Kode/Nama Rumpun ILmu: 571/Manajemen
Bidang Fokus: Sosial Humaniora, Seni Budaya, Pendidikan

LAPORAN AKHIR TAHUN
PENELITIAN DASAR UNGGULAN PERGURUAN TINGGI

EKSPLORASI PERILAKU INVESTOR DALAM PENGGUNAAN APLIKASI ROBOTIK SEBAGAI BENTUK DIGITALISASI PASAR MODAL

Tahun ke 1 dari rencana 3 tahun

Ketua Peneliti
Dr. Sri Utami Ady, SE., MM / 0715127001
Anggota Peneliti:
1. **Ilya Farida, SE., MM/0722127201**
2. **Mustika Winedar, SE., MM/0709047201**

Dibiayai oleh:
Direktorat Riset dan Pengabdian Masyarakat Direktorat Jenderal Penguatan Riset dan Pengembangan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi sesuai dengan Surat Keputusan Nomor 21987/MPK.A/KP.08.00/2022 tanggal 5 April 2022, tentang Penetapan Pendanaan Penelitian di Perguruan Tinggi Tahun Anggaran 2022

UNIVERSITAS DR. SOETOMO SURABAYA
DESEMBER 2022

HALAMAN PENGESAHAN
PENELITIAN DASAR UNGGULAN PERGURUAN TINGGI

Judul Penelitian : Eksplorasi Perilaku Investor dalam Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal

Kode/Nama Rumpun Ilmu	: 571 / Manajemen
Bidang Unggulan PT	: Pembangunan Ekonomi Berkelanjutan
Topik Unggulan	: Meningkatkan peran Pasar Modal dalam Investasi global
Ketua Peneliti	
a. Nama Lengkap	: Dr. Sri Utami Ady, SE., MM ~~L~~/P
b. NIDN	: 0715127001
c. Jabatan Fungsional	: Lektor Kepala
d. Program Studi	: Manajemen
e. Nomor HP	: 082335923104
f. Alamat surel (e-mail)	: sri.utami@unitomo.ac.id
Anggota Peneliti (1)	
a. Nama Lengkap	: Ilya Farida, SE., MM
b. NIDN	: 0722127201
c. Perguruan Tinggi	: Universitas Dr. Soetomo
Anggota Peneliti (2)	
a. Nama Lengkap	: Mustika Winedar, SE., MM
b. NIDN	: 0709047201
c. Perguruan Tinggi	: Universitas Dr. Soetomo
Jumlah Mahasiswa yang terlibat	: 4 Orang
Lama Penelitian Keseluruhan	: 3 tahun
Tahun Pelaksanaan	: Tahun ke 1
Biaya Tahun Berjalan	: Rp 200.000.000,-
Biaya Keseluruhan	: Rp 749.800.000,-

Surabaya, 15 Desember 2022

Mengetahui,
Kepala Lembaga Penelitian

(Dr. Dra. Eny Haryati, M.Si)
NIK . 87.01.1.029

Ketua Peneliti,

(Dr. Sri Utami Ady, SE., MM)
NIK. 94.01.1.170

Ringkasan

Menghadapi kondisi ketidakpastian dan pandemic Covid-19 yang belum menunjukkan titik terang kapan akan berakhir, banyak investor beralih menggunakan aplikasi robotic dalam melakukan trading saham, dalam rangka untuk meminimalkan risiko dan meningkatkan return. **T**eknologi dan algoritma canggih yang dimiliki robot trading, diharapkan mampu memberikan keuntungan tanpa kendali penuh dari trader. Walaupun pengalaman trading belum memadai, robot trading dianggap mampu memberikan keuntungan setara trader profesional. Tetapi apakah benar robot trading mampu bekerja sangat efisien sehingga kita dapat mempercayai sepenuhnya? Apakah di masa depan kegiatan trading akan dikendalikan oleh robot? Banyak hasil riset menunjukkan penggunaan robot trading membuat perdagangan saham menjadi lebih simple dan efisien, namun tak sedikit investor yang merasakan kerugian besar karena penggunaan robot trading yang keliru. Tujuan penelitian ini adalah untuk mengeksplorasi perilaku investor saham dalam menyongsong digitalisasi terutama di bidang keuangan dan pasar modal. Untuk menggali lebih dalam seberapa efektif penggunakan robot trading dalam pasar modal. Penelitian ini dilakukan selama 3 tahun. Pada tahun pertama, penelitian ini menggunakan metode kualitatif fenomenologi untuk mengeksplorasi perilaku investor berdasarkan perspektif emik untuk memahami lebih dalam fenomena digitalisasi finansial. Metode wawancara mendalam, observasi dan content analisis dilakukan untuk mendapatkan pemahaman mendalam untuk mendukung triangulasi metode. Hasil penelitian menunjukkan bahwa Robot trading diperlukan oleh investor jangka pendek yang melakukan trading dalam frekuansi tinggi. Automasi trading akan sangat efektif untuk mengurangi fear and greed yang sering membayangi dalam trading, sehingga membuat keputusan investor menjadi lebih efisien. Robot trading tak akan mampu menggantikan peran manusia dalam trading dalam segala kondisi, namun orang yang tidak mampu beradaptasi dengan lingkungan yang terus berkembang sesuai dengan teknologi, akan tergantikan oleh orang lain yang mampu lebih cepat berinovasi mengikuti perubahan.

Kata Kunci: Fenomenologi; *automatic trading*; Perilaku investor, qualitative, bias Psikologis

PRAKATA

Alhamdulillah puji syukur kehadirat Allah SWT. yang telah melimpahkan rahmat dan kekuatan-Nya, sehingga penulisan Laporan Hasil Penelitian ini dapat terselesaikan.

Pada kesempatan ini penulis ingin menyampaikan ucapan terima kasih kepada Kemendikbud Ristek Dikti yang telah memberikan dana hibah penelitian sehingga terselesaikannya Laporan Kemajuan penelitian ini. Demikian juga ucapan terimakasih kami sampaikan juga kepada Ibu Dr. Siti Marwiyah, SH., M.Hum. selaku Rektor Universitas Dr. Soetomo, Ibu Dr. Dra. Eny Haryati, MSi , selaku Ketua Lembaga Penelitian, yang telah memberi kesempatan kepada kami untuk mendapatkan hibah penelitian, dan kepada para informan yang ikut berpartisipasi untuk memberikan data kepada peneliti, serta semua pihak yang membantu demi terselesaikannya laporan kemajuan penelitian ini.

Penulis menyadari bahwa laporan kemajuan penelitian ini masih jauh dari sempurna. Oleh karena itu, segala kritik dan saran yang sifatnya membangun akan menyempurnakan pelaporan ini serta bermanfaat bagi penulis, pembaca, dan penelitian selanjutnya.

Surabaya, Desember 2022

Ketua Peneliti,

Dr. Sri Utami Ady, SE., MM
NIDN. 0715127001

DAFTAR ISI

Halaman

HALAMAN SAMPUL. …… i

HALAMAN PENGESAHAN …….. ii

RINGKASAN ……..……. iii

PRAKATA …… iv

DAFTAR ISI ……. v

1. IDENTITAS PENELITIAN ……. 1

2. IDENTITAS PENGUSUL …… 1

3. MITRA KERJASAMA PENELITIAN ……. 2

4. LUARAN DAN TARGET CAPAIAN ……. 2

5. ANGGARAN …… 3

6. KEMAJUAN PENELITIAN ……. 8

A. RINGKASAN ……. 8

B. KATA KUNCI …… 9

C. HASIL PENELITIAN ……..……. 10

D. STATUS LUARAN ……..... 53

E. PERAN MITRA …… 54

F. KENDALA PELAKSANAAN PENELITIAN …… 54

G. RENCANA TAHAPAN SELANJUTNYA …….. 55

LAMPIRAN (bukti luaran yang didapatkan)..……... 64

Lampiran I. Luaran Wajib : Publikasi di International Journal of eBusiness and eGoverment Studies. Status: Publish

Lampiran II. Luaran Tambahan: Publikasi di Polish jurnal of Management Studies. Status: Publish

Lampiran III. Luaran Tambahan: Publikasi di Journal of Word Economy:

Transformation and Transition. Status: Publish

Lampiran IV. Oral Presentation di International Conference on Business Management and Accounting (ICOBIMA). Status : Sudah dilaksanakan

Lampiran V. HKI

Lampiran IV. SPTB 100%

Lampiran VII. Bukti Unggah Laporan Akhir Tahun, SPTB 100% dan Catatan Harian 100%

Isian Substansi Proposal

PENELITIAN DASAR UNGGULAN PERGURUAN TINGGI (PDUPT)

Petunjuk:Pengusul hanya diperkenankan mengisi di tempat yang telah disediakan sesuai dengan petunjuk pengisian dan tidak diperkenankan melakukan modifikasi template atau penghapusan di setiap bagian.

Tuliskan judul usulan penelitian

JUDUL USULAN

Eksplorasi Efekfititas Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal**.**

Ringkasan penelitian tidak lebih dari 500 kata yang berisi latar belakang penelitian, tujuan dan tahapan metode penelitian, luaran yang ditargetkan, serta uraian TKT penelitian yang diusulkan.

RINGKASAN

Salah satu indikator untuk melihat perkembangan ekonomi suatu negara adalah dengan melihat perkembangan pasar modalnya. Keberadaan pasar modal telah memberikan manfaat yang besar bagi pertumbuhan ekonomi suatu negara. Pengembangan pasar modal termasuk salah satu bidang unggulan dalam **Rencana Strategis Penelitian (Renstra Penelitian) Universitas Dr. Soetomo Surabaya**, khususnya dalam bidang **Pendidikan, seni, budaya, humaniora dan industry kreatif** dengan topik **3.1.2. Pasar Modal dan Industry Kreatif**. Berita tentang **Digitalisasi** sudah merambah pada berbagai sector, termasuk pasar modal Indonesia. Besarnya pengaruh factor psikologis dalam bertransaksi saham membuat para Investor beralih dengan menggunakan aplikasi robotic dalam investasi saham untuk meningkatkan return dan meminimalkan risiko. Tujuan jangka panjang dari penelitian ini adalah untuk mengeksplorasi Efektifitas penggunakan aplikasi robotic dalam bertransaksi saham oleh Investor individu. *automated trading* diperkirakan mampu melakukan kegiatan trading secara otomatis. Teknologi dan algoritma canggih yang dimiliki robot trading mampu memberikan keuntungan tanpa kendali penuh dari trader. Hal ini diperlukan untuk mengeksplorasi sejauh mana Digitalisasi ekonomi dan pasar modal mampu memberikan terobosan terutama pada emerging market seperti pada pasar modal Indonesia melalui robot trading.

Rencana kegiatan dilaksanakan selama 3 tahun. Tahun pertama meneliti fenomena Perilaku investor individu pengguna aplikasi robotik. Tahun ke 2 melakukan uji comparasi penggunaan berbagai aplikasi robotik. Tahun ke 3, Pengembangan model yang dihasilkan di tahun ke-1 dan tahun ke-2 menghasilkan model Efektivitas penggunaan aplikasi robotik. Metode yang digunakan adalah tahun pertama kualitatif, tahun ke dua analisis kuantitatif komparatif. Sedangkan di tahun ketiga analisis kuantitatif. Penggunakan analisis kualititif memungkinkan untuk mengeksplorasi faktor budaya, nilai-nilai dan kearifan lokal dari perilaku investor. Manfaat penelitian ini bagi regulator adalah rujukan kebijakan bagi terciptanya pasar modal yang lebih efisien, stabil, berdaya saing, sehingga lebih siap dalam menghadapi globalisasi dan digitalisasi ekonomi, meskipun tetap berbasis budaya dan nilai-nilai moral bangsa Indonesia

Kata kunci maksimal 5 kata

KATA KUNCI

Perilaku investor individu, automated trading, Digitalisasi pasar modal, Return saham

Latar belakang penelitian tidak lebih dari 500 kata yang berisi latar belakang dan permasalahan yang akan diteliti, tujuan khusus dan studi kelayakannya. Pada bagian ini perlu dijelaskan uraian tentang spesifikasi keterkaitan skema dengan bidang fokus atau renstra penelitian PT.

LATAR BELAKANG

Harga saham tercipta karena adanya perilaku dari para pelaku pasar. Jika perilaku mereka optimis, maka harga saham akan naik, dan begitu juga sebaliknya, jika perilaku pelaku pasar pesimis akan menciptakan penurunan harga secara umum di pasar. Sehingga dapat disimpulkan bahwa harga saham terjadi lebih banyak karena faktor psikologis pelaku pasar dibandingkan rasional seperti yang seharusnya. [1]; [2]; [3]; [4]; [5]; [6]; [7]

Diantara perilaku bias para investor adalah *representativeness*, *loss aversion*, dan *self attribution bias* [1]; [8]. Shefrin, (2007) menyatakan bahwa *representativeness bias* adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang tidak meningkatkan perolehan return.

Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan [10]. *Loss Aversion* membuat investor sangat menghindari resiko ketika mengevaluasi kemungkinan keuntungan, menyebabkan investor memegang saham yang rugi dan menjual saham-saham yang menguntungkan sehingga menjadikan *return* portofolio menjadi tidak optimal. [8]; [1]

Self attribution bias adalah kecenderungan untuk mendiskripsikan kesuksesan yang dialami karena faktor dari dalam diri, sementara kegagalan yang dialami, Karena faktor-faktor dari luar. Bias ini akan menyebabkan: (1) *Overconfidence* [8], (2) investor berdagang terlalu sering (*overtrading*), [5]; [6], (3) investor hanya mendengar apa yang ingin didengar, [4], (4) memegang portofolio yang *underdiversified* [7].

Pandemic Covid-19 telah menambah kepanikan investor secara psikologis. Kondisi ini menyebabkan mereka melakukan aksi yang lebih ekstrim untuk menghindari kerugian atau justru memanfaatkan peluang untuk mendapatkan untung besar dengan melakukan berbagai aksi yang mungkin merupakan moral hazard atau semakin membahayakan pasar modal.

Menghadapi kondisi ketidakpastian dan pandemic Covid-19 yang belum menunjukkan titik terang kapan akan berakhir, banyak investor beralih menggunakan aplikasi robotic dalam melakukan trading saham rangka untuk meminimalkan risiko dan meningkatkan return. Digitalisasi ekonomi telah membuat para pelaku pasar menggunakan cara yang dianggap lebih simple dalam memprediksi harga saham ke depan. Kondisi ini memunculkan minat dan ketertarikan peneliti untuk melakukan ekplorasi mengenai perilaku investor dalam melakukan

trading/investasi saham menggunakan aplikasi dengan tujuan untuk mengurangi psikologi trading. Robot-robot trading berbasis algoritma pun bermunculan. **T**eknologi dan algoritma canggih yang dimiliki robot trading mampu memberikan keuntungan tanpa kendali penuh dari trader. Walaupun pengalaman trading belum memadai, robot trading mampu memberikan keuntungan setara trader profesional. Tetapi apakah benar robot trading mampu bekerja sangat efisien hingga kita dapat mempercayai sepenuhnya? Apakah di masa depan kegiatan trading akan dikendalikan oleh robot?

Penelitian ini merupakan implementasi dari **Renstra Penelitian Universitas Dr. Soetomo** pada bidang **Pendidikan, Seni**, **Budaya, Humaniora, dan Industry Kreatif** pada topik riset "**Pasar Modal & Industri Kreatif"** dan sesuai dengan salah satu dari lima (5) bidang Fokus utama penelitian pada tahun ini yaitu **Teknologi digital atau digitalisasi ekonomi**. Adapun tujuan khusus dari penelitian ini adalah : (1) Mengeksplorasi perilaku investor individu pengguna aplikasi robotik. (2) Tahun ke 2 melakukan uji comparasi penggunaan berbagai aplikasi robotik. (3) Pengembangan model yang dihasilkan di tahun ke-1 dan tahun ke-2 menghasilkan model Efektivitas penggunaan aplikasi robotic di pasar modal.

Tinjauan pustaka tidak lebih dari 1000 kata dengan mengemukakan *state of the art* dan peta jalan (*roadmap*) dalam bidang yang diteliti/teknologi yang dikembangkan. Penyajian peta jalan dapat berupa bagan dalam bentuk *image*. Sumber pustaka/referensi primer yang relevan dan dengan mengutamakan hasil penelitian pada jurnal ilmiah dan/atau paten yang terkini.

TINJAUAN PUSTAKA

2.1. Teori Keuangan Perilaku (*Behavioral Finance*)

Behavioral finance (keuangan prilaku) adalah aplikasi dari psikologi terhadap ilmu keuangan, menjadi topik yang sangat panas sejak terjadinya *tech-stock bubble* pada bulan Maret 2000, [10]. *Behavioral finance* adalah studi investigatif yang berusaha menerangkan inefisiensi pasar dengan menggunakan teori-teori psikologi. Mengamati bahwa orang sering melakukan kesalahan dan asumsi tak logis ketika berhubungan dengan masalah keuangan [8]. Kemunculan *Behavioral finance* berawal ketika Shiller, seorang professor dari universitas Yale memunculkan paper yang berjudul "*Irrational Exuberance".* Shiller memperingatkan investor bahwa harga saham, berdasarkan berbagai pengukuran historik akan meningkat terlalu tinggi, dan publik akan sangat kecewa dengan kinerja saham di masa depan. Hal ini terbukti dengan munculnya penggelembungan harga saham tidak lama setelah peringatan dari Shiller.

Keuangan perilaku (*behavioral finance*) merupakan paradigma baru dalam keuangan, yang memberi suplemen untuk teori keuangan standar dengan memperkenalkan aspek-aspek perilaku

pada pengambilan keputusan. Keuangan perilaku berfokus pada aplikasi dan prinsip ekonomi untuk pengembangan pembuatan keputusan finansial [12].

Terdapat dua topik dalam *behavioral finance*, yaitu : (1) *behavioral finance mikro (BFMI)* yang menguji perilaku atau bias dari investor individu yang membedakan mereka dari individu yang rasional seperti dalam teori ekonomi klasik, [1]; [3]; [5]; [4]; [6]; [7] (2) behavioral finance makro (BFMA) yang mendeteksi dan mendiskripsikan *anomaly* dalam hipotesis pasar efisien yang dijelaskan dalam model perilaku [13] . Kajian ini fokus pada BFMI, studi tentang perilaku investor individu, dalam rangka mengidentifikasi bias psikologis dan melakukan investigasi perilaku terhadap keputusan alokasi asset sehingga dapat menekan bias pada proses investasi. Adapun perilaku bias yang akan dikaji dalam penelitian ini adalah:

1. *Representativeness Bias*

Shefrin, 2007) menyatakan bahwa representativeness bias adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang keliru, yaitu keputusan keuangan yang tidak meningkatkan perolehan imbal hasil.

Kahneman dan Riepe [14] juga menyatakan ulasan yang tidak jauh berbeda bahwa investor yang mengalami *representativeness bias* cenderung bereaksi berlebihan pada saat memproses informasi untuk membuat keputusan transaksi. Bukti temuan empiris, diantaranya [15], menemukan bahwa cara berpikir representativeness bias menyebabkan investor keliru karena menyangka perusahaan bagus adalah investasi bagus (good company is good investment).

1. Loss Aversion

Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan. Sebuah studi tentang loss aversion telah menjadi rule of thumb, yaitu secara psikologis, probabilitas untuk mendapatkan kerugian memiliki dua kali kekuatan motivasi probabilitas mendapatkan keuntungan dengan jumlah yang sama [10].

Bias loss aversion dapat membuat investor sangat menghindari risiko ketika mengevaluasi kemungkinan keuntungan karena menghindari kerugian adalah lebih penting daripada mendapatkan profit. Ketika investasi mulai membuahkan keuntungan, individu yang loss aversion akan cepat mengunci profit dan menjual saham karena kekuatiran pasar berbalik arah dan mengambil profit. Secara umum loss aversion menyebabkan investor memegang saham yang rugi dan menjual saham-saham yang menguntungkan sehingga menjadikan return portofolio menjadi tidak optimal [8].

2. Self Atribution Bias

Self attribution bias adalah kecenderungan individu unuk mendiskripsikan kesuksesan yang dialami karena factor dari dalam diri, sementara kegagalan yang dialami karena factor-faktor dari luar. Bias ini akan menyebabkan [10]: (1) Self attribution bias setelah sukses yang panjang akan menyebabkan rasa percaya diri yang berlebihan, sehingga mengambil risiko yang lebih besar, yaitu overconfidence, (2) Menyebabkan investor berdagang terlalu sering (overtrading) yang berisiko tinggi, (3) Menyebabkan investor hanya mendengar apa yang ingin didengar. [8] menemukan bahwa self attribution bias tampak pada investor yang terlalu percaya diri bahwa kesuksesan yang mereka dapat berasal dari keahlian yang dimiliki dan kerugian yang dialami berasal dari factor eksternal. Berbagai bias psikologis tersebut membuat return investor menjadi berkurang bahkan rugi, yang menyebabkan mereka beralih ke robot trading.

2.2. Algoritma Trading

algoritma merupakan sekumpulan instruksi atau langkah-langkah yang dituliskan secara sistematis dan digunakan untuk menyelesaikan masalah/persoalan logika dan matematika dengan bantuan computer [16]. Sementara trading adalah proses menjual dan membeli produk di pasar saham dan valuta asing. Sehingga algoritma trading adalah algoritma yang dibuat secara spesifik untuk proses jual-beli saham dan valuta asing.

Peran algoritma sangat penting dari komputer. Dalam sudut pandang matematika dan statistika, kemampuan sebuah robot trading dinilai berdasarkan algoritma yang dimilikinya. Sehingga jika faktor-faktor eksternal dieliminasi, dapat disimpulkan sebuah robot trading dapat bekerja efektif jika algoritma tradingnya dapat bekerja efektif. Algoritma trading sangat memanfaatkan ilmu statistika. Ilmu statistika itu sendiri merupakan cabang dari ilmu matematika.

