics
Innovation Technology Cloud Computing Pay-per-use Digital Wireless Server Simulation Software Modelling Modeling Platform Monte Carlo Research R&D Computer Programming Cloud	Connectivity Internet of Things Vehicle to Everything V2V Connected Object Actuator V2X Intelligent Things Sensor Intelligent Solutions Adaptive Architecture	Predictive analytics Big data User behavior Data Analytics Algorithm Data aggregation Data Feed Database
Process Automation	Artificial intelligence	Online Things
Automation Robotization 3D printing Industry 4.0 Autonomous device Asset tracking SMART	Machine learning Artificial intelligence Neural network Deep learning Robotic Chatbot Profiling	Social network E-commerce Internet Website online

APPENDIX 2 ESTIMATION MODEL TEST

Chow Test

Redundant Fixed Effects Tests				
Equation: Untitled				
Test cross-section fixed effects				
Effects Test	Statistic	d.f.	Prob.	
Cross-section F	0.975285	(8,29)	0.4743	
Cross-section Chi-square	10.721880	8	0.2180	
Cross-section fixed effects test equation:				
Dependent Variable: SR				
Method: Panel Least Squares				
Date: 06/10/24 Time: 15:33				
Sample: 2019 2023				
Periods included: 5				
Cross-sections included: 9				
Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022038	1.152253	-0.019126	0.9848
DIGITAL	-0.038264	0.034661	-1.103953	0.2767
EPS	-5.59E-05	2.68E-05	-2.084371	0.0441
SG	0.507228	0.240274	2.111044	0.0416
AGE	-0.057347	0.050999	-1.124467	0.2681
LEV	-0.031592	0.251653	-0.125540	0.9008
PE	-0.000394	0.001329	-0.296594	0.7684
SIZE	0.008018	0.035344	0.226867	0.8218
R-squared	0.289469	Mean dependent var	-0.098638	
Adjusted R-squared	0.155044	S.D. dependent var	0.171599	
S.E. of regression	0.157737	Akaike info criterion	-0.695969	
Sum squared resid	0.920591	Schwarz criterion	-0.374784	
Log likelihood	23.65930	Hannan-Quinn criter.	-0.576235	
F-statistic	2.153386	Durbin-Watson stat	2.302129	
Prob(F-statistic)	0.061699			

Hausman Test

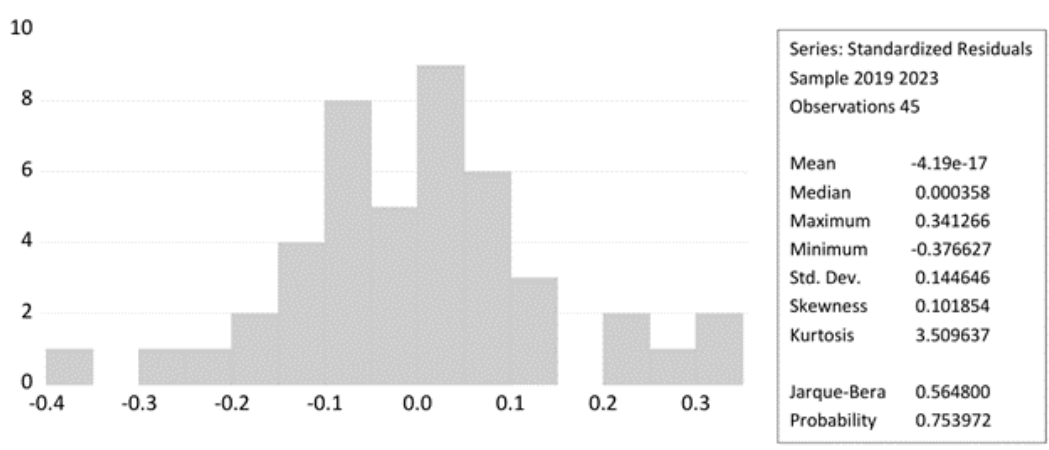
Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	7.537931	7	0.3751	
** WARNING: estimated cross-section random effects variance is zero.				
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
DIGITAL	0.044935	-0.038264	0.007977	0.3516
EPS	-0.000025	-0.000056	0.000000	0.5095
SG	0.675676	0.507228	0.008225	0.0633
AGE	1.482878	-0.057347	0.487806	0.0274
LEV	-1.280127	-0.031592	0.623462	0.1138
PE	0.002435	-0.000394	0.000002	0.0267
SIZE	0.102525	0.008018	0.022177	0.5257

Lagrange-Multiplier Test

Lagrange Multiplier Tests for Random Effects			
Null hypotheses: No effects			
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	3.024328 (0.0820)	0.177516 (0.6735)	3.201844 (0.0736)
Honda	-1.739060 (0.9590)	-0.421326 (0.6632)	-1.527624 (0.9367)
King-Wu	-1.739060 (0.9590)	-0.421326 (0.6632)	-1.348058 (0.9112)
Standardized Honda	-0.761817 (0.7769)	-0.147917 (0.5588)	-4.230026 (1.0000)
Standardized King-Wu	-0.761817 (0.7769)	-0.147917 (0.5588)	-3.819982 (0.9999)
Gourieroux, et al.	--	--	0.000000 (1.0000)

APPENDIX 3 CLASSICAL ASSUMPTION TEST

Normality Test



Autocorrelation Test

Dependent Variable: SR Method: Panel Least Squares Date: 06/10/24 Time: 15:40 Sample: 2019 2023 Periods included: 5 Cross-sections included: 9 Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022038	1.152253	-0.019126	0.9848
DIGITAL	-0.038264	0.034661	-1.103953	0.2767
EPS	-5.59E-05	2.68E-05	-2.084371	0.0441
SG	0.507228	0.240274	2.111044	0.0416
AGE	-0.057347	0.050999	-1.124467	0.2681
LEV	-0.031592	0.251653	-0.125540	0.9008
PE	-0.000394	0.001329	-0.296594	0.7684
SIZE	0.008018	0.035344	0.226867	0.8218
R-squared	0.289469	Mean dependent var	-0.098638	
Adjusted R-squared	0.155044	S.D. dependent var	0.171599	
S.E. of regression	0.157737	Akaike info criterion	-0.695969	
Sum squared resid	0.920591	Schwarz criterion	-0.374784	
Log likelihood	23.65930	Hannan-Quinn criter.	-0.576235	
F-statistic	2.153386	Durbin-Watson stat	2.302129	
Prob(F-statistic)	0.061699			

Multicollinearity Test

	AGE	DIGITAL	EPS	LEV	PE	SG	SIZE
AGE	1.000000	0.212209	-0.044329	-0.671071	-0.052677	-0.284385	-0.383408
DIGITAL	0.212209	1.000000	-0.422312	0.017146	-0.092150	-0.060741	-0.033017
EPS	-0.044329	-0.422312	1.000000	0.031336	-0.227050	0.129946	0.350632
LEV	-0.671071	0.017146	0.031336	1.000000	-0.025861	0.306209	0.414306
PE	-0.052677	-0.092150	-0.227050	-0.025861	1.000000	-0.281012	-0.233415
SG	-0.284385	-0.060741	0.129946	0.306209	-0.281012	1.000000	0.230559
SIZE	-0.383408	-0.033017	0.350632	0.414306	-0.233415	0.230559	1.000000

Variance Inflation Factors			
Date: 07/02/24 Time: 22:58			
Sample: 1 45			
Included observations: 45			
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.963798	3550.297	NA
AGE	0.002870	82.00610	2.386599
DIGITAL	0.001170	9.867012	1.409573
EPS	7.24E-10	2.154562	1.564470
LEV	0.064226	5.901768	2.084137
PE	1.84E-06	2.717608	1.280430
SG	0.057789	1.478276	1.235533
SIZE1	0.001763	3139.335	2.055864