2.3. Strategi Algoritma Trading bagi Trader Muda

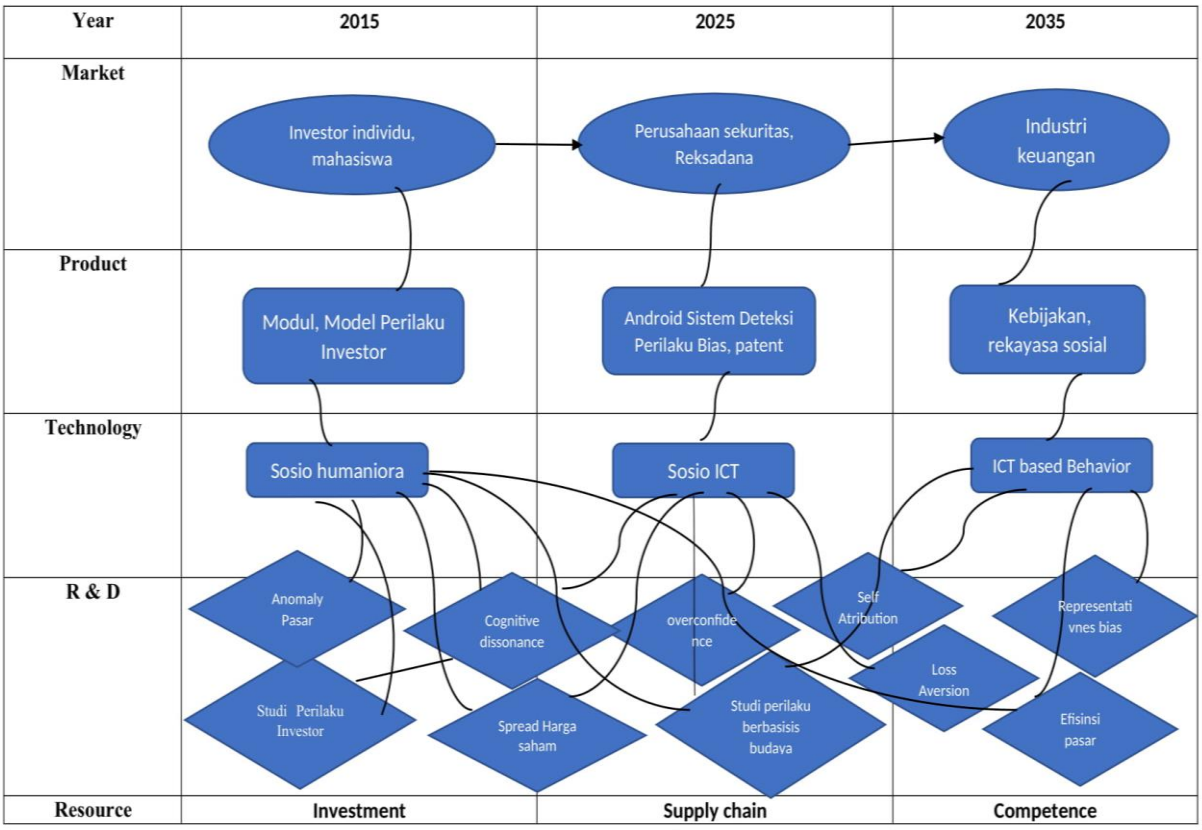
Trader muda zaman sekarang sangat percaya akan kekuatan teknologi. Mereka cenderung membiarkan robot melakukan tugasnya daripada mencari tahu lebih dalam. Salah satu faktor mengapa mereka percaya akan robot trading, karena algoritma yang dirancang pada robot tersebut memiliki banyak keunggulan.

Algoritma trading yang digunakan bukan hanya algoritma yang menganalisa kondisi pasar, tetapi juga algoritma yang menggunakan strategi para trader profesional. Seperti mengeksploitasi perbedaan harga secara cepat (strategi arbitrase), memprediksi harga akan balik

ke harga rata-rata di titik tertentu (strategi *mean revision*), dan lain-lain. Sehingga trader muda jauh lebih percaya diri dengan algoritma trading tersebut. Tapi dari sekian banyak strategi algoritma trading, ada satu strategi yang lumayan populer karena didukung oleh bukti saintifik, yakni *quantitative trading* atau trading kuantitatif.

Quantitative trading atau trading kuantitatif mengandalkan analisis kuantitatif yang dibantu oleh pemodelan matematika dan statistika dan mampu membuat prediksi dari data yang dikumpulkan. Untuk membuat sebuah algoritma kuantitatif membutuhkan ahli matematika, statistika, dan komputer karena proses pembuatannya yang tidak mudah. Sehingga biasanya algoritma kuantitatif digunakan oleh perusahaan-perusahaan besar yang mengincar keuntungan di pasar saham atau valuta asing untuk jangka waktu panjang.

Tapi pada zaman sekarang, tidak sedikit robot trading premium yang menggunakan *quantitative trading* yang dipakai oleh individual. Sehingga dapat disimpulkan trading kuantitatif adalah cara menghasilkan keuntungan di dunia saham dengan dukungan perhitungan dan prediksi matematis. Kecepatan transaksi sangat berpengaruh dalam dunia saham. Jika trader yang melakukan transaksi yang menghasilkan keuntungan 1 rupiah, tapi dilakukan 1 juta kali dalam 1 detik, maka dalam 17 menit saja sudah menjadi miliuner. Namun disisi lain, [17] penggunakan robot trading menunjukkan tidak diperolehnya return abnormal, sedangkan [18] menunjukkan bahwa mayoritas forex trading robot adalah menguntungkan.



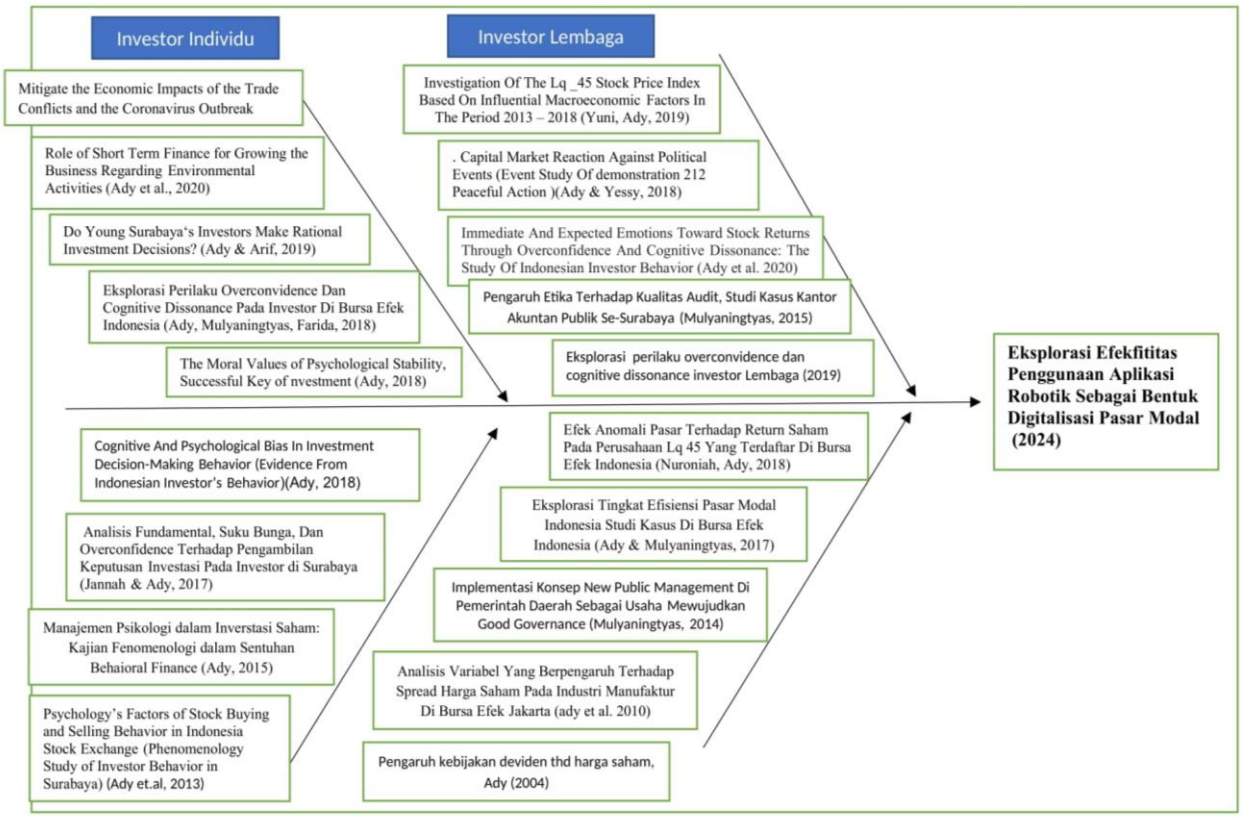
Gambar 2.1. Roadmap Penelitian Keuangan Perilaku (Behavioral Finance)

Roadmap ini berisi tentang rencana penelitian pengusul sampai dengan tahun 2035, berdasarkan sumberdaya berupa investasi, supply chain, dan kompetensi, meliputi tahap-tahap R&D, Technologi yang digunakan, produk yang dihasilkan dan pasar yang ditargetkan.

Tabel 2.1. Peta Jalan (Roadmap) Sri Utami Ady

Tahun	Penelitian Dasar	Penelitian Terapan	Penelitian Pengembangan
2021		The Effect Of World Oil Prices, Gold Prices, And Other Energy Prices On The Indonesian Mining Sector With Exchange Rate Of Indonesian Rupiah As The Moderating Effect	Does the combining effects of energy and consideration of financial development lead to environmental burden: social perspective of energy finance?
2020	1. Role of Short Term Finance for Growing the Business Regarding Environmental Activities (Ady et al., 2020) 2. Mitigate the Economic Impacts of the Trade Conflicts and the Coronavirus Outbreak (Wijanarko et al., 2020)	1. The Financial Equilibrium Based on a Marginal Approach to Improve the Financial Performance of the State Electricity Company (PLN) (Assegaf et al., 2020)	Corporate Governance and Earnings Management Evidence from Listed Non-Financial Firms (Sadik et al 2020)
2019	1. E-Money As A Payment System Tool In Flazz Bca Card Users In Surabaya (Muhaimin & Ady, 2019) 2. Quality and University Governance in Indonesia (Nur Sayidah et al., 2019) 3. Review of Project Risk Management and Risk Assessment (Lilis et al., 2019)	1. Do Young Surabaya's Investors Make Rational Investment Decisions? (Ady & Arif, 2019) 2. Investigation Of The Lq _45 Stock Price Index Based On Influential Macroeconomic Factors In The Period 2013 – 2018 (Yuni et al., 2019)	
2018	1. Cognitive And Psychological Bias In Investment Decision-Making Behavior (Evidence From Indonesian Investor's Behavior)(Ady, 2018) 2. The Moral Values of Psychological Stability, Successful Key of nvestment (Ady, 2018) 3. Eksplorasi Perilaku Overconvidence Dan Cognitive Dissonance Pada Investor Di Bursa Efek Indonesia (Ady, Mulyaningtyas, Farida, 2018)	1. Capital Market Reaction Against Political Events (Event Study Of Demonstration 212 Peaceful Action)(Ady & Yessy, 2018) 2. Market Anomalies Of Lq 45 Companies Stock Return Listed On The Indonesia Stock Exchange (Nuroniah, Ady, 2018)	
2017	Eksplorasi Tingkat Efisiensi Pasar Modal Indonesia Studi Kasus Di Bursa Efek Indonesia (Ady & Mulyaningtyas, 2017)	1. Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor di Surabaya (Jannah & Ady, 2017) 2. Analisis Kinerja Keuangan Primer Koperasi STKIP PGRI Bangkalan (Farida, 2017)	
2015	Manajemen Psikologi dalam Inverstasi Saham: Kajian Fenomenologi dalam Sentuhan Behaioral Finance (Ady, 2015)	Pengaruh Etika Terhadap Kualitas Audit, Studi Kasus Kantor Akuntan Publik Se-Surabaya (Mulyaningtyas, 2015)	
2014		Implementasi Konsep New Public Management Di Pemerintah Daerah Sebagai Usaha Mewujudkan Good Governance (Mulyaningtyas, 2014)	
2013	Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya) (Ady et.al, 2013)		
2010		Analisis Variabel Yang Berpengaruh Terhadap Spread Harga Saham Pada Industri Manufaktur Di Bursa Efek Jakarta (ady et al. 2010)	
2004		Pengaruh kebijakan deviden thd harga saham, Ady (2004)	

Tabel 2.1. menunjukkan peta jalan penelitian yang telah dilakukan oleh pengusul sampai dengan sat ini pada bidang yang diusulkan.



Gambar 2.2. Fishbone Penelitian yang Sudah Dilakukan dan Penelitian yang akan Datang

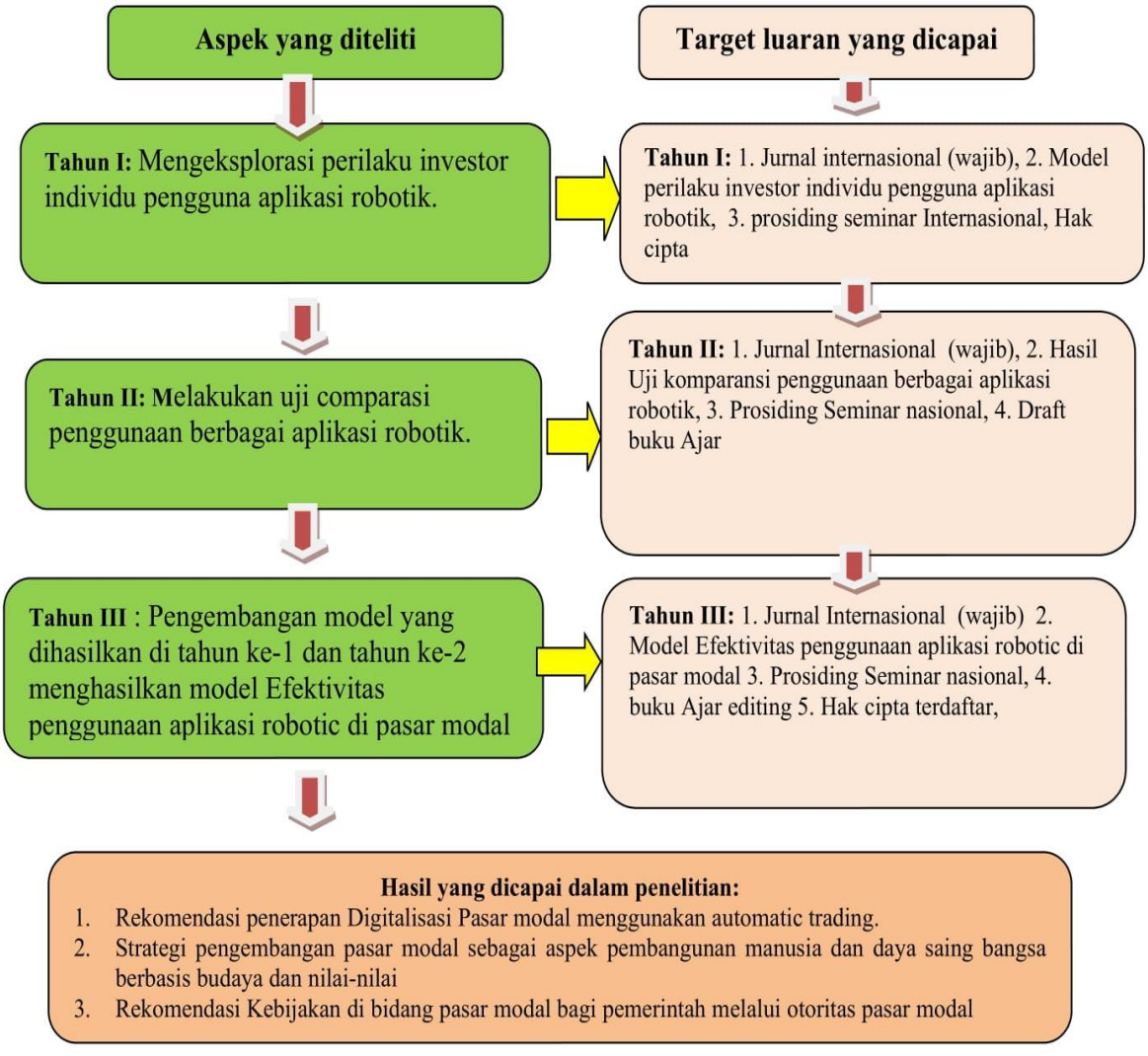
Gambar 2.2. menunjukkan arah penelitian yang sudah dilakukan Tim pengusul menunju kearah topik penelitian yang diusulkan saat ini.

Metode atau cara untuk mencapai tujuan yang telah ditetapkan ditulis tidak melebihi 600 kata. Bagian ini dilengkapi dengan diagram alir penelitian yang akan dikerjakan selama waktu yang diusulkan. Bagan penelitian harus dibuat secara utuh dengan penahapan yang jelas, semua tahapan untuk mecapai luaran beserta indikator capaian yang ditargetkan. Pada bagian ini harus juga dijelaskan tugas masing-masing anggota pengusul sesuai tahapan penelitian yang diusulkan.

METODA

BAB.3. METODE PENELITIAN

3.1. Bagan Alir Penelitian



Metode dalam penelitian ini secara utuh digambarkan dalam diagram alir penelitian sebagaimana dapat dilihat pada gambar 3.1. di atas

3.2. Metode Penelitian

Pelaksanaan Penelitian	Rancangan	Metode Penelitian	Indikator	Tugas Tim Peneliti
TAHUN KE-1				
1. Eksplorasi Efekfititas Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal	Menggunakan rancangan penelitian Kualitatif interpretive fenomenologi	1. Metode penelitian kualitatif 2. Metode pengumpulan data dengan Melakukan wawancara dengan investor, Observ. partisipan, 3. Analisi data fenomenologi dari Moustakas,	1.Model Eksplorasi Efekfititas Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal 2. Semakin tingginya Return investor dengan penggunaan Aplikasi robotik	1. Ketua : Penanggungjawab kegiatan 2. Anggota 1: Koordinator Pengumpulan data 3. Anggota 2: Koordinator analisis data kualitatif
TAHUN KE-2				
1. melakukan uji comparasi penggunaan berbagai aplikasi robotik	Menggunakan rancangan penelitian Kuantitatif	1. Metode penelitian kuantitatif 2. Pengumpulan data dengan penyebaran Questioner 3. Analisis data menggunakan anova atau Chi Square	1.Hasil Uji komparasi penggunaan berbagai aplikasi robotik	1. Ketua : Penanggungjawab kegiatan 2. Anggota 1: Koordinator Pengumpulan data 3. Anggota 2: Koordinator analisis data kuantitatif
TAHUN KE-3				
Implementasi model tahun ke-1 dan ke-2 menjadi model Efektivitas penggunaan aplikasi robotik	Menggunakan Rancangan metode Kuantitatif	1. Metode penelitian kuantitatif 2. Pengumpulan data dengan penyebaran Questioner 3. Analisis data menggunaka SEM	1. model Efektivitas penggunaan aplikasi robotik 2. Pengambilan keputusan investasi lebih rasional	1. Ketua : Penanggungjawab kegiatan 2. Anggota 1: Koordinator Pengumpulan data 3. Anggota 2: Koordinator analisis data kuantitatif

Adapun metode pelaksanaan penelitian,rancangan, metode, indicator, dan tugas masing-masing peneliti setiap tahun dapat dilihat pada table 3.2 di atas.

Metode yang digunakan dalam penelitian ini pada tahun ke-1 adalah paradigma kualitatif. dengan metode fenomenologi, untuk melakukan Eksplorasi Efekfititas Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal melalui proses berfikir induktif dalam

konteks yang sebenarnya yaitu pelaku investor saham. Karakteristik pokok pendekatan kualitatif dalam penelitian ini lebih mementingkan makna, konteks, dan perspektif emik [19].

Pada tahun ke-2 Metode yang dipakai adalah kuantitatif. untuk melakukan uji komparansi dari berbagai aplikasi robotic dalam rangka untuk menilai aplikasi yang terbaik.

Pada tahun ke-3 metode yang dipakai adalah metode kuantitatif, dengan menggunakan hasil yang diperoleh pada tahun pertama dan kedua, meciptakan model Efektivitas penggunaan aplikasi robotik

3.3. Lokasi Pelaksanaan Penelitian

Lokasi pelaksanaan penelitian adalah di Bursa Efek Indonesia, investor individu di enam perusahaan sekuritas di Surabaya (Danareksa securities, Panin Securities, Daewoo Securities, Pintraco Securities, Reliance Securities, IPOT).

3.4. Teknik Pengumpulan Data

Unit (satuan) analisis data penelitian ini adalah individu sebagai investor, perusahaan sekuritas, otoritas pasar modal. Teknik penetapan informan kunci dalam penelitian ini menggunakan teknik *conditio sine qua non* [20], yaitu teknik penetapan informan berdasarkan criteria khusus. Teknik *snowball* digunakan untuk mendapatkan informan berikutnya, yang diperoleh berdasarkan informasi dari informan kunci. Penelitian ini akan selesai jika peneliti menganggap informasi yang didapatkan dari informan sudah mencukupi (data saturation) tergantung kepada subjektifitas peneliti dan masalah penelitian yang ingin dijawab [21]; [22]; [23].

Selanjutnya dilakukan metode focus group untuk mendapatkan informasi dari para pakar di bidang pasar modal beserta seluruh stakeholdernya.

3. 5. Analisis yang Dilakukan

Pada Tahun ke-1 dan ke-2, Penelitian ini mengadopsi analisis data fenomenologi dari Moustakas (1994). Berikut adalah tahap analisis data dalam penelitian ini:

1. Mengidentifikasi unit makna dan mengelompokkan tema. Tahap ini adalah tahapan reduksi fenomenologi. Pada tahap ini dilakukan : (1) *transcribing*, yaitu dengan mendengarkan kembali rekaman wawancara dan membuat transkrip hasil wawancara, (2) Identifikasi unit makna dan menentukan tema.
2. *Individual textural-structural description.* Tahapan deskripsi tektural diawali dengan validitas internal yaitu triangulasi.