Heteroscedasticity Test (Glejser Test)

Dependent Variable: ABS(RESID)				
Method: Panel Least Squares				
Date: 06/10/24 Time: 15:52				
Sample: 2019 2023				
Periods included: 5				
Cross-sections included: 9				
Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.126079	0.672504	-0.187477	0.8523
DIGITAL	0.036444	0.020230	1.801502	0.0798
EPS	-1.14E-05	1.57E-05	-0.726964	0.4718
SG	0.071797	0.140234	0.511977	0.6117
AGE	0.006509	0.029765	0.218668	0.8281
LEV	0.067915	0.146875	0.462399	0.6465
PE	-0.000479	0.000776	-0.617659	0.5406
SIZE	0.004409	0.020628	0.213721	0.8319
R-squared	0.191551	Mean dependent var	0.108802	
Adjusted R-squared	0.038601	S.D. dependent var	0.093892	
S.E. of regression	0.092062	Akaike info criterion	-1.772900	
Sum squared resid	0.313589	Schwarz criterion	-1.451716	
Log likelihood	47.89026	Hannan-Quinn criter.	-1.653166	
F-statistic	1.252375	Durbin-Watson stat	2.193413	
Prob(F-statistic)	0.300309			

APPENDIX 4
PANEL DATA REGRESSION

Dependent Variable: SR				
Method: Panel Least Squares				
Date: 06/10/24 Time: 15:55				
Sample: 2019 2023				
Periods included: 5				
Cross-sections included: 9				
Total panel (balanced) observations: 45				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022038	1.152253	-0.019126	0.9848
DIGITAL	-0.038264	0.034661	-1.103953	0.2767
EPS	-5.59E-05	2.68E-05	-2.084371	0.0441
SG	0.507228	0.240274	2.111044	0.0416
AGE	-0.057347	0.050999	-1.124467	0.2681
LEV	-0.031592	0.251653	-0.125540	0.9008
PE	-0.000394	0.001329	-0.296594	0.7684
SIZE	0.008018	0.035344	0.226867	0.8218
R-squared	0.289469	Mean dependent var	-0.098638	
Adjusted R-squared	0.155044	S.D. dependent var	0.171599	
S.E. of regression	0.157737	Akaike info criterion	-0.695969	
Sum squared resid	0.920591	Schwarz criterion	-0.374784	
Log likelihood	23.65930	Hannan-Quinn criter.	-0.576235	
F-statistic	2.153386	Durbin-Watson stat	2.302129	
Prob(F-statistic)	0.061699			

APPENDIX 5 COLLECTED DATA

No	Ticker	Name	File Name	References or Digital Maturity	Digital Maturity Level	Adj. Closed Price (1 Jan Y0)	Adj. Closed Price (1 Jan Y+1)	Stock Return	Annual Net Income (Y0)	Total Asset (Y0)	ROA	Total Revenue (Y0)	Total Revenue (Y-1)	Sales Growth	Firm Size = Total Asset (Y0)	Size	Total Debt (Y0)	Leverage	Firm Age	EPS	P/E Ratio	
1	AALI	Astra Agro Lestari Tbk.	AALI 2019	228	1.00	11,795.94	10,209.68	13.45%	211,117,000,000	26,974,124,000,000.00	0.78%	17,452,700,000,000	19,084,387,000,000	-8.55%	26,974,124,000,000.00	31	5,785,000,000,000.00	21.45%	3.433987204	109.69	132.87	
			AALI 2020	253	1.00	10,209.68	9,702.50	-4.97%	833,090,000,000	27,781,231,000,000	3.00%	18,807,000,000,000	17,452,700,000,000	7.76%	27,781,231,000,000	31	5,858,300,000,000.00	21.09%	3.465735903	432.84	28.47	
			AALI 2021	329	2.00	9,702.50	8,824.39	-9.05%	1,971,365,000,000	30,399,906,000,000	6.48%	24,322,000,000,000	18,807,000,000,000	29.32%	30,399,906,000,000	31	5,818,100,000,000.00	19.14%	3.496507561	1024.25	9.28	
			AALI 2022	353	2.00	8,824.39	7,616.09	13.69%	1,726,607,000,000	29,249,340,000,000	5.90%	21,828,600,000,000	24,322,000,000,000	-10.25%	29,249,340,000,000	31	4,053,800,000,000.00	13.86%	3.526360525	897.08	8.95	
			AALI 2023	326	2.00	7,616.09	6,722.80	11.73%	1,055,897,000,000	28,846,243,000,000	3.66%	20,745,500,000,000	21,828,600,000,000	-4.96%	28,846,243,000,000	31	4,005,100,000,000.00	13.88%	3.555348061	548.61	12.81	
2	CPIN	Charoen Pokphand Indonesia Tbk	CPIN 2019	283	1.00	6,736.27	6,199.86	-7.96%	3,644,672,000,000	29,109,408,000,000	12.52%	42,501,100,000,000	53,957,604,000,000	-21.23%	29,109,408,000,000	31	5,048,000,000,000.00	17.34%	3.850147602	221.65	29.33	
			CPIN 2020	131	1.00	6,199.86	5,432.33	12.38%	3,842,083,000,000	31,159,291,000,000	12.33%	42,518,800,000,000	42,501,100,000,000	0.04%	31,159,291,000,000	31	4,454,500,000,000.00	14.30%	3.871201011	234.3	27.85	
			CPIN 2021	142	1.00	5,432.33	6,059.67	11.55%	3,620,961,000,000	35,446,051,000,000	10.22%	51,698,200,000,000	42,518,800,000,000	21.59%	35,446,051,000,000	31	6,282,400,000,000.00	17.72%	3.891820298	220.82	26.95	
			CPIN 2022	134	1.00	6,059.67	5,717.13	-5.65%	2,928,342,000,000	39,847,545,000,000	7.35%	56,867,500,000,000	51,698,200,000,000	10.00%	39,847,545,000,000	31	9,343,300,000,000.00	23.45%	3.912023005	178.58	31.64	
			CPIN 2023	140	1.00	5,717.13	4,480.00	21.64%	2,318,584,000,000	40,970,800,000,000	5.66%	61,615,800,000,000	56,867,500,000,000	8.35%	40,970,800,000,000	31	9,577,000,000,000.00	23.38%	3.931825633	141.39	35.54	
3	GGRM	Gudang Garam Tbk.	GGRM 2019	102	1.00	67,230.54	46,368.22	31.03%	10,880,701,000,000	78,647,274,000,000.00	13.83%	110,523,800,000,000	95,707,663,000,000	15.48%	78,647,274,000,000.00	32	17,413,100,000,000.00	22.14%	4.110873864	5654.99	9.37	
			GGRM 2020	135	1.00	46,368.22	31,362.46	32.36%	7,647,725,000,000	78,191,409,000,000	9.78%	114,477,300,000,000	110,523,800,000,000	0	3.58%	78,191,409,000,000	32	6,185,900,000,000.00	7.91%	4.127134385	3974.73	10.32
			GGRM 2021	152	1.00	31,362.46	27,220.44	13.21%	5,605,315,000,000	89,964,369,000,000	6.23%	124,881,300,000,000	114,477,300,000,000	0	9.09%	89,964,369,000,000	32	10,103,000,000,000.00	11.23%	4.143134726	2913.23	10.5
			GGRM 2022	160	1.00	27,220.44	22,006.30	19.16%	2,779,739,000,000	88,562,617,000,000	3.14%	124,682,700,000,000	124,881,300,000,000	0	-0.16%	88,562,617,000,000	32	10,136,500,000,000.00	11.45%	4.158883083	1444.7	12.46
			GGRM 2023	160	1.00	22,006.30	19,700.00	10.48%	5,324,514,000,000	92,450,823,000,000	5.76%	118,953,000,000,000	124,682,700,000,000	0	-4.60%	92,450,823,000,000	32	13,395,800,000,000.00	14.49%	4.17438727	2767.29	7.34