3. Identifikasi munculnya tema-tema lintas seluruh partisipan (*cross participant*) atau disebut dengan analisis lintas situs.
4. Identifikasi esensi pengalaman. Merupakan hasil dari narasi *composite textural-structural description* atau analisis lintas situs. Tahapan ini mengintegrasikan intuisi, *tacit dimention, self searching and reflecting* dari deskripsi tekstural dan structural [24]. Keterkaitan tema-tema tersebut dijelaskan dalam suatu model

Pada tahun ke-2 dilengkapi dengan metode focus group untuk menghasilkan berbagai pendapat dari para ahli untuk mendukung hasil melalui metode fenomenologi. Dan pada tahun ke tiga menggunakan metode kuantitatif.

3.6. Indikator Capaian yang Terukur

Indikator dari capaian penelitian ini adalah:

Pada tahun pertama dihasilkan:

1. Jurnal internasional (wajib), 2. Model perilaku investor individu pengguna aplikasi robotik,
3. prosiding seminar Internasional, Hak cipta

Pada tahun ke dua dihasilkan:

1. Jurnal Internasional (wajib), 2. Hasil Uji komparansi penggunaan berbagai aplikasi robotik,
3. Prosiding Seminar nasional, 4. Draft buku Ajar

Pada tahun ketiga dihasilkan:

1. Jurnal Internasional (wajib) 2. Model Efektivitas penggunaan aplikasi robotic di pasar modal 3. Prosiding Seminar nasional, 4. buku Ajar editing 5. Hak cipta terdaftar

Jadwal penelitian disusun dengan mengisi langsung tabel berikut dengan memperbolehkan penambahan baris sesuai banyaknya kegiatan.

JADWAL PENELITIAN

Tahun ke-1

No	Nama Kegiatan	Bulan											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Persiapan, survey pendahuluan			√									
2	Studi Pustaka			√	√								
3	Pencarian informan				√	√	√	√	√				
4	Indepth interview				√	√	√	√	√				
5	Analisis Jawaban informan					√	√	√	√	√			
6	Interpretasi Hasil						√	√	√	√			
7	Pembuatan Laporan								√	√	√	√	√
8	Penulisan Jurnal Ilmiah							√	√	√	√	√	√

Tahun ke-2

No	Nama Kegiatan	Bulan											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Persiapan, survey pendahuluan			√									
2	Studi Pustaka			√	√								
3	Penyebaran Questioner				√	√	√	√	√				
4	Analisis data				√	√	√	√	√				
5	Interpretasi hasil					√	√	√	√	√	√		
6	Pembuatan laporan						√	√	√	√	√	√	
7	Penulisan Jurnal Ilmiah							√	√	√	√	√	√

Tahun ke-3

No	Nama Kegiatan	Bulan											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Persiapan, survey pendahuluan			√									
2	Studi Pustaka			√	√								
3	Penyebaran Questioner				√	√	√	√	√				
4	Analisis data				√	√	√	√	√				
5	Interpretasi hasil					√	√	√	√	√	√		
6	Pembuatan laporan						√	√	√	√	√	√	
7	Penulisan Jurnal Ilmiah							√	√	√	√	√	√
dst.													

Daftar pustaka disusun dan ditulis berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada usulan penelitian yang dicantumkan dalam Daftar Pustaka.

DAFTAR PUSTAKA

[1] S. U. Ady, M. Sudarma, U. Salim, and S. Aisyah, "Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya)," *IOSR J. Bus. Manag.*, vol. 7, no. 3, pp. 11–22, 2013, doi: 10.9790/487X-0731122.

[2] S. U. Ady, "Nilai-nilai dibalik Kestabilan Psikologis, Kunci Sukses Berinvestasi (Studi pada Perilaku Investor di Bursa Efek Indonesia," in *Simposium Riset Ekonomi VI-2014*, 2014, pp. 323–334.

[3] S. U. Ady, *Manajemen Psikologi dalam Investasi Saham, Kajian Fenomenologi dalam Sentuhan Behavioral Finance*, 1st ed. Jogja: CV. Andi Offset, 2015.

[4] S. U. Ady, "The Moral Values of Psychological Stability , Successful Key of Investment," in *1st International Conference on Intellectuals' Global Responsibility (ICIGR 2017)*, 2018, vol. 125, no. Icigr 2017, pp. 33–37.

[5] W. Jannah and S. U. Ady, "Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya," *Ekspektra J. Bisnis dan Manaj.*, vol. 1, no. 2, pp. 138–155, 2017, doi: 10.1007/BF00139728.5.

[6] S. U. Ady and A. Hidayat, "Do Young Surabaya's Investors Make Rational Investment Decisions ?," *Int. J. Sci. Technol. Res.*, vol. 8, no. 07, pp. 319–322, 2019, doi:

https://www.ijstr.org/research-paper-publishing.php?month=july2019.

[7] S. U. Ady, A. Mulyaningtyas, and I. Farida, "Overconfidence : Technical Analysis in Trading , Investment or Gambling ?," in *Conference on Islamic and Technology*, 2020, doi: 10.4108/eai.21-9-2019.2293942.

[8] S. U. Ady, *Manajemen Psikologi dalam Investasi Saham: Kajian Fenomenologi dalam Sentuhan Behavioral Finance*, 1st ed. Jogjakarta: Andi, 2015.

[9] H. Shefrin, *Behavioral Corporate Finance: Decision That Create Value*, McGraw-Hil. 2007.

[10] M. M. Pompian, *Behavioral Finance and Wealth Management How to Build Optimal Portfolios That Account for Investor Biases*, 1st ed. New Jersey: John Wiley & Sons, 2006.

[11] S. U. Ady, U. Salim, and H. Susanto, "Analisis Variabel yang Berpengaruh terhadap Spread Harga Saham pada Industri Manufaktur di Bursa Efek Jakarta," *WACANA*, vol. 13, no. 132, 2010.

[12] R. A. Olsen, "Behavioral finance and implications volatility for stock-price volatility," *Financ. Anal. J.*, vol. 54, no. 2, pp. 10–18, 1998.

[13] R. Nuroniyah, S. U. Ady, and Sugiyanto, "Market Anomalies of LQ 45 Companies Stock Return Listed On the Indonesia Stock Exchange," *Ekspektra J. Bisnis dan Manaj.*, vol. 2, no. 2, pp. 103–120, 2018.

[14] D. Kahneman and M. W. Ripe, "Aspects of Investor Psychology," *J. Portf. Manag.*, vol. 24, no. 4, pp. 52–65, 1998, doi: DOI: https://doi.org/10.3905/jpm.1998.409643.

[15] J. Lakonishok, A. Shleifer, and R. W. Vishny, "Contrarian Investment, Extrapolation, and Risk," *J. Finance*, vol. 49, no. 5, pp. 1541–1578, 1994, doi: 10.1111/j.1540-6261.1994.tb04772.x.

[16] H. Sismoro, *Pengantar Logika Informatika. Algoritma dan Pemrograman Komputer*, 1st ed. Jogjakarta: Andi Offset, 2005.

[17] G. M. Caporale, L. Gil-Alana, A. Plastun, and I. Makarenko, "Intraday Anomalies and Market Efficiency: A Trading Robot Analysis," *Comput. Econ.*, vol. 47, no. 2, pp. 275–295, 2015, doi: 10.1007/s10614-015-9484-9.

[18] M. D. A. Nunes, "Automated Trading Systems VS Manual Trading in Forex Exchange Market," NOVA Information Management School, 2021.

[19] E. Kuswarno, *Metode Penelitian Komunikasi, Fenomenologi, Konsepsi, Pedoman, dan contoh penelitian, Fenomena Pengemis Kota Bandung,*. Bandung: Widya Padjadjaran, 2009.

[20] H. A. Fatchan, *Metode Penelitian Kualitatif, beserta contoh proposal skripsi, tesis, dan disertasi*. Surabaya: Jenggala Pustaka Utama, 2011.

[21] S. K. Bogdan, R. C. dan Biglen, *Qualitative Reseach for Education: an Introduction to*

theory and Method. Boston: Allyn & Bacor, 1992.

[22] B. G. Glaser and A. L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research*, vol. 1, no. 4. 1967.

[23] E. G. Guba and Y. S. Lincoln, "Competing paradigms in qualitative research," *Approaches to qualitative research: A reader on theory and practice*. pp. 17–38, 2004, doi: http://www.uncg.edu/hdf/facultystaff/Tudge/Guba%20&%20Lincoln%201994.pdf.

[24] J. W. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, vol. 2nd ed. 2007.

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan seringkas mungkin. Dilarang menghapus/memodifikasi template ataupun menghapus penjelasan di setiap poin.

C. **HASIL PELAKSANAAN PENELITIAN:** Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian meliputi data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Harga saham tercipta karena adanya perilaku dari para pelaku pasar. Jika perilaku mereka optimis, maka harga saham akan naik, dan begitu juga sebaliknya, jika perilaku pelaku pasar pesimis akan menciptakan penurunan harga secara umum di pasar. Sehingga dapat disimpulkan bahwa harga saham terjadi lebih banyak karena faktor psikologis pelaku pasar dibandingkan rasional [1]; [2], seperti yang seharusnya . [3]; [4]; [5]; [6]; [7]; [8]; [9].

Diantara perilaku bias para investor adalah *representativeness*, *loss aversion*, dan *self attribution bias* [3]; [5]. [10] menyatakan bahwa *representativeness bias* adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang tidak meningkatkan perolehan return.

Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan [11]. *Loss Aversion* membuat investor sangat menghindari resiko ketika mengevaluasi kemungkinan keuntungan, karena menghindari kerugian lebih penting daripada mendapatkan profit [12]. Ketika investasi mulai membuahkan keuntungan, individu yang loss aversion akan cepat mengunci profit dan menjual saham karena kekuatiran pasar berbalik arah dan mengambil profit. Hal ini menyebabkan investor memegang saham yang rugi dan menjual saham-saham yang menguntungkan sehingga menjadikan *return* portofolio menjadi tidak optimal, [5]; [3]; [13]. Loss aversion telah membuat masyarakat menghindari pasar saham meskipun pasar ini menawarkan tingkat pengembalian yang tinggi. Misalnya, pada tahun 1984, hanya 28% rumah tangga AS yang memiliki saham, dan hanya 12% memiliki saham lebih dari $10.000. Saat ini rumah tangga yang memiliki saham sebanyak 50% [14]. Keengganan untuk berinvestasi di pasar saham ini dihubungkan dengan loss aversion, investor lebih sensitive terhadap kerugian dibandingkan keuntungan, dan karena return saham yang fluktuatif, memegang saham akan membuat investor sering menghadapi kerugian dan dengan demikian mereka enggan untuk berinvestasi di pasar saham [14].

Self attribution bias adalah kecenderungan untuk mendiskripsikan kesuksesan yang dialami karena faktor dari dalam diri, sementara kegagalan yang dialami, karena faktor-faktor dari luar. Bias ini akan menyebabkan: (1) *Overconfidence* [5], (2) investor berdagang terlalu

sering (*overtrading*), [7]; [8], (3) investor hanya mendengar apa yang ingin didengar, [6], (4) memegang portofolio yang *underdiversified* [9].

Pandemic Covid-19 telah menambah kepanikan investor secara psikologis. Kondisi ini menyebabkan mereka melakukan aksi yang lebih ekstrim untuk menghindari kerugian atau justru memanfaatkan peluang untuk mendapatkan untung besar dengan melakukan berbagai aksi yang mungkin merupakan moral hazard atau semakin membahayakan pasar modal.

Menghadapi kondisi ketidakpastian dan pandemic Covid-19 yang belum menunjukkan titik terang kapan akan berakhir, banyak investor beralih menggunakan aplikasi robotic dalam melakukan trading saham, dalam rangka untuk meminimalkan risiko dan meningkatkan return. Digitalisasi ekonomi telah membuat para pelaku pasar menggunakan cara yang dianggap lebih simple dalam memprediksi harga saham ke depan. Shah (2015) mengembangkan model prediksi untuk memutuskan kapan membeli, menjual atau hold saham menggunakan data mining dan machine learning technique. Azhikodan et al. (2019) mengusulkan trading swing otomatis menggunakan deep reinforcement learning dengan melakukan percobaan trading swing untuk menentukan posisi beli, jual atau hold. Pricope (2021) menunjukkan bahwa Deep Reinforcement Learning (DRL) dalam perdagangan saham telah memberikan potensi penerapan yang sangat besar yang menyaingi pedagang profesional di bawah asumsi yang kuat. Yang et al. (2020) Seperangkat strategi trading yang menggunakan 3 algoritma dasar, yaitu: Proximal Policy Optimization (PPO), Advantage Actor Critic (A2C), dan Deep eterministic Policy Gradient (DDPG), menunjukkan bahwa penerapan seperangkat strategi yang digunakan dalam penelitian ini berhasil mengungguli rata2 industri Dow Jones dan metode alokasi portofolio varian minimum, dalam hal rasio Sharpe dengan menyeimbangkan risiko dan pengembalian di bawah biaya transaksi. Kondisi ini memunculkan minat dan ketertarikan peneliti untuk melakukan ekplorasi mengenai perilaku investor dalam melakukan trading/investasi saham menggunakan aplikasi dengan tujuan untuk mengurangi psikologi trading. Robot-robot trading berbasis algoritma pun bermunculan. **T**eknologi dan algoritma canggih yang dimiliki robot trading, diharapkan mampu memberikan keuntungan tanpa kendali penuh dari trader. Walaupun pengalaman trading belum memadai, robot trading dianggap mampu memberikan keuntungan setara trader profesional. Tetapi apakah benar robot trading mampu bekerja sangat efisien sehingga kita dapat mempercayai sepenuhnya? Apakah di masa depan kegiatan trading akan dikendalikan oleh robot? Adapun tujuan khusus dari penelitian ini adalah untuk mengeksplorasi perilaku investor individu pengguna aplikasi robotik. Berupaya untuk menjawab pertanyaan Apa yang dimaksud Robot Trading? Mengapa Investor menggunakan

robot trading? Dan bagaimana para investor melakukan transaksi saham dengan menggunakan robot trading.

2. KERANGKA TEORI

2.1. Teori Keuangan Perilaku (*Behavioral Finance*)

Behavioral finance (keuangan prilaku) adalah aplikasi dari psikologi terhadap ilmu keuangan, menjadi topik yang sangat panas sejak terjadinya *tech-stock bubble* pada bulan Maret 2000, [11]. *Behavioral finance* adalah studi investigatif yang berusaha menerangkan inefisiensi pasar dengan menggunakan teori-teori psikologi. Mengamati bahwa orang sering melakukan kesalahan dan asumsi tak logis ketika berhubungan dengan masalah keuangan [5]. Kemunculan *Behavioral finance* berawal ketika Shiller, seorang professor dari universitas Yale memunculkan paper yang berjudul "*Irrational Exuberance".* Shiller memperingatkan investor bahwa harga saham, berdasarkan berbagai pengukuran historik akan meningkat terlalu tinggi, dan publik akan sangat kecewa dengan kinerja saham di masa depan. Hal ini terbukti dengan munculnya penggelembungan harga saham tidak lama setelah peringatan dari Shiller.

Keuangan perilaku (*behavioral finance*) merupakan paradigma baru dalam keuangan, yang memberi suplemen untuk teori keuangan standar dengan memperkenalkan aspek-aspek perilaku pada pengambilan keputusan. Keuangan perilaku berfokus pada aplikasi dan prinsip ekonomi untuk pengembangan pembuatan keputusan finansial [19].

Terdapat dua topik dalam *behavioral finance*, yaitu : (1) *behavioral finance mikro (BFMI)* yang menguji perilaku atau bias dari investor individu yang membedakan mereka dari individu yang rasional seperti dalam teori ekonomi klasik, [3]; [5]; [7]; [6]; [8]; [9] (2) behavioral finance makro (BFMA) yang mendeteksi dan mendiskripsikan *anomaly* dalam hipotesis pasar efisien yang dijelaskan dalam model perilaku [20] . Kajian ini fokus pada BFMI, studi tentang perilaku investor individu, dalam rangka mengidentifikasi bias psikologis dan melakukan investigasi perilaku terhadap keputusan alokasi asset sehingga dapat menekan bias pada proses investasi. Adapun perilaku bias yang akan dikaji dalam penelitian ini adalah:

2.1.1. Representativeness Bias

Shefrin (2007) menyatakan bahwa representativeness bias adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang keliru, yaitu keputusan keuangan yang tidak meningkatkan perolehan imbal hasil.

Kahneman dan Riepe [21] juga menyatakan ulasan yang tidak jauh berbeda bahwa investor yang mengalami *representativeness bias* cenderung bereaksi berlebihan pada saat memproses informasi untuk membuat keputusan transaksi. Bukti temuan empiris, diantaranya [22], menemukan bahwa cara berpikir representativeness bias menyebabkan investor keliru karena menyangka perusahaan bagus adalah investasi bagus (good company is good investment).

2.1.2. Loss Aversion

Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan. Sebuah studi tentang loss aversion telah menjadi rule of thumb, yaitu secara psikologis, probabilitas untuk mendapatkan kerugian memiliki dua kali kekuatan motivasi probabilitas mendapatkan keuntungan dengan jumlah yang sama [11].

Bias loss aversion dapat membuat investor sangat menghindari risiko ketika mengevaluasi kemungkinan keuntungan karena menghindari kerugian adalah lebih penting daripada mendapatkan profit. Ketika investasi mulai membuahkan keuntungan, individu yang loss aversion akan cepat mengunci profit dan menjual saham karena kekuatiran pasar berbalik arah dan mengambil profit. Secara umum loss aversion menyebabkan investor memegang saham yang rugi dan menjual saham-saham yang menguntungkan sehingga menjadikan return portofolio menjadi tidak optimal [5].

2.1.3. Self Attribution Bias

Self attribution bias adalah kecenderungan individu untuk mendiskripsikan kesuksesan yang dialami karena factor dari dalam diri, sementara kegagalan yang dialami karena factor-faktor dari luar. Bias ini akan menyebabkan [11]: (1) Self attribution bias setelah sukses yang panjang akan menyebabkan rasa percaya diri yang berlebihan, sehingga mengambil risiko yang lebih besar, yaitu overconfidence, (2) Menyebabkan investor berdagang terlalu sering (overtrading) yang berisiko tinggi, (3) Menyebabkan investor hanya mendengar apa yang ingin didengar. [5] menemukan bahwa self attribution bias tampak pada investor yang terlalu percaya diri bahwa kesuksesan yang mereka dapat berasal dari keahlian yang dimiliki dan kerugian yang dialami berasal dari factor eksternal. Berbagai bias psikologis tersebut membuat return investor menjadi berkurang bahkan rugi, yang menyebabkan mereka beralih ke robot trading. Berbagai bias psikologis yang terjadi dalam trading saham, membuat portofolio investor menjadi tidak optimal dan cenderung beresiko tinggi. Untuk menghindari berbagai perilaku

bias yang bersumber dari psikologi, banyak investor beralih melakukan trading dengan menggunakan robot.

2.2. Algoritma Trading

Algoritma merupakan sekumpulan instruksi atau langkah-langkah yang dituliskan secara sistematis dan digunakan untuk menyelesaikan masalah/persoalan logika dan matematika dengan bantuan computer [23]. Sementara trading adalah proses menjual dan membeli produk di pasar saham dan valuta asing. Sehingga algoritma trading adalah algoritma yang dibuat secara spesifik untuk proses jual-beli saham dan valuta asing.

Peran algoritma sangat penting dari komputer. Dalam sudut pandang matematika dan statistika, kemampuan sebuah robot trading dinilai berdasarkan algoritma yang dimilikinya. Sehingga jika faktor-faktor eksternal dieliminasi, dapat disimpulkan sebuah robot trading dapat bekerja efektif jika algoritma tradingnya dapat bekerja efektif. Algoritma trading sangat memanfaatkan ilmu statistika. Ilmu statistika itu sendiri merupakan cabang dari ilmu matematika. Shah (2015) mengembangkan model prediksi untuk memutuskan kapan membeli, menjual atau hold saham menggunakan data mining dan machine learning technique. Azhikodan et al. (2019) mengusulkan trading swing otomatis menggunakan deep reinforcement learning dengan melakukan percobaan trading swing untuk menentukan posisi beli, jual atau hold. Pricope (2021) menunjukkan bahwa Deep Reinforcement Learning (DRL) dalam perdagangan saham telah memberikan potensi penerapan yang sangat besar yang menyaingi pedagang profesional di bawah asumsi yang kuat. Yang et al. (2020) menunjukkan seperangkat strategi trading yang menggunakan 3 algoritma dasar, yaitu: Proximal Policy Optimization (PPO), Advantage Actor Critic (A2C), dan Deep eterministic Policy Gradient (DDPG), menunjukkan bahwa penerapan seperangkat strategi yang digunakan dalam penelitian ini berhasil mengungguli rata-rata industri Dow Jones dan metode alokasi portofolio varian minimum, dalam hal rasio Sharpe dengan menyeimbangkan risiko dan pengembalian di bawah biaya transaksi.

2.3. Robot Trading vs. conventional trader

Penelitian automasi trading dilakukan oleh [16]. Menggunakan deep reinforcement learning, melakukan percobaan trading swing dalam rangka menentukan posisi beli, jual atau hold. Penelitian ini menjawab kebutuhan untuk memprediksi trend nilai saham yang bekerja sepanjang algoritma reinforcement. Juga melakukan implementasi model analisis sentiment menggunakan a recurrent convolutional neural network untuk memprediksi trend saham

berdasarkan berita keuangan. Tujuan paper ini untuk membuktikan bahwa metode reinforcement learning mampu mempelajari trik trading saham. [15] mengembangkan model prediksi dan untuk memutuskan kapan membeli, menjual atau hold saham menggunakan data mining dan machine learning technique. Teknik learning mesin seperti Naive Bayes, k-Nearest Neighbor(k-NN), Support Vector Machine(SVM), Artifificial Neural Network(ANN) and Random Forest digunakan untuk pengembangan model prediksi. Model dapat digunakan untuk memberikan sinyal buy and hold untuk pasar modal kepada pengguna pasar modal seperti jumlah yang diinvestasikan, durasi waktu, minimum profit, maksimum lost menggunakan data mining dan mesin learning technique. Dengan menggunakan sinyal beli dan jual ini maka akan mengurangi factor psikologis investor.