No	Ticker	Name	File Name	References or Digital Maturity	Digital Maturity Level	Adj. Closed Price (1 Jan Y0)	Adj. Closed Price (1 Jan Y+1)	Stock Return	Annual Net Income (Y0)	Total Asset (Y0)	ROA	Total Revenue (Y0)	Total Revenue (Y-1)	Sales Growth	Firm Size = Total Asset (Y0)	Size	Total Debt (Y0)	Leverage	Firm Age	EPS	P/E Ratio
4	HMSP	H.M. Sampoerna Tbk.	HMSP 2019	469	3.00	2.669.67	1.496.01	43.96%	13,721,513,000,000.00	50,902,806,000,000.00	26.96%	45,868,400,000,000.00	45,956,880,000,000.00	-0.19%	50,902,806,000,000.00	32	424,500,000,000.00	0.83%	4.663439094	117.97	17.8
			HMSP 2020	612	3.00	1,496.01	1,009.06	32.55%	8,581,378,000,000.00	49,674,030,000,000.00	17.28%	40,252,200,000,000.00	45,868,400,000,000.00	-12.24%	49,674,030,000,000.00	32	311,500,000,000.00	0.63%	4.672828834	73.78	20.4
			HMSP 2021	648	3.00	1,009.06	770.23	23.67%	7,137,097,000,000.00	53,090,428,000,000.00	13.44%	41,512,600,000,000.00	40,252,200,000,000.00	3.13%	53,090,428,000,000.00	32	425,900,000,000.00	0.80%	4.682131227	61.36	15.73
			HMSP 2022	545	3.00	770.23	846.72	9.93%	6,323,744,000,000.00	54,786,992,000,000.00	11.54%	45,616,400,000,000.00	41,512,600,000,000.00	9.89%	54,786,992,000,000.00	32	531,300,000,000.00	0.97%	4.691347882	54.37	15.45
			HMSP 2023	466	3.00	846.72	804.08	-5.04%	8,096,811,000,000.00	55,316,264,000,000.00	14.64%	53,106,400,000,000.00	45,616,400,000,000.00	16.42%	55,316,264,000,000.00	32	522,100,000,000.00	0.94%	4.700480366	69.61	12.86
5	ICBP	Indofood CBP Sukses Makmur Tbk	ICBP 2019	396	2.00	9,714.65	10,398.42	7.04%	5,038,789,000,000.00	38,709,314,000,000.00	13.02%	42,296,700,000,000.00	38,413,407,000,000.00	10.11%	38,709,314,000,000.00	31	2,356,200,000,000.00	6.09%	2.302585093	432.07	25.81
			ICBP 2020	499	2.00	10,398.42	8,513.46	18.13%	6,586,907,000,000.00	103,588,325,000,000.00	6.36%	46,641,000,000,000.00	42,296,700,000,000.00	10.27%	103,588,325,000,000.00	32	31,724,400,000,000.00	30.63%	2.397895273	564.82	16.95
			ICBP 2021	372	2.00	8,513.46	8,373.82	-1.64%	6,399,431,000,000.00	118,015,311,000,000.00	5.42%	56,803,700,000,000.00	46,641,000,000,000.00	21.79%	118,015,311,000,000.00	32	41,752,500,000,000.00	35.38%	2.48490665	547.81	15.88