[17] menunjukkan Perdagangan saham algoritmik telah menjadi pokok di pasar keuangan saat ini, mayoritas perdagangan sepenuhnya otomatis. Agen Deep Reinforcement Learning (DRL) terbukti menjadi kekuatan yang harus diperhitungkan dalam perdagangan saham dan telah menunjukkan potensi penerapan yang sangat besar yang menyaingi pedagang professional di bawah asumsi yang kuat, meskipun penelitian ini masih dalam tahap pengembangan yang sangat awal. [24] menunjukkan bahwa untuk meramalkan future price dapat menggunakan harga saham masa lalu menggunakan machine learning, namun [25] menggunakan robot trading menunjukkan bahwa strategi perdagangan yang ditujukan untuk mengeksploitasi pola harian tidak menghasilkan abnormal return. Tidak terdapat perbedaan yang signifikan antara sub periode 2005 – 2006 (Normal), 2007-2009 (Krisis), dan 2019-2011 (paska krisis). [26] menunjukkan bahwa hanya dengan melihat harga saham di masa lalu tidak cukup untuk memprediksi return dimasa depan menggunakan automated trading. Cara yang lebih baik adalah dengan melihat seluruh sektor yang menjadi target dan menggunakan informasi harga historis dari semua perusahaan dalam sektor tersebut untuk memprediksi target return keesokan harinya. [27] menunjukkan rata-rata algoritmic trading memperbaiki likuiditas dan informational efficiency, namun meningkatkan volatilitas jangka pendek. (Ani Omuchesi and Bosire 2014) menunjukkan bahwa pengenalan ATS tidak memiliki pengaruh yang signifikan secara statistic pada efisiensi pasar di Nairobi Securities Exchange. Secara keseluruhan, hasilnya menunjukkan bahwa otomatisasi belum menghasilkan manfaat yang diharapkan dalam meningkatkan efisiensi Bursa Efek Nairobi.

[29] melakukan riset kualitatif menganalisis kelebihan dan kekurangan dari algoritma trading, menunjukkan: (1) BNP Paribas telah banyak mengembangkan automatis trading system (ATS), namun masih ada banyak ruang untuk meningkatkan dan implementasi sistem

baru, (2) Manfaat utama perangkat lunak trading otomatis adalah disiplin dan tidak melakukan kesalahan, dibanding seorang trader yang mungkin sulit untuk tetap fokus pada rencana. Namun seorang trader dapat memperhitungkan segala sesuatu yang terjadi dan memprosesnya, sedangkan robot hanya dapat melakukan hasil berdasar situasi yang telah diprogram, (3) Sistem trading otomatis lebih murah dan meningkatkan volume bisnis, Sistem trading otomatis meningkatkan keuntungan dan efisiensi bisnis, namun harus ditetapkan batas penarikan maksimum yang dapat merusak robot yang dipicu penggunaan stop loss pada setiap trading.

Berdasarkan temuan hasil riset diatas, terdapat Gap penggunaan robot trading dibandingkan dengan trader konvensional tentang mampukah robot trading menggantikan peran manusia dalam trading saham secara penuh? apakah robot trading mampu bekerja sangat efisien sehingga kita dapat mempercayai sepenuhnya? Apakah di masa depan kegiatan trading akan dikendalikan oleh robot?

3. METODE

Metode yang digunakan dalam penelitian ini adalah paradigma kualitatif. dengan metode fenomenologi, untuk melakukan Eksplorasi Efekfititas Penggunaan Aplikasi Robotik Sebagai Bentuk Digitalisasi Pasar Modal melalui proses berfikir induktif dalam konteks yang sebenarnya yaitu pelaku investor saham. Karakteristik pokok pendekatan kualitatif dalam penelitian ini lebih mementingkan makna, konteks, dan perspektif emik.

Penelitian ini menggunakan paradigma kualitatif interpretive dengan metode fenomenologi schutz dan deontologi untuk melihat makna dibalik fenomena beserta aspek moral dari perilaku investor. Penentuan informan dengan tehnik purposive dan snowball. Setting penelitian adalah investor individu. Pencarian informan dilakukan dengan metode purposive yaitu memilih informan dengan melihat kualifikasi yang telah ditentukan. Informan adalah investor aktif yang telah melakukan investasi saham minimal 5 tahun. Wawancara mendalam dilakukan di tempat yang disepakati oleh informan dalam jangka waktu empat bulan. Proses pengumpulan data secara interaktif, dengan durasi 1 sampai 2 jam tergantung kondisi saat wawancara. Untuk mendapatkan informan kunci yang memenuhi kriteria, peneliti memperoleh informasi dari Perusahaan sekuritas, selanjutnya dilakukan pencarian informan dengan teknik bola salju. Wawancara mendalam dilakukan tiga sampai empat kali wawancara mendalam sampai mencapai jenuh tergantung pada subjektivitas peneliti dan masalah penelitian yang ingin diselidiki [30]; [31]; [32].

Dalam penelitian kualitatif tidak dimaksudkan untuk menarik kesimpulan secara umum tetapi untuk menggali pengalaman setiap informan yang bersifat unik, sehingga pentingnya

penelitian kualitatif bukanlah besar kecilnya sampel, melainkan kedalaman dan keunikan persepsi dan pengalaman para informan masing

Metode pengumpulan data menggunakan wawancara mendalam, observasi partisipan, dan dokumentasi. Kriteria yang digunakan untuk keabsyahan data dalam rangka untuk menguji validitas dan reliabilitas data kualitatif adalah [33], [34], credibility/trustworthiness menggunakan triangulasi, member checking dan external audit. Authenticity/confirmability dilakukan dengan bracketing dan epoche. Untuk melengkapi data dan pemahaman tentang masalah yang diteliti maka peneliti juga mengambil dari video-video yang berasal dari youtube menggunakan content analysis sebagai bagian dari triangulasi metode.

Table 1: Demographic Data The Main Informant

No	Name	Age	Sex	Education	Marital Status
1	Fjr	45	Laki-laki	S1	Menikah
2	Iks	30	Laki-laki	S2	Menikah
3	Hdr	32	Laki-laki	S1	Menikah
4	Brd	30	Laki-laki	S1	Lajang
5	Rf	40	Laki-laki	S2	Menikah

Source: Processed data, 2022

Data analysis menggunakan phenomenological data analysis [35]. Analis data dilakukan melalui tahap: (1) Mengidentifikasi unit makna dan mengelompokkan tema. Tahap ini adalah tahapan reduksi fenomenologi. (2) Individual textural-structural description, menyimpulkan tiap tema untuk menciptakan diskripsi tekstural dan struktural yang mendalam (exhaustive description) tentang pengalaman informan. (3) analisis lintas situs. Pada tahap ini dilakukan cross analyze untuk unit makna yang sama diantara partisipan, dan membuat diskripsi tekstural dan struktural untuk semua partisipan (Composite textural and structural description) untuk menemukan esensi makna. (4) Identifikasi esensi pengalaman. Merupakan hasil dari narasi *composite textural-structural description* atau analisis lintas situs. Tahapan ini mengintegrasikan intuisi, *tacit dimention, self searching and reflecting* dari deskripsi tekstural dan structural [36]).

4. HASIL

Robot trading sebenarnya suatu bentuk dari automated trading**.** Transaksi perdagangan dilakukan sepenuhnya otomatis oleh perangkat lunak dan berdasarkan algoritma

pemrograman. Perangkat lunak ini bekerja dengan sendirinya dan manusia hanya melakukan perubahan parameter program. Jangan dibayangkan robot trading seperti dalam fiksi ilmiah, tapi robot trading berwujud software yang berada di server (komputer berkinerja tinggi). Jadi trader masa depan nanti adalah kumpulan server yang menjalankan trading otomatis. [37], https://juruscuan.com/belajar/trading/523-robot-trading-di-masa-depan)

Robot trading atau trading otomatis sering disebut sebagai algorithmic trading. Umumnya setiap robot trading memiliki strategi dan algoritma sendiri, yang dibuat oleh pembuatnya. Strategi dan algorima ini disebut blackbox, merujuk pada sifatnya yang rahasia. Sehingga robot trading sering juga disebut blackbox trading. Setiap institusi besar yang bermain di pasar keuangan memiliki blackbox-nya masing-masing, contohnya Chameleon (dikembangkan oleh BNP Paribas), Stealth (dikembangkan oleh Deutsche Bank), Sniper dan Guerilla (dikembangkan oleh Credit Suisse). Trader ritel pun sekarang sudah mulai menggunakan robot trading. Misalnya yang cukup marak dilakukan oleh trader saham dengan software online tradingnya masing-masing. Atau trader forex, komoditas dan indeks dengan Expert Advisor (EA) di MetaTrader.

4.1. Perkembangan Robot Trading

Sejarah perdagangan otomatis di pasar keuangan dimulai pada tahun 1970-an ketika para trader besar mampu melakukan kontrak perdagangan otomatis di Chicago Mercantile Exchange. Langkah selanjutnya dibuat pada tahun 1999 ketika perusahaan internet menciptakan software forex ritel pertama yang didedikasikan untuk individu, yang memberikan trader sarana untuk membeli dan menjual mata uang langsung di pasar forex.

Saat ini robot trading bisa menerima berita dari pasar dan algoritma dapat mengidentifikasi peluang pasar, membuat keputusan beli atau jual dan memprosesnya dalam hitungan hanya milidetik. Jadi bahkan sebelum kita mendapatkan kesempatan untuk membaca berita, robot trading sudah melangkah di pasar.

Perkembangan penggunaan robot trading sangat cepat. Sepertiga dari semua perdagangan saham Uni Eropa dan Amerika Serikat pada tahun 2006 dilakukan oleh robot trading. Hanya dalam selang waktu 3 tahun, pada tahun 2009 penggunaan robot trading menjadi sekitar 60-70% dari seluruh volume perdagangan saham di AS. Menurut data, sekarang robot trading digunakan pada 80% lebih dari transaksi perdagangan finansial, mulai dari saham, forex, komoditas, futures dan sebagainya. Semua pemain utama, seperti bank, dana investasi, dan institusi finansial sudah menggunakan robot untuk trading. Boleh dibilang satu-

satunya jenis trading yang masih manual dilakukan oleh trader dan investor ritel. Di Indonesia pun, kecenderungan penggunaan robot trading diperkirakan akan semakin meluas, seiring dengan meningkatnya pemakaian software online trading.

4.2. Kelebihan Robot Trading

Ada beberapa keuntungan dari penggunaan robot trading, diantaranya adalah: (1) Keuntungan yang paling penting dari robot trading adalah penghapusan total unsur psikologis yang terlibat dalam trading. Sehingga pada dasarnya diharapkan robot trading bisa menghilangkan kesalahan manusia (human error); (2) Keuntungan yang kedua, adalah volume transaksi dalam jumlah besar yang dapat dibuat dan terus menerus. Robot trading dapat melakukan transaksi terus-menerus pada semua pasar, menerapkan algoritma yang sama berulang-ulang, tanpa jeda; (3) Keuntungan yang ketiga adalah kecepatan. Robot trading mampu mengeksekusi transaksi dengan sangat cepat. Bila dianalogikan seperti kecepatan elektron. Waktu pertama kali robot trading diperkenalkan, faktor kecepatan menjadi kelebihan. Tapi seiring semakin banyaknya pengguna robot trading, faktor kecepatan tidak lagi menjadi keuntungan yang utama.

4.3. Dampak Penggunaan Robot Trading

Penggunaan robot trading menciptakan perdagangan dengan ciri khas yaitu trading frekuensi tinggi (*High Frequency Trading* atau HFT). Robot trading melakukan transaksi dalam volume besar secara terus menerus setiap saat. Umumnya HFT hanya mencari keuntungan kecil, tapi dalam volume yang besar.

Karena volume trading yang dilakukan sangat besar, bila terjadi kesalahan dalam transaksi maka bisa berakibat dahsyat. Sebagai contoh ada dua kasus fatal dalam penggunaan trading otomatis, yaitu: (1) Flash Crash. Pada tanggal 6 Mei 2010, bursa saham AS mengalami penurunan tajam. Indeks Dow Jones Industrial Average turun 9% atau 1.000 poin hanya dalam hitungan menit; (2) Knight Capital. Pada 1 Agustus 2012, algoritma milik Knight Capital Group menimbulkan kekacauan di pasar saham. Akibatnya Knight Capital merugi hingga empat kali laba bersihnya di tahun 2011.

4.4. Perlukah Menggunakan Robot Trading?

Pada bulan Maret 2014, Virtu Financial, sebuah perusahaan HFT, melaporkan bahwa selama lima tahun berhasil melakukan 1277 trading yang menguntungkan dari 1.278 hari. Jadi Virtu hanya loss dalam satu hari dalam 5 tahun. Klaim yang diberikan oleh Virtu boleh jadi

mengindikasikan bahwa robot trading bisa menguntungkan. Tapi tidak semua robot trading bisa menguntungkan. Supaya robot trading bisa menguntungkan harus memiliki dua syarat: 1. Algoritma yang hebat. 2 Server yang sangat cepat.

Trader ritel tidak memiliki dua syarat tersebut. Server yang cepat sangat mahal. Algoritma yang lebih hebat dari milik para institusi juga sulit dibuat. Perlu kemampuan intelektual dan biaya sangat tinggi untuk riset dalam membuat algoritma tersebut.

Walaupun robot trading semakin marak, tapi pada dasarnya semuanya merupakan perpanjangan dari emosi manusia. Psikologi manusia masih berperan besar di pasar. Dan psikologi tersebut membuat pasar tidak mudah ditebak bahkan oleh algoritma paling canggih sekalipun. Jadi selalu ada kesempatan bagi para trader konvensional, yaitu yang masih trading secara manual untuk meraih keuntungan dari pasar.

Menurut Informan 1 (Fj) dari Pintraco Securitas, **alasan pertama** Forex lebih menggunakan robot trading dibandingkan dunia saham adalah dunia saham tidak seekstrim dunia Forex, sehingga tidak perlu menggunakan robot trading bagi trader ritel. Ada perbedaan mendasar antara saham dengan valuta asing. Dalam transaksi forex, investor dapat menjual valuta asing meskipun saat itu dia tidak punya valuta asing tersebut. Dalam istilah trading, disebut margin trading. Namun kalau dalam pasar modal, margin trading tidak dibenarkan. Membeli saham berarti membeli perusahaan, sehingga investor dapat menjual saham tersebut jika dia sudah memilikinya seperti penuturannya berikut:

> "*Nah kalau di saham itu itu bisa begitu karena konsepnya kalau kita beli saham itukan membeli perusahaan, kita menjual saham berarti kita jual perusahaan nah kita bisa menjual perusahaan kalau kita sudah punya perusahaan, karena disaham ada hal lain yang pasti, kita beli saham kita mendapatkan sertifikat bahwa kita benar-benar membeli saham maka akan mengikat perusahaan. Ketika perusahaan itu mendapatkan laba, kita kecipratan deviden itu, kalau di forex kan tidak ada seperti itu, sehingga bisa aja ngomong beli atau jual dulu bisa karena lebih mudah pindah-pindahnya kalau disaham kan tidak bisa harus beli dulu baru kita bisa menjualnya" (Fjr.Als.1)*

Transaksi valuta asing lebih mudah dalam hal memindahkan kepemilikan dari satu investor kepada investor yang lain karena tidak berhubungan dengan hak atas deviden seperti pada saham, sehingga pencatatannya lebih mudah.

Alasan yang kedua mengapa trading saham tidak perlu menggunakan robot trading adalah karena alasan kondisional order. Artinya transaksi beli ataupun jual saham dilakukan dengan order yang di setting di dalam aplikasi trading system dalam perusahaan sekuritas tertentu. Setiap kali akan melakukan transaksi sangat tergantung kondisi pasar dan kemudian melakukan setting order pembelian atau penjualan. Tidak seperti dalam valuta asing yang

transaksi pembelian dan penjualan terjadi secara otomatis melalui robot trading, seperti uraian dari Fjr berikut:

> *"Kondisional order jadi ketika mau order jual harus ngerti dulu jadi gak se robot yang ada di forex yang bisa disetting, kalau saham itu beli lalu disetting nanti jual disetting. itu kondisional order yang kaitannya jual dan beli. lalu ada lagi itu yang jual saja. iya jadi ada kaitannya yang jual saja jadi kita mau jual diharga berapa gitu, jadi kita bisa share nah saya pengennya jual diharga 1.500 atau saya mau stoploss", (Fjr.Al.2)*

Aplikasi trading saham, khususnya di dalam system Pintraco memiliki menu GTC (Got till Cancel), yaitu fasilitas untuk menjual saham sesuai dengan harga yang diinginkan yang memiliki batas waktu satu bulan atau sampai investor membatalkan instruksi tersebut. Fasilitas ini diperuntukkan bagi investor yang ingin menjual saham dengan harga tertentu tanpa dia harus memantau pasar dan melakukan order jual setiap hari. Sehingga dengan menggunakan menu GTC, investor tidak perlu memantau pergerakan harga jika dia ingin menjual sahamnya dengan harga yang sudah tertentu. Berikut penjelasan Fjr:

> *"Tidak harus Investor melakukan ini, karena itu tadi saya pengen jual diharga tertentu walaupun sekarang harganya belum nyampe diharga tertentu otomatis dijual gitu namanya got till cancel (GTC). itu kita order jual bisa juga beli. ketika saya pengen jual diharga sekian kalau sekarang harganya tidak sampai segitu kita order lalu kita tinggal seperti itu. Jadi dari sini kita punya ancer-ancer kalau udah dapet jualnya disitu misal diharga 1000 saya pengen beli diharga 900 tapi ini fix kalau yang tadi itu kan bisa sama dengan lebih kecil nah kalau ini fix 900 ya 900 kalau 900 sudah tercapai kita jual 1500 bisa seperti itu GTC kalau tadi kan ada variabel nya , kemudian itu dari beli dan jual itu misalnya stoploss saya beli di angka 1000 saya pengen kalau turun diangka 900 dijual dulu, kenapa ? karena kalau sahamnya waktu beli di 1000 itu bisa jadi turun 900, turun lagi di 700 sampai ke 500 kalau makin lama aset malah berkurang, mending stop dulu baru nanti 900 swicth dulu ke saham lain yang bahkan bisa menaikkan asset yang mengurangi kerugian, atau mengubah kerugian menjadi keuntungan itu stoploss"(Fjr.Fas.1)*

Istilah stoploss adalah menjual rugi. Dilakukan oleh investor jika harga saham terus menurun. Untuk membatasi kerugiananya, maka dia menggunakan menu stoploss. Jadi kalau harganya sudah tercapai, maka system akan melakukan penjualan otomatis untuk menghindari kerugian yang lebih parah. Ada lagi istilah trailing stop. Menu ini digunakan ketika investor ingin memantau pasar, melakukan transaksi sesuai dengan kondisi pasar. Seperti penuturan Fjr Berikut:

> *"Ada lagi yang kaitannya dengan kita menggunakan aplikasi memantau market ketika masih ada potensi naik tidak usah dijual. kalau masih ada potensi naik itu kita tidak dijual dulu sahamnya ketika turun. nah kalau stoploss itu kaitannya dengan penurunan harga yang trailing stop kenaikan harga itu kita memerintahkan sistem kalau aku belinya 1000 di sistem nih kalau harga 1500 pantau ya kalau masih naik di 1500 gausah dijual dulu naik ke 1800 gak usah dijual dulu tetapi kalau naik ke angka 2000 ternyata kok*

turun itu dijual itu bisa, nah kalau yang tadi GTC itu saya jual di 1500 kan, saham naik ke 2000 yauda kejual 1500 kalau saham stoplossnya di 900 itu dari 1000 turun ke 900 maka exsekusi di 900 ketika turun di 500,400 kita sudah tidak ada barangnya karena fix 1 variabel harga kalau trailling stop ini kita memperintahkan kalau naik diatur dulu kalau gk kuat naik turun dijual, nah setelah kita setting kita tinggal aja nanti ke exsekusi sendiri tetapi ada batas hari nya 30 hari"(Fjr.Fas.2).

Berdasarkan penjelasan dari Fjr, transaksi saham jarang menggunakan robot trading karena transaksinya bersifat jangka panjang dan sangat kondisional sehingga investor perlu memantau pasar dan mengatur menu sesuai kondisi pasar. Menu setting yang ada dalam system aplikasi sekuritas memberikan kesempatan kepada investor untuk melakukan penyetelan transaksi. Masing-masing sekuritas akan mengembangkan software sendiri, seperti "profit" untuk Pintraco sekuritas, "Mouse" untuk Mandiri Sekuritas, bisa dengan system android dan sebagainya. Masing-masing perusahaan memiliki ciri masing-masing untuk memikat dan memudahkankan investornya. Ada yang sederhana dengan menggunakan laptop, belum bisa diaplikasikan ke Handphone, namun ada juga yang sudah bisa digunakan pada Android seperti di Pintraco, meskipun tetap secara frekuensi masih lebih aktif dalam transaksi valuta asing, Beriku penjelasan Fjr:

"Ada yang sekuritas yang sangat sederhana dan saat ini masih ada jadi transaksi harus pakai laptop tidak bisa pakai hp ada yang seperti itu , nah beberapa aja yang pake hp maksudnya mengembangkan dengan hp ada yang sama seperti Pintraco dan itu secara umum sama untuk fiturnnya baik dari Indopremier itu hampir sama fiturnya tapi ga seaktif yang diforex karena saham itu kalau naik 1% nunggu seharian kadang setengah jam bisa 1% gitu",(Fjr.Al.3)

Alasan ketiga mengapa di saham tidak diperlukan robot trading adalah karena pasar saham lebih pasif daripada pasar valas. Berbeda dengan pasar valuta asing yang bergeraknya sangat atraktif setiap menit, bahkan detik, pasar modal lebih pasif, tinggal pantau pasar, lalu dijual jika harga sudah sesuai dengan yang diinginkan, bahkan bisa jadi menjualnya di hari yang berbeda bagi orang yang trading dengan tipe swing, atau tipe position trader. Jadi masih perlu pantauan manual dari manusia setiap hari melihat pergerakan harga pasar, kecuali mensetting robot untuk memantau pasar seperti yang diuraikan di atas, Hal ini berbeda dengan pasar valuta asing yang bisa disetting naik 1% jual turun 1% jual seperti penjelasan FJr berikut:

"*Ya artinya kalau kita mensetting robot ga perlu mantau misalnya beli di harga 1000 lalu di 1500 mau dijual tp saya minta komputer untuk mantau dulu sampai 1.600, 1.700 gitu kan dalam harga 1000 saya input menu traillingstop 1.500"(Fjr.Al.4)*

Saham adalah investasi jangka panjang yang jangka waktunya bertahun-tahun. Namun di Pintraco Sekuritas, perusahaan memberikan fasilitas bagi para investor yang menginginkan

trading cepat. Tetapi tidak semua perusahaan sekuritas memiliki fasilitas tersebut. Namun setiap sekuritas memilki aplikasi sendiri-sendiri, tergantung masing-masing perusahaan, mana yang akan dikembangkan.

Bagi investor jangka panjang yang membeli saham untuk disimpan, fasilitas seperti stoploss, GTC, atau trailing stop tidak perlu untuk dipakai, karena saham disimpan, jadi tidak perlu dijual setiap hari apalagi sampai dijual rugi. Lebih baik disimpan, karena harga saham naik turun. Namun bagi investor baru yang belum memahami perdagangan, dan masih memiliki psikologis yang tinggi, mungkin akan merasa ketakutan ketika melihat harga saham yang baru dibeli pagi ini ternyata mengalami penurunan harga, sehingga dia melakukan stoploss. Padahal sebentar kemudian harga saham kembali naik, sehingga akhirnya investor menyesal. Berdasarkan hasil wawancara dengan Fjr, diketahui ternyata masih banyak investor yang melakukan seperti di atas, hanya karena tidak memiliki pemahaman tentang trading harian dan investasi jangka panjang.

> "*iya itu tadi ketika beliaunya ada keperluan dan tidak berkesempatan memantau diwakilkan dengan stoploss tapi kalau beliaunya memantau tidak pakai stoploss karena kan stoploss perlu waktu , kalau misalkan ini turun mau naik lepas stoplossnya jadi kalau kita mantau market kan lebih enak jadi kalau mantau market pakai itu saja ohh ini waktu nya jual daripada turun lagi langsung aja jual, nah kalau memang beliaunya ini trader, paham waktunya jual disitu baru pakai stoploss kalau masih belum apa-apa gak tau range pergerakan harga kan eman, sedikit-sedikit dijual itu yang pengen jadi trading*."(Fjr.Plk.1)

Mengenai software yang dipakai oleh oleh setiap perusahaan sekuritas mengembangkan sendiri software masing-masing, namun secara umum fiturnya sama, namun tidak seaktif di forex karena saham itu kalau naik 1% nunggu seharian kadang setengah jam bisa 1%, sedangkan kalau di Forex sangat aktif pergerakan harganya. Hanya mungkin ada yang bisa diaplikasikan dengan android atau hanya bisa dengan laptop saja.

Sejalan dengan perkembangan transaksi di bursa efek, transaksi pada umumnya dijalankan dengan cara manual trading. Manual trading adalah melakukan trading saham secara manual. Jika ada saham yang menarik untuk dibeli, dilakukan trading buy oleh investor secara manual dengan memasukkan order buy ke dalam system aplikasi di sebuah perusahaan sekuritas dengan menentukan harga yang diinginkan. Dan ketika sudah dirasakan keuntungan yang didapatkan sudah cukup besar, maka dimasukkan order jual secara manual juga pada system aplikasi dengan harga yang diinginkan.

Otomatisasi adalah melakukan sesuatu pekerjaan yang sudah disetting, agar kita tidak perlu memantau secara terus menerus. Otomasi seperti ini sebenarnya cukup lama ada di Bursa

Efek Indonesia, yaitu pada system aplikasi yang ada di perusahaan sekuritas, seperti fasilitas "pending order" ketika kita akan menjual saham pada suatu harga yang diinginkan. Dalam perkembangannya, banyak pihak ketiga yang menawarkan aplikasi-aplikasi diluar broker saham yang mengembangkan konsep-konsep untuk analisa, namun kemudian kembali lagi kepada brokernya, karena eksekusi transaksi dilakukan pada sistem aplikasi yang ada di Broker. Fasilitas-fasilitas seperti trailing stop digunakan untuk melakukan operasi pembelian atau penjualan saham namun system diminta untuk memantau pasar seperti yang diinginkan oleh investor, seperti apa yang diungkapkan oleh Ryan Filbert berikut: [38], https://youtu.be/czEeKthG9mM) :

> "*Nah, sebenarnya yang berlaku di Indonesia dengan tren yang terjadi di dunia ini agak sedikit berbeda karena di Indonesia yang kita bisa pahami bahwa banyak third party ataupun aplikasi-aplikasi diluar daripada broker saham itu juga yang mengembangkan konsep-konsep untuk analisa. Nah, memang sampai dengan hari ini, dari yang saya tahu ya, saya juga enggak tahu mesti-mesti kroscek dengan Pak Bernard juga, itu tidak dimungkinkan bahwa… kita ngelihat dari… di tempat mana di pihak ketiga tapi tetap kembali ketika kita mau melakukan eksekusi kita kembalikan ini ke si broker kita, oh iya dah saya pencet. Nah di dunia itu sudah ada satu kondisi bahwa ada pihak ketiga yang memungkinkan terjadi suatu otomatisasi. saya bisa bilang… oke pokoknya kalau kondisinya kayak gini Kamu Tolong langsung eksekusi buy, ketika kondisinya begini langsung eksekusi sell dan itu sampai satu kali setting untuk cukup lama, bukannya setiap kali mau terjadi itu baru kita setting. Nah, otomatisasi atau robot trading yang dimaksudkan dari bursa itu juga kita juga lagi coba untuk telaah lebih dalam karena kalau yang sifatnya adalah* ***trailing stop,*** *kalau sifatnya adalah* ***pending order*** *itu kita pada saat ini sudah mulai biasa untuk melakukan itu jadi otomatisasi Ini juga masih banyak penafsirannya yang perlu kita perjelas Mbak kalau dari sudut pandang saya*".*(Rf.Fas.1)*

Alasan keempat forex lebih membutuhkan robot trading dibandingkan saham adalah karena pasar forex buka 24 jam sehari dalam 5 hari kerja dalam seminggu, sehingga trader Forex lebih membutuhkan alat bantu yang dapat memantau pasar dan bahkan melakukan trading secara rutin. Sebaliknya pasar modal hanya buka jam 09.00 sampai dengan jam 15.00 sehingga lebih santai. Namun perlu diingat juga bahwa tidak ada satu robot tradingpun yang dapat menjamin bahwa penggunaan robot tertentu akan selalu untung dan tidak akan pernah rugi? Jika ada yang menawarkan hal tersebut, maka perlu diperhatikan bahwa hal tersebut hanyalah trik marketing semata. Setiap keputusan investasi pasti mengandung sebuah risiko, sehingga tidak ada investasi menggunakan aplikasi apapun yang akan bebas risiko. Robot trading hanyalah alat bantu yang membantu para investor untuk mengambil keputusan, dimana untuk mengambil keputusan tersebut, robot harus terlebih dulu disetting oleh manusia. Yang berarti robot trading bukanlah maha pintar. Bahkan robot yang menggunakan artificial

intelegent pun tidak akan memiliki risiko nol, seperti apa yang diungkapkan oleh Ryan Filbert Berikut [38], https://youtu.be/czEeKthG9mM):

> *"Nah, yang kita perlu ketahui itu bahwa gak ada yang namanya otomatisasi tidak ada resiko dan ini barang jualan yang membuat orang salah pikir bahwa robot itu maha pintar. Nah, kita perlu tahu* ***ada robot yang harus kita setting artinya robot ini bodoh kita harus setting tertentu. Dia itu cuma menjadi alat bantu kita untuk melakukan beli dan jual. Dia tidak memiliki logika berpikir*** *di sana. Nah, orang hari ini jadi tambah bingung lagi ada robot kecerdasan buatan.* ***Kecerdasan buatan itu adalah robot belajar bagaimana mengambil keputusan namanya artificial intelegence sama seperti kita menggunakan Google Maps****. Dia bisa secara dinamis mengganti rute karena dia menghitung tingkat kepadatan jalanan dengan sendirinya, bukannya nanti ada server di Google tuh ada operator zona. Oh ya saya akan verifikasi ini adalah benar atau salah rute enggak begitu karena dia memiliki suatu logika berpikir sendiri. Nah, masyarakat dibingungkan dengan berbagai macam percepatan teknologi ini sehingga mungkin yang baru masuk tidak mengerti membedakan robotnya dan apalagi dengan adanya bumbu-bumbu yang keliatan keren bahwa robot itu tidak bisa gagal saya dapat katakan, pengalaman ke-17 tahun di dunia keuangan dan investasi tidak ada robot yang pasti untung. Ini adalah cara marketing yang membuat orang bisa salah paham naruh uang dan justru malah jadi trauma terkait dengan seluruh instrumen apapun, dengan adanya robot ini yang dianggap tidak bisa rugi. saya katakan sekali lagi semuanya pasti ada risikonya. Otomatisasi itu hanya alat bantu. Mana ada nyetir mobil matic itu bisa membuat kita terhindar dari kecelakaan. Emangnya kalau mobil matic mobil manual bisa sama-sama bisa celaka toh, jadikan bukan artinya otomatisasi dengan matic itu menghindari kecelakaan tapi adalah alat bantu untuk mempermudah. Jadi itu yang perlu kita gaungkan ke masyarakat terkait hal ini mbak*". (Rf.Al.4)

Disisi lain, penggunaan robot juga melihat kondisi ekonomi saat itu. Jika kondisi ekonomi tidak stabil, maka penggunaan robot trading justru membahayakan, karena investor mengalami kesulitan untuk menyeting robot trading karena kondisi yang terus berubah, seperti ungkapan dari Brn berikut :

> *"Robot trading itu gini bu kalau selama ini pakai itu malah justru bisa membahayakan kalau musim gini kalau saya si no jangan pernah dilakukan karena pasca pergererakan ekonomi lagi guncang gini robot trading itu engga ada fungsi nya bu, kalau pas ekonominya stabil pergerakannya kita bisa pakai robot. Ketika kita tau ekonomi nya goyang dan bisa di identifikasikan kita biasanya bisa setting itu robot trading. Kan sebenarnya kita setting sendiri bu, batasan sampai mana proteksi sampai mana itukan tergantung kita kalau pasca seperti ini robot trading susah bu" (Wwc.Brn.ALS_1)*

4.5. Tahapan dalam Otomatisasi (Robot Trading)

Otomatisasi dalam Trading saham melewati berbagai tahap. Hal ini terjadi sesuai dengan perkembangan jaman dan perkembangan pengetahuan dari investor. Adapun tahap-tahap dalam perkembangan otomatisasi trading adalah sebagai berikut

1. Tahap 1. Generasi Manual (Manual Trading)

Pada tahap ini trading saham dilakukan secara manual, mulai dari melakukan analisa fundamental, membaca laporan keuangan emiten, membaca berita di surat kabar, mencari

berita di internet atau dimanapun, dilakukan sendiri, termasuk melakukan analisa teknikal, membuat support-resisten, menghitung indicator, membuat chart untuk menentukan kapan posisi buy dan sell akan dilakukan, sampai kemudian melakukan eksekusi (buy atau sell) dilakukan sendiri, Ryan Filbert mendefinisikan sebagai "orang yang mengerti apa yang dibaca". Berikut adalah generasi manual trading menurut Rf. [39] https://youtu.be/B8bVDbz8DlE)

> ***"generasi otomatisasi*** *terjadi dalam beberapa tahapan Kita sebenarnya pernah bahas lo mengenai robot trading yang Kalau enggak salah judulnya seperti itu Anda boleh cari-cari di 2 atau 3 tahun lalu dan saya akan kembali merefresh membuat yang menjadi lebih current ya yang lebih update gitu ya, yang pertama* ***generasi manual*** *yang tadi dimana generasi manual itu orangnya yang melakukan trading dengan gaya manual they can read a newspaper dia bisa Baca dia tahu bahwa ini diatas dia bisa tahu dia dibawah ini adalah support ini adalah resistant ini adalah pembalikan Arah ini adalah continuous dia tahu mau benar atau salah itu nomor dua Emang semua orang yang baca koran tahu apa yang terjadi sebenarnya gak tau juga kan, Oke so They can read a newspapper and they can get the point dia bisa melihat Pointnya oh poinnya di atas di bawah di kiri di kanan jenuh jual jenuh beli ya kan ada namanya Break Out Break Down ada asending, triangle lalalala lalalala pokoknya itulah initinya adalah* ***manual ini artinya adalah orang yang ngerti apa yang dibaca*** *manual namanya juga sama lah sama orang nyetir manual mobil ya dia harus tahu kapan gas kapan rem kapan ganti kopling angkat kopling pindahin gigi tarik rem tangan ya kan gak mungkin semua kalo orangnya nggak ngerti nah kan gak mungkin,so anda harus paham ketika anda melakukan manual trade"(Rf.Otm.1)*

2. Generasi Ringkasan (Terapan)

Pada tahap ini investor mencari alat-alat analisis yang tersedia untuk membuatnya lebih mudah untuk memahami berita di koran. Dia melakukan pencarian berbagai macam indicator yang tersedia, melakukan penyaringan, mana yang dirasa cocok akan dipakai dan yang dirasakan tidak cocok akan dibuang. Mulai mengenal moving average, RSI dan lain sebagainya yang merupakan indicator yang tersedia untuk membantunya melakukan analisis teknikal, seperti ungkapan dari Rf berikut [39] https://youtu.be/B8bVDbz8DlE):

> ***"generasi ringkasan*** *nah ini sudah mulai ada namanya generasi ringkasan, generasi ringkasan itu seperti ada di gambar anda dia sudah mulai menambahkan jurus-jurus serapan hmm kalo saya mesti cari support Resistance sendiri Saya merasa kurang yakin apa ya alat bantu untuk bisa membuat saya mengetahui support dan resisten aha namanya adalah moving average. Minggu kemarin inilah Bagaimana caranya membuat manual tuh terapan terapan bukannya automatic tapi terapan Kenapa karena indikatornya itu sudah muncul Anda tinggal ambil dan muncul Anda tinggal cara bacanya Mengapa jurus-jurus terapan versi dirinya sendiri sehingga newspappernya makin mudah dibaca Ah saya lebih cocok dengan yang ini yang ini saya nggak cocok yang ini saya cocok yang ini nggak cocok saya buang yang nggak cocok eh yang ini cocok tapi saya akan modifikasi nah itu belum sampe disini ni ini adalah sebuah versi terapan yang diambil dan dibaca untuk mempermudah jadi inilah bagian dari technical analysis tapi kalau saya pribadi mengatakan sebagai modern teknikal analisis". (Rf.Otm.2)*

3. Generasi Evolution Level Satu

Generasi evolution level satu adalah generasi yang tidak hanya melakukan pencarian berbagai alat/indicator dalam memutuskan beli/jual saham, tapi melakukan modifikasi dari berbagai indicator yang ditemuinya untuk menghasilkan model analisis terapan untuk dirinya sendiri yang merupakan perpaduan dari berbagai analisis sehingga sudah bisa lebih memahami berita, mengambil keputusan yang bersifat mandiri [39] https://youtu.be/B8bVDbz8DlE).

> ***"generasi evolution level satu*** *nah level satu ini adalah orang-orang yang sudah ngerti How to read newspaper, dia mengerti indikator-indikator dan dia mulai tahu Oh kelemahan indikator ini lagging Oh ini Indicator leading Oh ini ada false signal Oh ukuran segini nggak terlalu pas saya akan pakai ukuran segini dia sudah tahu, sehingga akhirnya dia bilang uhm kalau ini sama Ini digabung akan menghasilkan kayak gini ini berarti Adalah terapan yang bagus jadi dia membuat terapan versi jurusnya sendiri nah saya pun juga dalam satu masa yang lalu karena saya punya idealisme saya juga membuat versi terapan saya sendiri jadi kalau misalnya anda baca di buku saya judulnya adalah* ***investasi saham ala swing trader dunia*** *buku itulah teknikal analisis klasik yang dan digabung dengan yang modern saya sudah memiliki otomatisasi jadi pasti Saya yakin anda yang mengikuti trading teknikal dengan membaca buku saya pun ataupun mengikuti kelas itu tidak ada yang sudah terotomatisasi seperti ini Sayang sistemnya sudah kita hentikan karena abodemennya terlalu mahal sehingga saya tidak lanjutkan toh dengan manual trade saya juga sudah cukup untung mau ngapain cari yang dengan yang ada seperti ini kan yang penting adalah menaikkan profit mengurangi biaya artinya saya dapat untung lebih banyak gitu ya ini sudah ada namanya rebound. Pesan sponsornya diawal sebelum sampai dengan simpulan memang nggak bisa awam awam banget, memang trading itu tidak bisa lebih awam daripada seorang investor ya jadi bagian daripada trading aktif bisa menghasilkan suatu profit sebenarnya harus hati-hati Kalau Anda terlalu menyerahkan pada robot ini belum sampai kesimpulan tapi saya sudah buka separuh ya jadi generasi Evolution level satu ini dia bukan hanya menggunakan ilmu terapan tapi dia sudah punya ilmu terapannya sendiri dan dia bisa combine, nah jadi seperti yang di kanan layar anda ini sebenarnya adalah indikator terapan dari swing trading strategy versi saya yang sudah ada rebornnya yang sudah bisa mengukur kedalaman yang saya pakai seperti itu". ((Rf.Otm.3)*

4. Generasi Evolution Level Kedua

Generasi evolution level kedua adalah generasi otomatisasi, dimana pada level ini investor tidak hanya mengambil bermacam-macam indicator, dan memodifikasinya untuk menentukan posisi buy atau sell, tetapi juga memberikan sinyal alarm buy dan sell dan melakukan pembelian dan penjualan secara langsung bisa jadi menggunakan expert adviser sehingga bisa melakukan trading secara otomatis, seperti uraian dari Rf berikut [39] https://youtu.be/B8bVDbz8DlE :

> *"**Generasi evolution level kedua** jurus-jurus tersebut dibuatkan sebuah robot yang bukan hanya otomatis bisa memberikan sinyal pada saatnya untuk beli atau jual sehingga Anda bisa pencet beli atau jual ketika sinyalnya muncul tapi bisa melakukan*

otomatisasi terhadap buy dan sell jadi level 2 ini setelah dia tahu ada buy maka dia direct akan langsung buy order kalau tadi kan manual Anda buka laptop anda baca dulu setelah baca anda melakukan action kalau ini bener-bener Anda tidak Anda tidak lihat anda cuma nonton gini saja begitu dia muncul tandanya langsung order tuh, berarti jurus ini sudah jauh lebih kompleks karena apa karena sudah sampai dengan pembelian dan penjualan karena ada orang bilang begini, wah ryan kalo saya lagi masak ternyata indikator di belakang laptop saya bunyi ting-tung-ting-tung beli-beli tangan saya kotor saya gimana dong ? ya betul ada orang yang berpikir dengan strategi dia seperti itu Apakah salah ? Iya tentu tidak, kenapa karena mungkin strateginya sangat pendek sehingga presisi waktu begitu begitu matters buat dia kita nggak tahu tapi intinya adalah pada generasi evlove level 2 ini, ini udah kayak pokemon ya ada evolve ya level 1 itu adalah indikatornya yang di otak-atik level 2 ini sampai yang otak-atiknya itu bisa mentransfer command untuk melakukan beli dan jual".(Rf.Otm.4)

5. Generasi Evolution Level Ketiga. Generasi evolution level ketiga adalah generasi otomatisasi otomatisasi yang lebih canggih menggunakan artificial Inteligent (AI), dimana pada level ini investor tidak hanya mengambil bermacam-macam indicator, dan memodifikasinya untuk menentukan posisi buy atau sell, tetapi juga robot trading semakin canggih, robot pintar yang bisa belajar menyesuaikan kondisi pasar.
6. Generasi Copy Trade

Yaitu investor yang melakukan trading dengan mengcopy akun orang lain. Jadi seperti pengelolaan bersama dana investasi. Akun induk dicopy kepada anggota, sehingga pembelian yang dilakukan investor pada akun induk, akan dicopy atau di mirror, sehingga investor yang lain juga akan mendapatkan pembelian yang sama. Hal ini seperti pengelolaan dana manajer investasi atau fun manajer. Apakah akun induk menggunakan robot atau manual, kita tidak tahu, tetapi yang jelas investor tidak melakukan aksi apapun, hanya mengikuti apa yang dilakukan oleh akun induk, dan masing-masing investor akan mendapatkan return sesuai dengan persentasi dana yang dimasukkan. Ini adalah salah satu jenis otomatisasi trading yang juga sering dilakukan, seperti apa yang diungkapkan oleh Rf berikut [39] https://youtu.be/B8bVDbz8DlE):

*"Otomatisasi trading sebenarnya otomatisasi trading itu bukan hanya pada robot, zaman makin maju ada juga namanya **copytrade**, copytrade itu artinya adalah Anda mengcopy akun orang lain. Akun Anda ini adalah akun orang lain di mana akun anda akan di miror seperti akun orang lain dia beli anda beli dia jual anda jual masalahnya adalah kita tidak tahu orang ini membeli akibat robot jadi dia pasang di akun Dia robot atau dia melakukan suatu transaksi manual pada akhirnya kalau tempat anda otomatis Kenapa karena anda do nothing bisa juga disebut dengan **percentage allocation manajemen modul**. Ini seperti fun manajer ini lebih banyak diforex, jadi ada sebuah pulling account uangnya ditaruh secara persentase akan ditransaksikan Iya tetap saja bisa saja robot bisa saja manual didalamnya otomatisasi trading anda sampai mana sampai dengan robotnya atau sampai dengan copytradenya dimana copytradenya itu adalah akun anda di mirror dengan akun orang atau uang anda ditaruh pada satu tempat*

dengan percentage allocation manajemen modul sehingga secara persentase ini seperti kepemilikan saham lah ini kayak lagi bisnis, bisnis trading sama-sama uang anda 10% uang saya 90% uang siapa lagi gitu ya jadi Pokoknya initinya 100% ini dikelola oleh orang, beli dan jual dengan menggunakan akun ini dan ternyata kalau ini untung atau rugi ya akun ini akan dibagi secara prorata sesuai dengan kepemilikannya".(Rf.Otm.5)

Berdasarkan perkembangan teknologi yang semakin pesat, bahkan saat ini menggunakan teknologi **artificial intelegence (AI)** robot trading semakin canggih, robot pintar yang bisa belajar menyesuaikan kondisi pasar. Namun benarkah bahwa ada robot trading yang tak pernah salah? Berdasarkan pengalaman Rf di bidang pasar modal, sampai saat ini belum ada robot trading yang tidak terkalahkan, robot trading yang selalu menang, karena bagaimanapun teknologi yang digunakan, tidak akan dapat seratus persen benar, pasti ada juga error, tidak sesuai harapan, pasar yang berubah drastis, dan sebagainya yang menyebabkan robot tidak dapat bekerja secara maksimal. Karena pasar adalah kondisi yang dinamis, tidak statis, yang akan terus berubah sesuai dengan kondisi ekonomi, politik, sentiment pasar dan sebagainya. kalaupun ada, menurut Rf mungkin bukan investor ritel biasa yang punya. Konglomerat konglomerat itu jauh lebih memiliki akses segalanya dapat membayar orang-orang yang sangat ahli baik dari programmer sampai dengan ahli pemenang Nobel sekalipun, sayangnya mereka pun bisa salah, sehingga jika ada yang mengklaim memiliki robot trading yang tidak pernah kalah, maka patut dipertanyakan kebenarannya. Sama halnya dengan penggunaan google map yang menggunakan teknologi AI, apakah google map tak pernah salah? Sekali waktu kita menyadari bahwa google map pun pernah mengalami kesalahan atau error.