			ICBP 2022	359	2.00	8,373.82	9,933.44	18.62%	4,587,367,000,000.00	115,305,536,000,000.00	3.98%	64,797,500,000,000.00	56,803,700,000,000.00	14.07%	115,305,536,000,000.00	32	46,006,100,000,000.00	39.90%	2.564949357	393.36	25.42
			ICBP 2023	199	2.00	9,933.44	11,775.00	18.54%	6,990,572,000,000.00	119,267,076,000,000.00	5.86%	67,909,900,000,000.00	64,797,500,000,000.00	4.80%	119,267,076,000,000.00	32	43,990,300,000,000.00	36.88%	2.63905733	599.44	17.64
6	INDF	Indofood Sukses Makmur Tbk.	INDF 2019	405	2.00	6,428.93	6,652.51	3.48%	4,908,172,000,000.00	96,198,600,000,000.00	5.10%	76,593,000,000,000.00	73,394,728,000,000.00	4.36%	96,198,600,000,000.00	32	23,487,000,000,000.00	24.42%	3.36729583	558.99	14.18
			INDF 2020	497	2.00	6,652.51	5,365.26	19.35%	6,455,632,000,000.00	163,136,516,000,000.00	3.96%	81,731,500,000,000.00	76,593,000,000,000.00	6.71%	163,136,516,000,000.00	33	54,036,600,000,000.00	33.12%	3.401197382	735.23	9.32
			INDF 2021	380	2.00	5,365.26	5,860.77	9.24%	7,662,254,000,000.00	179,271,840,000,000.00	4.27%	99,345,600,000,000.00	81,731,500,000,000.00	21.55%	179,271,840,000,000.00	33	62,649,500,000,000.00	34.95%	3.433987204	870.37	7.27
			INDF 2022	367	2.00	5,860.77	6,493.01	10.79%	6,359,094,000,000.00	180,433,300,000,000.00	3.52%	110,830,300,000,000.00	99,345,600,000,000.00	11.56%	180,433,300,000,000.00	33	66,849,700,000,000.00	37.05%	3.465735903	724.24	9.29
			INDF 2023	199	1.00	6,493.01	6,375.00	-1.82%	8,147,019,000,000.00	186,587,957,000,000.00	4.37%	111,703,600,000,000.00	110,830,300,000,000.00	0.79%	186,587,957,000,000.00	33	65,323,400,000,000.00	35.01%	3.496507561	927.86	6.95
7	JPFA	Japfa Comfeed Indonesia Tbk.	JPFA 2019	709	3.00	2,523.71	1,329.56	47.32%	1,765,178,000,000.00	26,650,895,000,000.00	6.62%	38,872,084,000,000.00	36,228,261,000,000.00	7.30%	26,650,895,000,000.00	31	9,197,300,000,000.00	34.51%	3.871201011	150.53	10.2
			JPFA 2020	706	3.00	1,329.56	1,225.90	-7.80%	916,711,000,000.00	25,951,760,000,000.00	3.53%	36,964,948,000,000.00	38,872,084,000,000.00	-4.91%	25,951,760,000,000.00	31	8,769,600,000,000.00	33.79%	3.891820298	78.17	18.74