Penggunaan teknologi adalah untuk mempermudah manusia dalam pekerjaannya atau sebagai tools dalam pengambilan keputusan, namun kehadiran robot tidak dapat serta merta menggantikan manusia. Karena bagaimanapun robot perlu disetting, dan yang melakukan hal itu adalah manusia. Jadi jika orang tidak berubah sesuai jamannya, menambah pengetahuan sesuai perkembangan jaman dan teknologi, maka dia tidak akan dapat bertahan, dan lama kelamaan akan digantikan oleh orang yang lebih memahami, lebih mengerti teknologi sesuai dengan jamannya. Menurut Rf, robot pintar dipakai orang yang bodoh, maka akan menjadi tools yang bodoh, karena untuk mengaplikasikan dan mengerti tools tersebut dia harus sudah belajar dan memahami trading, bukan orang yang baru pertama kali mengenal pasar modal, karena tools tersebut menjadi kurang bermanfaat dan justru beresiko tinggi, seperti uraian Rf berikut [39] https://youtu.be/B8bVDbz8DlE):

"Opini pribadi benar robot memudahkan sistem ada memudahkan kita itu tidak ada penyangkalan buat diri saya. Saya pun menggunakan strategi sistem yang saya gunakan tapi memang saya semi-automatic bukannya full automatic ***tapi robot pintar dipakai***

orang bodoh akan menjadi tools yang bodoh*, ini adalah suatu pernyataan yang agak kontroversi ya saya bilang bahwa Kalau Anda adalah orang yang pemula sangat awam sekali dengan dunia trading forex, Anda tiba-tiba duduk nonton sebuah iklan di radio dengarkan di TV Anda tonton dan rasanya dia mengatakan robot Dia sangat hebat anda yang baru saja di PHK pada saat ini tidak usah lagi bekerja Taruhlah uang di sini biarkan robot yang bekerja anda do nothing dan lihat account anda mengalami pertumbuhan seolah-olah tidak ada resikonya ini yang menurut saya misleading, Jadi anda adalah orang yang saya katakan semua orang akan bodoh pertama kali bukan artinya Anda tidak akan bisa catch up dengan dunia, dunia trading ini tapi ini akan sangat berbahaya karena mimpi yang di depan itu seolah-olah tanpa risk, orang kita sudah Kemukakan segala sesuatunya dengan risk di depan orang tidak terima kok ketika rugi, sekarang Anda yang mendapatkan segala sesuatunya tanpa seolah-olah ada risk dan pada akhirnya Kalau nanti robotnya error dan rugi, Apakah Anda kira-kira akan menerima risk tersebut ? saya gak tahu dan gak bisa jawab tapi mungkin jawaban dalam hati saya ya kagak lah"(Rf.Rsk.1)*

"Tapi ingat robot bukan menggantikan, ada statement-statement yang keliru mengenai dunia perkembangan dunia teknologi bukan menggantikan tapi orang yang tidak peka zaman akan tergantikan dengan orang yang lebih ahli bukannya yang namanya robot akan menggantikan peran serta kita kenapa karena robot pun harus di maintain, Anda bisa bayangkan kalau seluruh rumah anda isinya adalah elektronik semua sehingga bisa bergerak sendiri saya mau tanya siapa yang akan melakukan setup ? Apakah robot akan melakukan set up sendiri dengan robot, mungkin tapi hari ini belum, kalaupun bisa terjadi seperti itu apakah tidak akan ada servis ? tidak ada sama sekali peran serta manusia, pasti peran serta manusia tapi peran serta manusia yang mengerti akan robot tersebut…bener gak, jadi artinya bukan menggantikan. Disruption itu ada, betul tapi kalau kita berbicara lebih jauh ini hanya meningkatkan sumber dayanya kalau sumber daya manusianya Ya dibawah ya enggak kepakai lama-lama betul, jadi menurut saya bila anda hari ini mau bergantung dan depends pada robot menurut opini pribadi saya itu tidak bisa karena apa, menurut saya robot yang pintar akan dipakai orang yang bodoh akan menjadi tools yang bodoh, saya tidak mengatakan Anda bodoh dalam arti kata bloon Tapi maksudnya adalah bodoh itu karena anda belum pernah mencoba tapi anda mau tiba-tiba menggantungkan diri pada robot yang seolah robot bisa menggantikan peran serta anda ini sangat mengerikan. sangat sangat mengerikan".(Rf.Rsk.2)

Senada dengan Rf, Brn juga berpendapat sama tentang robot trading, dimana penggunaan robot trading tergantung kepada pemakainya, Jika penggunanya tidak bisa menganalisa pasar, maka penggunaan robot tidak akan berguna karena robot berfungsi untuk membantu manusia, tetapi manusialah yang melakukan setting pada robot, seperti pernyataannya berikut:

"Robot trading itu bisa berakhir bagus bisa jelek bu tergantung siapa yang menggunakan bu, karena kembali lagi kodratnya kita yang setting kalau yang setting gak paham gimana robotnya berfungsi dengan baik. ketika kita tau dan bisa menganalisa pasar, pasti gak pakai robot. Pasti mereka akan menghitung dengan cara mereka sendiri. Setiap orang kan punya cara indikatornya masing-masing, kalau untuk keberlangsungan robotnya itu tergantung siapa yang menggunakan"(Wwc.Brn.Rsk_1)

Jadi investor dituntut untuk berhati-hati dengan iklan-iklan yang mengklaim robot trading tidak terkalahkan. Robot tidak dapat melakukan trading yang seratus persen benar, Karena pada akhirnya akan menjerumuskan pada risiko yang mungkin tak pernah terbayangkan.

4.6. Model Efektifitas Penggunaan Robot Trading Saham

Terdapat dua tipe investor dipandang dari segi timezone atau jangka waktu mereka melakukan investasi, yaitu investor jangka panjang dan investor jangka pendek. Investor jangka panjang melakukan investasi dalam jangka waktu satu tahun atau lebih, Jadi investor jenis ini, mereka membeli saham untuk disimpan dalam jangka waktu lama. Investor tipe yang kedua adalah investor jangka pendek, yang melakukan investasi saham dalam jangka pendek (kurang dari satu tahun) untuk kemudian dijual kembali.

Ady (2013); [5]; [40] menunjukkan bahwa investor jangka pendek dapat dibedakan menurut berapa lama mereka menahan saham untuk kemudian dijual kembali (Trading). Investor jangka pendek ini pun dapat dibagi lagi menjadi day trader, Swing Trader dan Position Trader, dimana day trader adalah trader yang melakukan transaksi harian, swing trader adalah trader dalam jangka waktu mingguan sampai bulan, dan position trader adalah trader yang melakukan trading saham dalam jangka waktu bulanan sampai 6 bulanan. Investor jangka pendek lebih sering mengalami tekanan psikologis yang menyebabkan perilaku mereka dalam trading saham mengalami bias seperti overconfidence, representativeness, loss aversion, dan self attribution bias [3]; [5]; [40].

Overconfidence adalah perilaku terlalu percaya diri investor yang membuat mereka berdagang terlalu sering (overtrading). Melakukan perdagangan saham dengan frekuensi tinggi untuk mendapatkan return yang lebih sering. Representativeness adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang keliru, yaitu keputusan keuangan yang tidak meningkatkan perolehan imbal hasil [10]. Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan. Sebuah studi tentang loss aversion telah menjadi rule of thumb, yaitu secara psikologis, probabilitas untuk mendapatkan kerugian memiliki dua kali kekuatan motivasi probabilitas mendapatkan keuntungan dengan jumlah yang sama [11].

Self attribution bias adalah kecenderungan individu untuk mendiskripsikan kesuksesan yang dialami karena faktor dari dalam diri, sementara kegagalan yang dialami karena faktor-faktor dari luar. Bias ini akan menyebabkan [11]: (1) Self attribution bias setelah sukses yang panjang akan menyebabkan rasa percaya diri yang berlebihan, sehingga mengambil risiko yang lebih besar, yaitu overconfidence, (2) Menyebabkan investor berdagang terlalu sering

(overtrading) yang berisiko tinggi, (3) Menyebabkan investor hanya mendengar apa yang ingin didengar. [5] menemukan bahwa self attribution bias tampak pada investor yang terlalu percaya diri bahwa kesuksesan yang mereka dapat berasal dari keahlian yang dimiliki dan kerugian yang dialami berasal dari faktor eksternal. Berbagai bias psikologis tersebut membuat return investor menjadi berkurang bahkan rugi, yang menyebabkan mereka beralih ke robot trading.

Automatisasi atau trading menggunakan aplikasi robot semakin marak digunakan dalam era globalisasi. Segala macam lini kehidupan menggunakan digitalisasi untuk mempercepat dan mempermudah pekerjaan, termasuk juga di pasar modal. Digitalisasi di pasar modal dapat dilihat dari system aplikasi yang ada di perusahaan sekuritas yang semakin canggih, dilengkapi dengan fitur atau menu yang dapat disetting oleh investor pada saat investor tidak dapat memantau pasar, sehingga trading bisa dilakukan dengan efektif dan efisien. Investor masih bisa melakukan pekerjaan yang lain pada saat trading. Fitur-fitur seperti stoploss, Trailing stop, got till cancel dan lain-lain adalah merupakan fitur yang meningkatkan efektifitas dan efisiensi trading bagi investor jangka pendek.

Digitalisasi pasar modal adalah sebuah keniscayaan. Kemajuan teknologi yang semakin canggih menuntut para pelaku pasar untuk beradaptasi dalam menghadapi dinamika pasar. Automatisasi merupakan tools yang dibuat untuk memudahkan manusia dalam pengambilan keputusan, namun tidak dapat menggantikan peran manusia seutuhnya. Masih tetap dibutuhkan manusia dalam perannya, terutama untuk melakukan setting pada mesin atau robot trading tersebut.

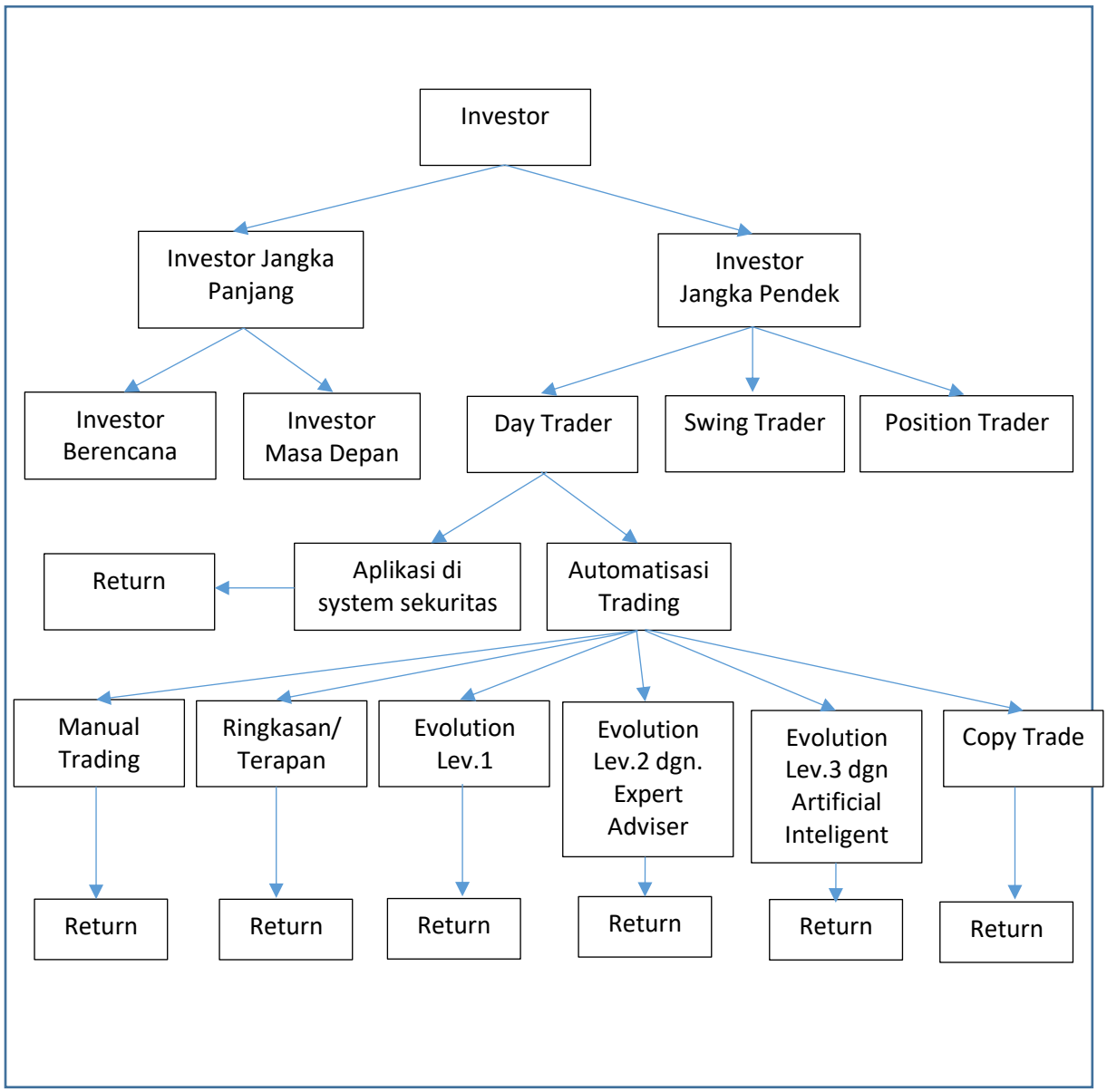
Automatisasi sudah dilakukan secara bertahap pada aplikasi di perusahaan sekuritas. Adanya berbagai menu seperti pending order, trailing stop, got till cancel (GTC) dan sebagainya dimaksudkan untuk memberikan fasilitas dan kemudahan bagi para investor yang tidak dapat memantau pasar secara penuh karena adanya pekerjaan yang lain, sehingga dia dapat melanjutkan pekerjaanya tanpa harus seharian memantau pasar modal. Namun segala fasilitas tersebut sebenarnya hanya cocok untuk investor yang melakukan trading harian, dan kurang begitu cocok untuk investor yang jangka panjang. Bagi investor jangka panjang, ketika dia menggunakan analisis fundamental sebagai dasar dalam pemilihan saham, mulai dari melihat kondisi makro baik di luar negeri maupun di dalam negeri, melihat sektor industri yang bagus pada saat itu, dan kondisi keuangan perusahaan, akan memudahkan dalam pemilihan saham, membeli saham-saham yang bagus, undervalue, memiliki likuitas yang tinggi dan kapitalisasi pasar yang besar akan mengurangi risiko kehilangan dana investasi (Capital lost). [29] menemukan bahwa manfaat utama perangkat lunak trading otomatis adalah disiplin dan tidak melakukan kesalahan, dibanding seorang trader yang mungkin sulit untuk tetap fokus

pada rencana. Namun seorang trader dapat memperhitungkan segala sesuatu yang terjadi dan memprosesnya, sedangkan robot hanya dapat melakukan hasil berdasar situasi yang telah diprogram. Lu (2016) menunjukkan bahwa hanya dengan melihat harga saham di masa lalu tidak cukup untuk memprediksi pengembalian dimasa depan. [27] Efek menguntungkan dari algoritmic trading lebih besar terjadi pada saham besar dibanding di saham kecil.

Berbeda dengan investor jangka panjang yang melakukan pembelian saham untuk tujuan buy and hold, mereka tidak merasa perlu untuk menggunakan fitur-fitur tersebut diatas, karena merasa tidak perlu menjual dalam jangka waktu dekat, sehingga tak perlu memantau pasar. Mereka akan menjual saham tersebut pada saat harga saham sudah overvalue, terutama bagi investor position trading dan investor berencana/jangka panjang [41];[40].

Investor jangka pendek/day trader menggunakan robot trading untuk membantu memudahkan analisis dan mengambil keputusan. Mereka melakukan setting pada robot sesuai dengan kondisi pasar yang mereka hadapi. Hal ini dilakukan investor terutama jika tidak memiliki waktu untuk terus menerus memantau pasar. Terdapat dua cara dalam melakukan automasi trading. **Pertama** menggunakan aplikasi yang ada di perusahaan sekuritas. Berbagai menu yang semakin lama semakin berkembang sesuai dengan kebutuhan investor. Saat ini banyak perusahaan sekuritas yang menyediakan fasilitas automasi trading seperti Got till cancel, trailing stop, pending order dan sebagainya yang memudahkan dan sebagai bentuk automatisasi, trading, dan **kedua** melakukan automasi trading sesuai dengan tahapan-tahapan seperti yang sudah dijelaskan pada sub title terdahulu untuk meningkatkan return, baik generasi evolution level satu, generasi evolution level dua, generasi evolution level tiga, maupun Generasi Copy Trade. Model Perilaku Investor Robot Trading Saham selengkapnya dapat dilihat pada gambar 1

Di masa Depan penggunaan robot trading akan semakin marak digunakan bagi investor jangka pendek, meskipun pada akhirnya tergantung kepada pengetahuan dan kemampuan investor tersebut dalam menganalisa pasar. Jadi bukan robot menggantikan peran manusia, namun secanggih apapun robot yang digunakan, tidak akan bermanfaat jika berada di tangan orang yang bodoh dan tidak memahami pasar keuangan.



Gambar 1. Model Perilaku Investor Robot Trading Saham

Perlu diingat bahwa manfaat utama perangkat lunak trading otomatis adalah disiplin dan tidak melakukan kesalahan, dibanding seorang trader yang mungkin sulit untuk tetap fokus pada rencana. Namun seorang trader dapat memperhitungkan segala sesuatu yang terjadi dan memprosesnya, sedangkan robot hanya dapat melakukan hasil berdasar situasi yang telah diprogram.

6. KESIMPULAN

Robot trading diperlukan oleh investor jangka pendek yang melakukan trading dalam frekuansi tinggi. Trading dalam frekuansi tinggi dan time horizon yang pendek, sering menyebabkan munculnya perilaku bias psikologis dan bias kognitif. Untuk mengurangi perilaku bias tersebut, maka automasi trading akan sangat efektif untuk mengurangi fear and

greed yang sering membayangi dalam trading, sehingga membuat keputusan investor menjadi buruk dan mengurangi return.

Automasi trading sendiri meliputi berbagai tahap yang menunjukkan seberapa besar tingkat kecanggihan dari system tersebut. Semakin hari perusahaan sekuritas memberikan menu yang semakin kreatif dan inovatif dalam rangka membantu investor melakukan otomatisasi trading. Ada beberapa alasan mengapa trading saham berbeda dengan trading forex, sehingga tidak memerlukan robot trading, yaitu: (1) Dunia saham tidak seekstrim dunia Forex, sehingga tidak perlu menggunakan robot trading bagi trader ritel. (2) alasan kondisional order. Artinya transaksi beli ataupun jual saham dilakukan dengan order yang di setting di dalam aplikasi trading system dalam perusahaan sekuritas tertentu. (3) karena pasar saham lebih pasif daripada pasar valas, (4) pasar forex buka 24 jam sehari dalam 5 hari kerja dalam seminggu, sehingga trader Forex lebih membutuhkan alat bantu yang dapat memantau pasar dan bahkan melakukan trading secara rutin. Sebaliknya pasar modal Indonesia hanya buka jam 09.00 sampai dengan jam 15.00 sehingga lebih santai.

Robot/automasi trading dimasa depan akan semakin meningkat penggunaannya, namun yang perlu diingat adalah secanggih apapun robot trading, tak akan mampu menggantikan peran manusia, karena secanggih apapun robot trading tetap harus disetting oleh manusia. Namun orang-orang yang tak mau beradaptasi menyesuaikan dengan perkembangan jaman dan teknologi, akan tergantikan oleh orang-orang yang mampu bersaing dalam teknologi, karena dimasa depan, aotomatisasi akan sedemikian canggih yang akan merambah di segala bidang termasuk bidang keuangan dan pasar modal.

Implikasi

Penting bagi investor untuk selalu mengikuti perkembangan teknologi, mempelajari automatisasi trading, namun yang lebih penting lagi adalah memahami bagaimana harga saham terbentuk. Mencoba lebih rasional menggunakan analisa fundamental dan teknikal serta disiplin dengan rencana perdagangan yang sudah dibuat, untuk mengurangi factor psikologi trading. Hal ini karena penggunaan robot trading hanya bisa efektif jika disetting oleh orang yang mengerti dan memahami ilmu keuangan dan pergerakan harga saham di pasar.

Keterbatasan

Keterbatasan dalam penelitian ini adalah tidak adanya informan perempuan yang dapat melengkapi perilaku investor dari sisi gender yang berbeda. Terbatasnya investor yang bersedia

berpartisipasi untuk diwawancarai, juga kondisi pandemic covid-19 yang masih belum reda sepenuhnya merupakan keterbatasan bagi peneliti dalam pengumpulan data.

Saran Untuk Riset Ke Depan

Untuk riset di masa yang akan datang, penting untuk menguji dan membandingkan hasil return dengan menggunakan robot trading dan manual trading untuk melihat apakah ada perbedaan yang signifikan pada dua metode trading tersebut, untuk melengkapi hasil riset ini.

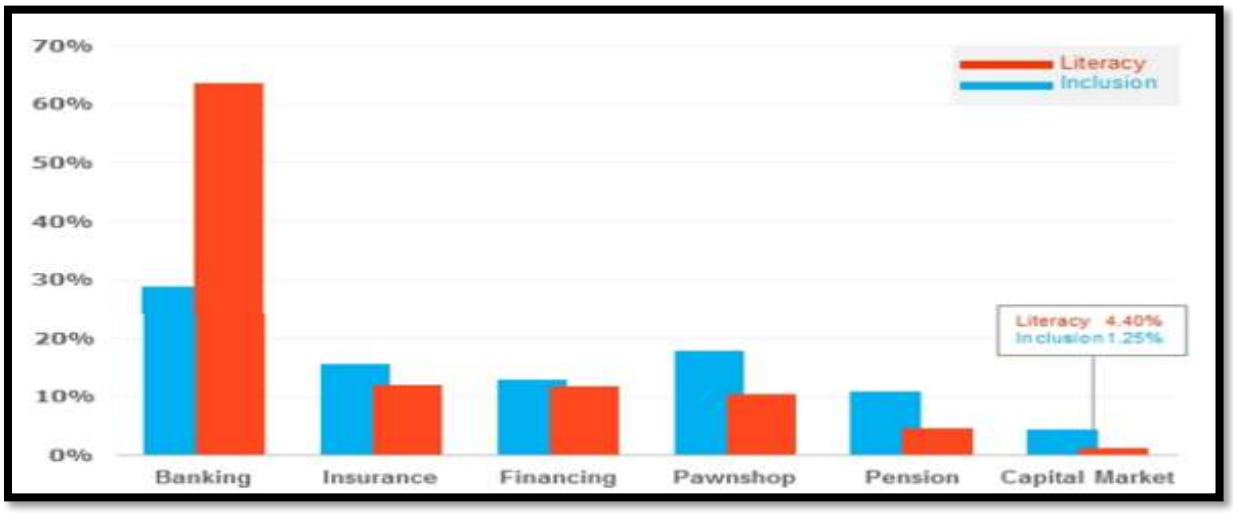
II. HASIL ANALISIS KUANTITATIF

Hasil analisa kualitatif tersebut di atas kemudian diperkuat dengan analisa kuantitatif untuk menyempurnakan hasil riset secara keseluruhan. Adapun tujuan metode kuantitaif di sini adalah untuk menganalisis peran perilaku investor dan ketidakbiasan psikologis terhadap digitalisasi pasar modal di Indonesia dengan mediasi kemajuan teknologi.

Pasar modal negara mana pun adalah salah satu pendukung dan kontributor utama bagi perekonomian negara. Pasar modal juga menjadi indikator investasi asing langsung, apakah akan menanamkan modalnya di dalam negeri atau tidak. Karena pasar modal adalah lokasi fisik yang terorganisir di mana sekuritas dipertukarkan [42]; Penting untuk disadari bahwa pasar saham adalah sistem terstruktur yang menghubungkan penjual dan pembeli sekuritas langsung dan tidak langsung. Selama beberapa tahun terakhir, salah satu faktor yang mempengaruhi pasar keuangan di seluruh dunia adalah pandemi Covid. Di tengah pandemi Covid-19 yang memberikan banyak tekanan pada pasar saham Indonesia sepanjang tahun 2020, jumlah investor di pasar tersebut mengalami tren peningkatan yang signifikan. Dengan frekuensi transaksi yang meningkat, jumlah investor di pasar modal meningkat menjadi 3,88 juta, meningkat 56% dari tahun sebelumnya. Jumlah investor terus meningkat menjadi 4 juta investor hingga Januari 2021. Menurut statistik KSEI dari Oktober 2020, agen perdagangan fintech menarik lebih dari 49,75 persen pelaku pasar modal [43]; [44]. Statistik ini menunjukkan bagaimana perubahan perilaku konsumen memengaruhi perpindahan industri ke platform digital. Dengan demikian, ada hubungan antara perilaku konsumen (yang dibangun dari jiwa individu) dan digitalisasi industri apa pun di negara ini [45]; [46].

Meskipun demikian, banyak tantangan yang dihadapi investor terkait digitalisasi pasar modal seperti resistensi investor dalam menghindari digitalisasi pasar, jiwa investor, dan keadaan ekonomi serta politik negara. Kajian kali ini akan membahas peran investor dalam digitalisasi pasar modal. Retensi investor adalah tujuan akhir dari pasar modal. Pasar sambil mengambil keputusan menganalisis setiap aspek keputusan untuk menghindari segala jenis

perlawanan. Indonesia adalah negara berkembang, oleh karena itu, begitu juga dengan negara maju belum sepenuhnya terdigitalisasi. Dengan tujuan untuk bertemu klien internasional, pasar modal menjadi digital. Digitalisasi ini mengungkapkan efek pada orang-orang itu. Faktor-faktor seperti perilaku investor bersama dengan bias psikologis adalah elemen kunci dalam keseluruhan proses [3]; [40]; [8]. Oleh karena itu, penelitian ini akan membahas peran investor dalam digitalisasi pasar modal. Kondisi pasar modal Indonesia disajikan pada gambar 1.



Gambar 1. Kondisi Pasar Modal Indonesia

Studi ini akan membahas beberapa kesenjangan yang ada dalam literatur seperti 1) sebagai akibat dari globalisasi revolusi teknologi telah memaksa setiap aspek masyarakat untuk mengadopsinya. Demikian pula halnya dengan pasar keuangan. Saat ini para investor juga lebih memilih untuk menjalankan investasinya dari mana saja, meskipun pasar modal mengadopsi digitalisasi namun masih ada sejumlah investor yang masih belum menerima digitalisasi ini, menjadi salah satu faktor penting dan disorot meskipun sudah diteliti meskipun masih ada sejumlah faktor yang belum dieksplorasi, 2) Uddin, Islam, dan Rahat [47], membahas perlunya digitalisasi pasar modal di Bangladesh saat situasi Pandemi, sedangkan penelitian ini akan memeriksanya dengan perilaku dan psikologi investor dalam perspektif Indonesia dengan kumpulan data baru, 3) Spindler [48], menyelidiki digitalisasi pasar modal dari sudut pandang hukum perusahaan, sedangkan penelitian ini akan menyelidikinya dengan perilaku investor, ketidakberpihakan psikologis dan juga dengan penambahan efek moderasi dalam perspektif Indonesia dengan segar kumpulan data, 4) Basrowi dan Utami [49], menggarap pasar Modal Syariah Islam bersama dengan dig teknologi ital, sedangkan penelitian ini akan memeriksanya di pasar modal tradisional dengan penambahan variabel pemoderasi yaitu kemajuan teknologi dari perspektif Indonesia, 5) model yang terdiri dari perilaku

investor, ketidakberpihakan psikologis, kemajuan teknologi dan digitalisasi pasar modal tidak diuji sebelumnya di Indonesia dalam beberapa waktu terakhir, 6) Kalbhor dan Jagannathan [50], bekerja di pasar modal dan pengambilan keputusan investor di India, sedangkan penelitian ini akan memeriksa pasar modal dari perspektif digitalisasi bersama dengan penambahan variabel moderasi kemajuan teknologi di Indonesia. Signifikansi penelitian ini adalah 1) akan menyoroti pentingnya digitalisasi pasar modal untuk perluasan pasar serta bagi investor khususnya di Indonesia, 2) akan membantu para profesional terkait pasar modal untuk mengubah kebijakan mereka dengan maksud untuk meyakinkan para investor untuk menerima digitalisasi di pasar modal, dan 3) akan membantu para peneliti untuk mengeksplorasi lebih banyak aspek digitalisasi pasar modal khususnya di Indonesia.

Kajian Pustaka

Selama beberapa dekade terakhir, pasar keuangan juga menyaksikan berbagai perubahan sebagai akibat dari kemajuan. Ada berbagai faktor yang mempengaruhi pengambilan keputusan pasar modal seperti digitalisasi atau perubahan teknologi lainnya. Kekuatan pasar saat memiliki keputusan apa pun memastikan analisis maksimum investor yang merupakan efek akhir dari perubahan ini. Digitalisasi pasar memiliki efek yang berbeda pada investor yang berbeda. Investor yang menghindari banyak keterlibatan teknologi biasanya menghindari perubahan semacam itu. Tetapi kekuatan pasar memastikan dukungan yang tepat dari individu-individu seperti perilaku individu mempengaruhi pasar modal [50]; [51]. Sebagai investor pasar modal memainkan peran penting dalam keseluruhan kinerja pasar modal. Pasar merupakan kombinasi dari investor seperti well-literate atau kurang literate [8]. Perilaku investor yang mengubah diri dengan perubahan teknologi dan lainnya berbeda dengan mereka yang mengabaikan adopsi perubahan. Faktor-faktor seperti literasi keuangan mempengaruhi perilaku individu yang selanjutnya mempengaruhi pasar modal dan segala jenis keputusan seperti digitalisasi. Dalam konteks ini, Shaik, Kethan, Jaggaiah, dan Khizerulla [52] meneliti hubungan antara literasi keuangan dan perilaku investor, khususnya di India. Kumpulan data 100 responden dikumpulkan dan diuji dengan bantuan SPSS. Hasil penelitian mengungkapkan bahwa ada beberapa faktor yang mempengaruhi jiwa investor dan salah satunya adalah literasi keuangan. Literasi keuangan membantu investor untuk lebih memahami pasar modal yang selanjutnya mempengaruhi perilaku individu dalam segala jenis pengambilan keputusan yang berkaitan dengan pasar modal [8]. Investor yang menunjukkan perilaku menggiring meniru perilaku orang lain [41]. Pandemi Covid telah mempengaruhi perilaku herding dalam dua cara berbeda, pertama investor memperhitungkan informasi yang tersedia untuk memelihara

dan/atau berinvestasi di pasar modal berdasarkan keyakinan mereka dan kemudian mereka mempertimbangkan agen lain yang lebih terinformasi dan menyesuaikan perilaku mereka. Hal ini dilakukan dalam menanggapi penurunan ekonomi dan ketidakpastian medis dan sosial. Dalam konteks ini, Espinosa-Méndez dan Arias [53], menggarap hubungan antara perilaku herding dan pasar modal akibat pandemi Covid. Penelitian dilakukan di Eropa. Kumpulan data 20 tahun seperti 2000 hingga 2020 dikumpulkan dan diuji. Hasil penelitian mengungkapkan bahwa pandemi Covid mengakibatkan peningkatan perilaku herding di pasar modal Prancis, Jerman, Italia, Inggris, dan Spanyol. Dengan demikian, perilaku investor mempengaruhi pasar modal. Dengan demikian, hipotesis yang berasal dari perdebatan di atas adalah sebagai berikut: H1: Perilaku investor berpengaruh signifikan terhadap digitalisasi pasar modal.

Investor adalah pemangku kepentingan utama dari setiap pasar keuangan. Demikian pula halnya dengan pasar modal. Keterlibatan investor menentukan masa depan pasar mana pun. Seiring berjalannya waktu pasar modal mengubah diri dengan tujuan untuk memudahkan investornya dengan tujuan untuk mendukung investornya. Jiwa investor memainkan peran penting dalam pengambilan keputusannya yang selanjutnya mempengaruhi keputusan pasar seperti digitalisasi [54]; [55]. Seiring berjalannya waktu, setiap pasar keuangan mengadopsi digitalisasi untuk memenuhi kebutuhan teknologi yang berubah dengan cepat. Jiwa investor membayar untuk mempengaruhi pasar modal dalam hal pengambilan keputusan. Dalam konteks ini, Kalbhor dan Jagannathan [50], menggarap perilaku individu dan pengambilan keputusan di pasar modal. Penelitian dilakukan di pasar modal India. Kumpulan data 241 responden dikumpulkan dan diuji dengan bantuan SEM. Hasil penelitian mengungkapkan hubungan yang substansial antara kepribadian Individualis dan wali dan ketiga bias seperti selebriti dan panah lurus dan bias penahan dan penggembalaan, dan bias petualang dan hanya menggiring. Selanjutnya, ditemukan bahwa semua kepribadian, kecuali panah lurus, memiliki hubungan yang substansial dengan demografi. Sementara memiliki keputusan mengenai pasar modal individu harus tetap tidak bias karena bias dapat menyebabkan pengambilan keputusan impulsif. Ketidakberpihakan psikososial individu memainkan peran penting dalam kasus pengambilan keputusan pasar modal [56]; [47]). Begitu pula Shahid, Aftab, Latif, dan Mahmood [57] yang menggarap psikologi investor dan pasar modal. Penelitian dilakukan di Pakistan. Dataset dari 30 wawancara dilakukan. Hasil penelitian mengungkapkan bahwa bias perilaku investor mempengaruhi pengambilan keputusan investor. Keputusan investor dengan ketidakberpihakan dapat mengarah pada keputusan yang baik di sisi lain segala jenis bias dapat menyebabkan pengambilan keputusan yang merugikan. Psikologi adalah salah satu alat yang kuat untuk perilaku individu. Bias perilaku berdasarkan psikologi. Seorang investor dengan

psikologi positif akan mengarah pada pengambilan keputusan yang tidak bias. Dalam konteks ini, Shah, Ahmad, dan Mahmood [58] membahas bias dalam pengambilan keputusan investor dan pengaruhnya terhadap kinerja pasar modal. Penelitian dilakukan di Pakistan. Kumpulan data 143 investor dikumpulkan dan diuji dengan bantuan teknik PS. Hasil penelitian mengungkapkan pemahaman empiris tentang bagaimana pilihan investasi, bias heuristik, dan efisiensi pasar yang dirasakan terkait. Dengan demikian, hipotesis yang berasal dari perdebatan di atas adalah sebagai berikut:

H2: Ketidakberpihakan psikologis berpengaruh signifikan terhadap digitalisasi pasar modal.

Perilaku investor mengenai investasi dan pasar keuangan berubah dari waktu ke waktu. Ada beberapa alasan untuk itu seperti perilaku individu, jiwa, kondisi pasar, dan reaksi kekuatan internal dan eksternal pasar. Jika investasi berjalan dengan baik bagi investor, seseorang menghindari segala jenis perubahan di pasar yang dapat mempengaruhi investasi (sesuai pendapat yang dikembangkan investor) [59]; [60]). Dunia semakin terdigitalisasi yang juga menunjukkan pengaruhnya terhadap pasar modal. Pasar semakin digital dengan tujuan untuk memenuhi permintaan dunia. Ada tanggapan beragam dari investor yang melaporkan digitalisasi tersebut. Para investor yang menyukai perubahan biasanya menerimanya dengan sepenuh hati, tetapi di sisi lain, para investor yang lebih menyukai cara tradisional menghindarinya. Dengan demikian, perubahan teknologi dipengaruhi oleh perilaku investor yang selanjutnya mempengaruhi digitalisasi pasar modal; dengan demikian, kemajuan teknologi dapat berperan sebagai mediator aktif. Dalam konteks ini, Feng, Wang, dan Liang [61] bekerja pada peran mediasi inovasi teknologi dalam hubungan antara informasi lingkungan dan pembangunan ekonomi. Penelitian dilakukan di Cina. Kumpulan data 10 tahun seperti 2008 hingga 2018 dikumpulkan dan diuji. Hasil penelitian mengungkapkan bahwa kemajuan teknologi dalam hal inovasi secara signifikan berperan sebagai mediator dalam hubungan tersebut. Selain itu, Kulathunga, Ye, Sharma, dan Weerathunga [62], juga menyelidiki peran mediasi kemajuan teknologi dalam hal perencanaan sumber daya perusahaan (ERP). Penelitian dilakukan pada UKM. Kumpulan data 319 karyawan UKM dikumpulkan dan diuji. Hasil penelitian mengungkapkan bahwa inovasi teknologi dalam hal inovasi secara signifikan berperan sebagai mediator. Senada dengan itu, Susilawati, Khaira, dan Pratama [63], juga mengeksplorasi peran mediasi kemajuan teknologi dalam hal inovasi teknologi. Penelitian dilakukan di Indonesia. Hasil penelitian mengungkapkan bahwa inovasi teknologi secara signifikan berperan sebagai mediator. Dengan demikian, hipotesis yang berasal dari perdebatan di atas adalah sebagai berikut:

H3: Kemajuan teknologi secara signifikan berperan sebagai mediator dalam hubungan antara perilaku investor dan digitalisasi pasar modal.

Ada banyak faktor yang mempengaruhi keputusan individu dan salah satu faktor utama adalah psikologi individu. Jiwa individu mengarah pada bias atau ketidakberpihakan dalam pengambilan keputusan seseorang. Jiwa individu selanjutnya dipengaruhi oleh banyak faktor seperti pendapat individu mengenai praktik apa pun. Setelah seseorang puas dengan latihan apa pun, maka penyimpangan apa pun dari latihan itu dapat menyebabkan individu tersebut mengekspresikan bias dan perubahan akan memengaruhi zona nyamannya dalam hal latihan lari. Hal serupa juga terjadi pada investor. Jika seorang investor nyaman dengan praktik pasar modal, maka setiap perubahan dalam praktik itu akan mempengaruhi jiwa investor. Dengan demikian, perubahan yang berdampak pada jiwa individu menyebabkan pengambilan keputusan yang bias [64]; [65]). Banyak investor di pasar menghindari digitalisasi yang berlebihan. Dengan demikian, mereka mengekspresikan pengambilan keputusan yang bias. Pengambilan keputusan investor yang tidak bias akan mendukung digitalisasi di pasar modal. Kesadaran yang lebih baik terhadap perubahan teknologi akan menyebabkan perubahan psikologi investor mengenai digitalisasi. Dalam konteks ini, Bagheri, Mitchelmore, Bamiatzi, dan Nikolopoulos [66] menyelidiki peran mediasi inovasi teknologi dalam hubungan antara orientasi internasional di UKM. Hasil penelitian mengungkapkan bahwa inovasi teknologi secara signifikan berperan sebagai mediator dalam hubungan tersebut. Selain itu, Khin dan Ho [67] juga mengeksplorasi peran mediasi inovasi digital dalam hubungan antara teknologi digital dan kinerja organisasi. Hasil penelitian mengungkapkan bahwa inovasi digital secara positif memediasi hubungan antara teknologi digital dan kinerja organisasi khususnya di Malaysia. Dengan demikian, hipotesis yang berasal dari perdebatan di atas adalah sebagai berikut:

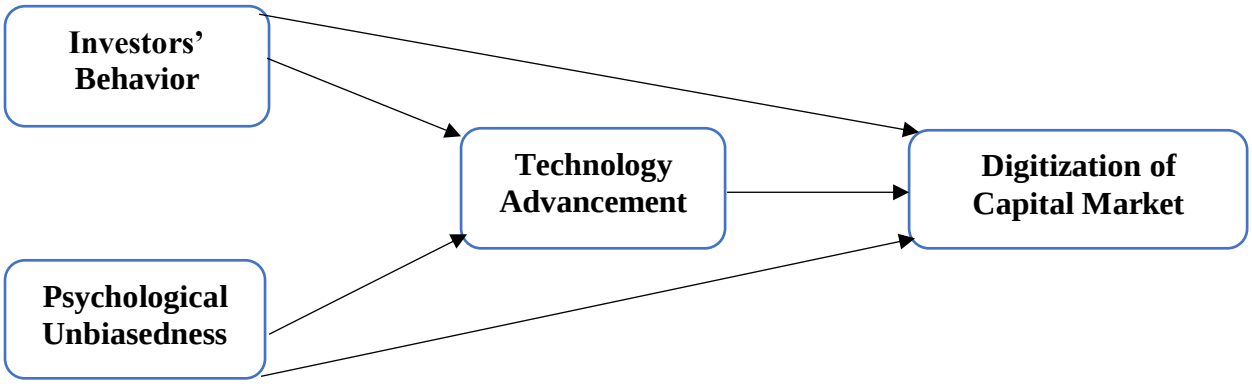
H4: Kemajuan teknologi secara signifikan berperan sebagai mediator dalam hubungan antara ketidakberpihakan psikologis dan digitalisasi pasar modal.

Metode Riset

Artikel ini mengkaji dampak perilaku investor dan ketidakbiasan psikologis tentang kemajuan teknologi terhadap digitalisasi pasar modal dan juga mengkaji peran mediasi kemajuan teknologi di antara perilaku investor, ketidakberpihakan psikologis tentang kemajuan teknologi dan digitalisasi pasar modal di Indonesia. Artikel ini menggunakan kuesioner untuk mengumpulkan data dari responden yang dipilih. Item tersebut digunakan untuk mengukur variabel penelitian. Item-item tersebut diambil dari penelitian sebelumnya, misalnya perilaku

investor diukur dengan enam item diambil dari Wang, Yuan, Li, dan Li [68], ketidakbiasan psikologis diukur dengan delapan item diambil dari Stanovich dan Toplak [69], Kemajuan teknologi diukur dengan lima item yang diambil dari Janse van Rensburg, Rothmann, dan Diedericks [70] dan digitalisasi pasar modal diukur dengan sepuluh item yang diambil dari Youssef, Boubaker, Dedaj, dan Carabregu-Vokshi [71].