No	Ticker	Name	File Name	References or Digital Maturity	Digital Maturity Level	Adj. Closed Price (1 Jan Y0)	Adj. Closed Price (1 Jan Y+1)	Stock Return	Annual Net Income (Y0)	Total Asset (Y0)	ROA	Total Revenue (Y0)	Total Revenue (Y-1)	Sales Growth	Firm Size = Total Asset (Y0)	Size	Total Debt (Y0)	Leverage	Firm Age	EPS	P/E Ratio
			JPFA 2021	615	3.00	1,225.90	1,529.01	24.73%	2,022,596,000,000	28,589,656,000,000.00	7.07%	44,878,300,000,000	36,964,948,000,000	21.41%	28,589,656,000,000.00	31	10,172,600,000,000.00	35.58%	3.912023005	172.48	9.97
			JPFA 2022	592	3.00	1,529.01	1,288.36	15.74%	1,419,855,000,000	32,690,887,000,000.00	4.34%	48,972,085,000,000	44,878,300,000,000	9.12%	32,690,887,000,000.00	31	12,866,900,000,000.00	39.36%	3.931825633	121.08	10.7
			JPFA 2023	569	3.00	1,288.36	1,060.00	17.72%	929,716,000,000	34,109,431,000,000.00	2.73%	51,175,898,000,000	48,972,085,000,000	4.50%	34,109,431,000,000.00	31	12,845,700,000,000.00	37.66%	3.951243719	79.28	14.88
8	LSIP	PP London Sumatra Indonesia Tbk	LSIP 2019	340	2.00	1,274.10	1,035.83	18.70%	253,902,000,000.00	10,225,322,000,000.00	2.48%	3,699,439,000,000	4,019,846,000,000	-7.97%	10,225,322,000,000.00	30	0.00	0.00%	4.727387819	37.21	39.91
			LSIP 2020	306	2.00	1,035.83	1,194.89	15.36%	696,011,000,000	10,922,788,000,000.00	6.37%	3,536,721,000,000	3,699,439,000,000	-4.40%	10,922,788,000,000.00	30	3,360,000,000.00	0.03%	4.736198448	102.01	13.48
			LSIP 2021	296	1.00	1,194.89	1,148.55	-3.88%	992,423,000,000	11,851,269,000,000.00	8.37%	4,525,473,000,000	3,536,721,000,000	27.96%	11,851,269,000,000.00	30	8,484,000,000.00	0.07%	4.744932128	145.28	8.16
			LSIP 2022	305	1.00	1,148.55	1,007.00	12.32%	1,036,448,000,000	12,417,013,000,000.00	8.35%	4,585,348,000,000	4,525,473,000,000	1.32%	12,417,013,000,000.00	30	3,772,000,000.00	0.03%	4.753590191	151.91	6.68
			LSIP 2023	252	2.00	1,007.00	845.00	16.09%	761,995,000,000	12,514,203,000,000.00	6.09%	4,189,896,000,000	4,585,348,000,000	-8.62%	12,514,203,000,000.00	30	8,417,000,000.00	0.07%	4.762173935	111.68	7.97
9	UNVR	Unilever Indonesia Tbk.	UNVR 2019	863	3.00	8,600.48	7,031.98	18.24%	9,081,187,000,000.00	20,649,000,000,000.00	43.98%	42,923,000,000,000.00	41,802,000,000,000.00	2.68%	20,649,000,000,000.00	31	3,965,000,000,000.00	19.20%	4.454347296	968.92	43.35
			UNVR 2020	820	3.00	7,031.98	6,276.76	10.74%	7,163,536,000,000	20,535,000,000,000.00	34.88%	42,972,000,000,000.00	42,923,000,000,000.00	0.11%	20,535,000,000,000.00	31	3,975,000,000,000.00	19.36%	4.465908119	187.77	39.14
			UNVR 2021	637	3.00	6,276.76	3,772.65	39.89%	5,758,148,000,000	19,069,000,000,000.00	30.20%	39,546,000,000,000.00	42,972,000,000,000.00	-7.97%	19,069,000,000,000.00	31	2,736,900,000,000.00	14.35%	4.477336814	150.93	27.23
			UNVR 2022	767	3.00	3,772.65	4,503.69	19.38%	5,364,761,000,000	18,318,000,000,000.00	29.29%	41,219,000,000,000.00	39,546,000,000,000.00	4.23%	18,318,000,000,000.00	31	1,284,000,000,000.00	7.01%	4.48863637	140.62	33.42
			UNVR 2023	840	3.00	4,503.69	3,100.00	31.17%	4,800,940,000,000	16,664,000,000,000.00	28.81%	38,611,000,000,000.00	41,219,000,000,000.00	-6.33%	16,664,000,000,000.00	30	750,800,000,000.00	4.51%	4.49980967	125.84	28.05