Para investor pasar modal menjadi responden penelitian ini. Mereka dipilih berdasarkan simple random sampling. Survei didistribusikan kepada investor terpilih melalui surat. Para peneliti mendistribusikan 570 survei kepada responden, tetapi hanya 290 yang diterima setelah satu bulan. Survei ini memiliki tingkat respons sekitar 50,88 persen. Selain itu, penelitian ini juga menerapkan PLS-SEM untuk menguji hubungan antar variabel menggunakan smart-PLS. Alat ini cocok ketika data dikumpulkan dari kuesioner. Ini memberikan hasil yang andal dalam kasus kumpulan data kecil dan besar. PLS-SEM juga merupakan teknik yang cocok yang memberikan hasil yang dapat diandalkan bahkan ketika peneliti menggunakan kerangka kerja yang kompleks. Penelitian ini menggunakan dua prediktor, yaitu perilaku investor (IB) dan ketidakberpihakan psikologis (PUB) tentang kemajuan teknologi. Selain itu, artikel tersebut juga menggunakan satu variabel mediasi, seperti kemajuan teknologi (TAD) dan juga mengambil satu variabel dependen bernama digitalisasi pasar modal (DCM). Konstruksi ini disajikan dalam kerangka pada Gambar 2.



Gambar 2. Model Teoritik

Hasil Temuan Riset

Hasil penelitian menunjukkan validitas konvergen yang menunjukkan korelasi antar item. Penelitian ini menggunakan composite reliability (CR) dan Alpha untuk menguji reliabilitas. Hasil penelitian menunjukkan bahwa nilai lebih tinggi dari 0,70 dan menunjukkan reliabilitas

yang valid. Selain itu, penelitian ini menggunakan faktor pemuatan dan rata-rata varians diekstraksi (AVE) untuk memeriksa validitas. Hasil penelitian menunjukkan bahwa nilainya lebih tinggi dari 0,50 dan menunjukkan validitas konvergen yang valid. Nilai-nilai ini diberikan pada Tabel 1.

Table 1: Convergent validity

Constructs	Items	Loadings	Alpha	CR	AVE
Digitalization of Capital Market	DCM1	0.807	0.907	0.924	0.579
	DCM10	0.641			
	DCM2	0.795			
	DCM3	0.821			
	DCM4	0.805			
	DCM5	0.788			
	DCM7	0.773			
	DCM8	0.802			
	DCM9	0.577			
Investors' Behavior	IB1	0.836	0.893	0.919	0.655
	IB2	0.849			
	IB3	0.705			
	IB4	0.768			
	IB5	0.838			
	IB6	0.849			
Psychological Unbiasedness	PUB1	0.901	0.975	0.979	0.869
	PUB2	0.928			
	PUB3	0.956			
	PUB4	0.944			
	PUB6	0.911			
	PUB7	0.953			
	PUB8	0.929			
Technology Advancement	TAD1	0.844	0.917	0.938	0.751
	TAD2	0.881			
	TAD3	0.874			
	TAD4	0.834			
	TAD5	0.900			

Hasil penelitian menunjukkan validitas diskriminan yang menunjukkan adanya korelasi antar variabel. Cross-loading dan Fornell Larcker digunakan untuk memeriksa validitas diskriminan. Hasil penelitian menunjukkan bahwa nilai yang menunjukkan hubungan antara variabel itu sendiri lebih besar daripada nilai yang menunjukkan hubungan dengan variabel lain. Hasil ini menunjukkan hubungan yang rendah antar variabel dan validitas diskriminan yang valid. Nilai-nilai ini diberikan pada Tabel 2 dan Tabel 3.

Table 2: Fornell Larcker

	DCM	IB	PUB	TAD
DCM	0.761			
IB	0.508	0.809		
PUB	0.471	0.494	0.932	
TAD	0.381	0.425	0.415	0.867

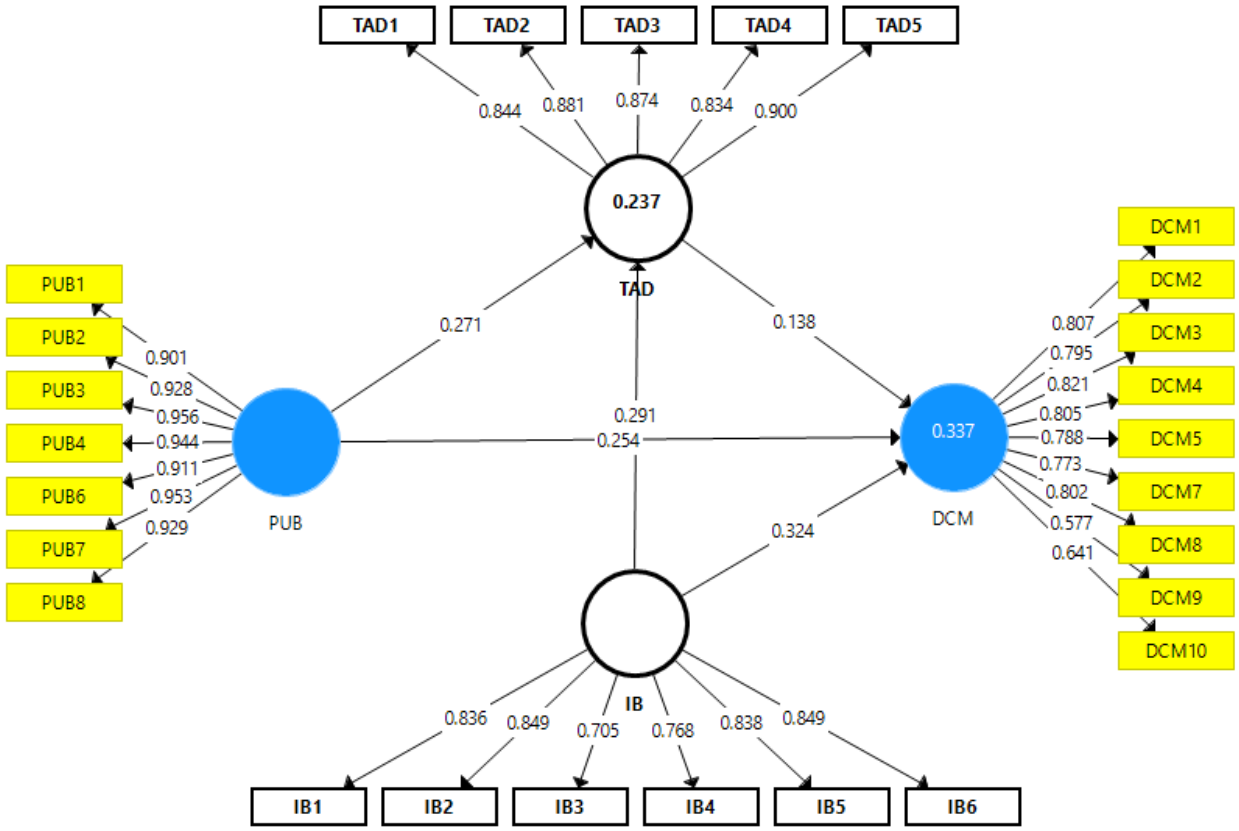
Table 3: Cross-loadings

	DCM	IB	PUB	TAD
DCM1	**0.807**	0.358	0.305	0.292
DCM10	**0.641**	0.260	0.341	0.211
DCM2	**0.795**	0.373	0.325	0.332
DCM3	**0.821**	0.403	0.332	0.326
DCM4	**0.805**	0.350	0.306	0.286
DCM5	**0.788**	0.455	0.393	0.301
DCM7	**0.773**	0.460	0.429	0.335
DCM8	**0.802**	0.447	0.406	0.305
DCM9	**0.577**	0.304	0.358	0.184
IB1	0.405	**0.836**	0.384	0.334
IB2	0.451	**0.849**	0.451	0.346
IB3	0.361	**0.705**	0.317	0.339
IB4	0.394	**0.768**	0.400	0.360
IB5	0.401	**0.838**	0.378	0.335
IB6	0.448	**0.849**	0.456	0.351
PUB1	0.420	0.455	**0.901**	0.388
PUB2	0.459	0.444	**0.928**	0.356
PUB3	0.441	0.471	**0.956**	0.406
PUB4	0.417	0.476	**0.944**	0.415
PUB6	0.430	0.462	**0.911**	0.384
PUB7	0.445	0.468	**0.953**	0.402
PUB8	0.462	0.446	**0.929**	0.358
TAD1	0.339	0.309	0.346	**0.844**
TAD2	0.352	0.390	0.357	**0.881**
TAD3	0.335	0.374	0.346	**0.874**
TAD4	0.303	0.391	0.382	**0.834**
TAD5	0.323	0.376	0.369	**0.900**

Hasil penelitian menunjukkan validitas diskriminan menggunakan rasio Heterotrait Monotrait (HTMT). Hasil penelitian menunjukkan bahwa nilainya lebih rendah dari 0,85. Hasil ini menunjukkan hubungan yang rendah antar variabel dan validitas diskriminan yang valid. Nilai-nilai ini diberikan pada Tabel 4.

Table 4: Heterotrait Monotrait ratio

	DCM	IB	PUB	TAD
DCM				
IB	0.555			
PUB	0.499	0.527		
TAD	0.414	0.470	0.439	

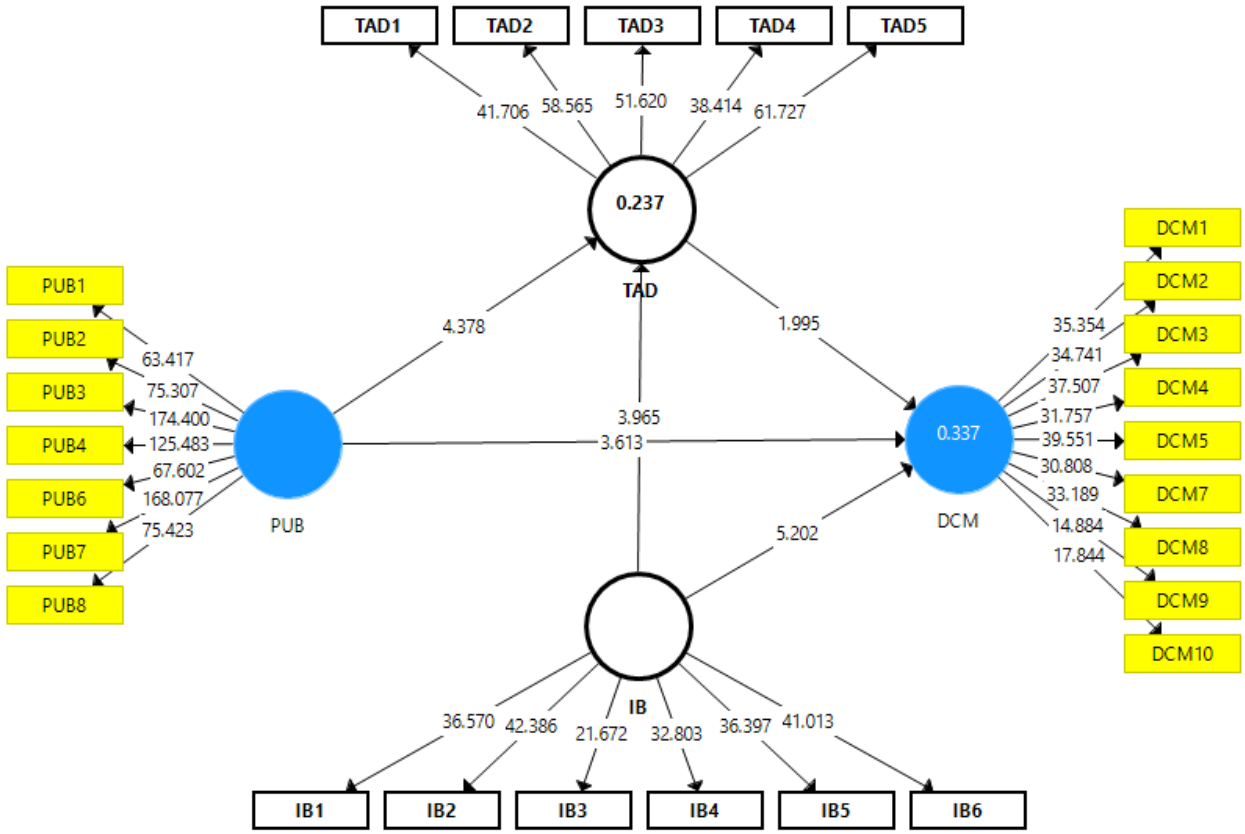


Gambar 3: Measurement model assessment

Hasil penelitian menunjukkan bahwa perilaku investor terhadap adopsi teknologi dan ketidakberpihakan psikologis tentang kemajuan teknologi memiliki hubungan positif dengan digitalisasi pasar modal di Indonesia dan menerima H1 dan H2. Temuan tersebut juga mengungkap bahwa kemajuan teknologi memediasi antara perilaku investor dan ketidakberpihakan psikologis, dan digitalisasi pasar modal di Indonesia dan menerima H3 dan H4. Nilai-nilai ini diberikan pada Tabel 5.

Table 5: Path analysis

Relationships	Beta	S.D.	T Statistics	P Values
IB -> DCM	0.324	0.062	5.202	0.000
IB -> TAD	0.291	0.073	3.965	0.000
PUB -> DCM	0.254	0.070	3.613	0.000
PUB -> TAD	0.271	0.062	4.378	0.000
TAD -> DCM	0.138	0.069	1.995	0.024



Gambar 4: Structural model assessment

Hasil penelitian mengungkapkan bahwa perilaku investor memiliki hubungan positif dengan digitalisasi pasar modal. Hasil ini sejalan dengan penelitian Hossnofsky dan Junge [72] sebelumnya. Studi ini berpendapat bahwa kinerja pasar modal tergantung pada perilaku investor ketika investor memiliki perilaku yang baik untuk mengetahui inovasi, berinteraksi dengan teknologi baru, dan memperoleh keterampilan yang diperlukan untuk menjalankan teknologi tersebut. Dengan cara ini, penggunaan teknologi di pasar modal meningkat. Hasil ini juga sejalan dengan penelitian Chen, Zhang, Jiang, Meng, dan Sun [73], yang menyoroti bahwa ketika investor membawa hal positif pada perilaku mereka saat akan mengadopsi teknologi baru, pasar modal menjadi mungkin untuk didigitalkan. Hasil penelitian mengungkapkan bahwa ketidakbiasan psikologis investor memiliki hubungan positif dengan digitalisasi pasar modal. Hasil ini sejalan dengan penelitian sebelumnya dari H. K. Kim dan Lee [74], yang menjelaskan bahwa salah satu rintangan besar dalam adopsi teknologi adalah bias pengguna. Investor yang bukan subjek bias psikologis memiliki penerimaan yang luas terhadap teknologi baru. Ini adalah sumber digitalisasi pasar modal. Hasil ini juga sesuai dengan penelitian Skare dan Soriano [75], yang menunjukkan bahwa ketika investor memiliki bias psikologis paling sedikit, mereka dapat berpikir bebas tentang kemudahan dan kegunaan teknologi. Pemikiran ini mendorong digitalisasi pasar modal.

Implikasi Teoritik

Studi saat ini memiliki pedoman untuk akademisi karena memiliki kontribusi yang signifikan terhadap literatur. Penelitian ini menganalisis pengaruh perilaku investor dan ketidakberpihakan psikologis terhadap digitalisasi pasar modal. Literatur sebelumnya membahas tentang dampak perilaku investor dan ketidakberpihakan psikologis terhadap digitalisasi pasar modal. Namun sebuah penelitian telah membahas peran baik perilaku investor maupun ketidakberpihakan psikologis investor dalam digitalisasi pasar modal. Dengan analisis simultan dari hubungan faktor-faktor ini, studi saat ini menambah literatur. Salah satu kontribusi utama adalah untuk mengeksplorasi dampak mediasi kemajuan teknologi antara perilaku investor dan ketidakberpihakan psikologis dan digitalisasi pasar modal. Studi ini memperluas literatur dalam arti menganalisis perilaku investor dan peran ketidakberpihakan psikologis dalam digitalisasi pasar modal di Indonesia.

Implikasi Empirik

Studi ini memiliki signifikansi yang cukup besar bagi negara berkembang seperti Indonesia. Ini membahas isu kritis ekonomi di era kontemporer, yaitu digitalisasi pasar modal. Kajian ini menyoroti cara-cara mempromosikan digitalisasi di pasar modal yang menjadi sumber keuangan dan peredarannya. Studi ini memandu para ekonom dan pelaku pasar modal bahwa mereka harus berjuang untuk mengembangkan sikap positif dalam perilaku investor terhadap berbagai jenis teknologi yang dirancang untuk komunikasi, manajemen informasi dan data, dan administrasi keuangan. Ini akan membantu dalam digitalisasi pasar modal. Hal ini juga menunjukkan bahwa ketidakberpihakan psikologis harus dikembangkan pada investor untuk meningkatkan digitalisasi pasar modal. Kajian ini memandu para pembuat kebijakan dalam menetapkan kebijakan terkait digitalisasi pasar modal dengan mengedepankan perilaku investor dan ketidakberpihakan psikologis terhadap adopsi teknologi. Lebih lanjut, studi tersebut menyampaikan bahwa pembuat kebijakan dan regulator harus memotivasi investor untuk berperilaku positif dan tidak memihak secara psikologis untuk mendorong kemajuan teknologi dan digitalisasi pasar modal.

Kesimpulan

Penelitian ini bertujuan untuk mengetahui pengaruh perilaku investor dan ketidakberpihakan psikologis terhadap digitalisasi pasar modal. Juga untuk mengetahui apa peran kemajuan teknologi dalam kaitannya antara perilaku investor, ketidakberpihakan

psikologis, dan digitalisasi pasar modal. Penulis mengumpulkan informasi tentang perilaku investor, ketidakberpihakan psikologis investor, kemajuan teknologi, dan digitalisasi pasar modal di Indonesia. Mereka menyimpulkan bahwa perilaku investor dan ketidakberpihakan psikologis berpengaruh positif terhadap digitalisasi pasar modal. Hasil penelitian menunjukkan bahwa ketika investor mengadopsi perilaku positif terhadap pemilihan dan penggunaan teknologi modern untuk menjalankan fungsinya dan mencapai tujuan, penggunaan teknologi digital meningkat di pasar modal. Hasil penelitian juga menunjukkan bahwa investor memiliki ketidakberpihakan psikologis, tidak hanya berpegang pada teknik komunikasi, manajemen informasi, dan manajemen keuangan yang khas. Tetapi mereka siap menerima teknologi baru, dan adopsi teknologi yang sebenarnya meningkatkan digitalisasi pasar modal. Hasil penelitian menyoroti bahwa kemajuan teknologi memediasi hubungan antara perilaku investor dan ketidakberpihakan psikologis dan digitalisasi pasar modal. Ketika investor memiliki perilaku positif dan ketidakberpihakan psikologis, ada permintaan dan dorongan untuk kemajuan teknologi. Kemajuan teknologi yang semakin meningkat mendorong digitalisasi pasar modal.

Keterbatasan

Ada beberapa keterbatasan yang masih terkait dengan penelitian saat ini. Keterbatasan ini kemungkinan akan dihapus dalam literatur masa depan, dan penelitian yang sama dapat ditingkatkan. Penelitian ini hanya mengkaji dua faktor, yaitu perilaku investor dan ketidakberpihakan psikologis, yang mempengaruhi digitalisasi pasar modal. Akibatnya, penelitian ini terbatas, dan direkomendasikan kepada para sarjana mereka harus mengeksplorasi lebih banyak faktor yang memiliki pengaruh terhadap digitalisasi pasar modal. Selain itu, hasil tentang hubungan perilaku investor dan ketidakberpihakan psikologis terhadap digitalisasi pasar modal tidak bersifat umum karena data dikumpulkan dari pasar modal Indonesia saja. Di masa depan, penulis harus mengumpulkan informasi tentang ekonomi yang berbeda untuk hasil yang lebih valid dan umum.

Ucapan Terimakasih

Penelitian ini didanai oleh Direktorat Riset, Teknologi dan pengabdian kepada Masyarakat, Direktorat Jenderal Pendididkan Tinggi, Riset dan Teknologi, Kementrian Pendididkan, Kebudayaan, Riset dan Teknologi tahun anggaran 2022, Nomor SP DIPA-023.17.1.690523/2022 revisi ke-02 tanggal 22 April 2022.

Daftar P ustaka

[1] S. U. Ady, S. Mohamad, A. A. Pantamee, K. O. C. H. V M, and K. W. Chong, "Effects of Ceo Incentives and Corporate Social Responsibilities on Financial Performance," *Polish J. Manag. Stud.*, vol. 25, no. 2, pp. 9–20, 2022, doi: 10.17512/pjms.2022.25.2.01.
[2] M. Sadiq, A. A. Pantamee, S. Mohamad, T. M. Aldeehani, and S. U. Ady, "Corporate governance and earnings management: Evidence from listed non-financial firms," *Polish J. Manag. Stud.*, vol. 22, no. 2, pp. 456–469, 2020, doi: 10.17512/pjms.2020.22.2.30.
[3] S. U. Ady, M. Sudarma, U. Salim, and S. Aisyah, "Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya)," *IOSR J. Bus. Manag.*, vol. 7, no. 3, pp. 11–22, 2013, doi: 10.9790/487X-0731122.
[4] S. U. Ady, "Nilai-nilai dibalik Kestabilan Psikologis, Kunci Sukses Berinvestasi (Studi pada Perilaku Investor di Bursa Efek Indonesia," in *Simposium Riset Ekonomi VI-2014*, 2014, pp. 323–334.
[5] S. U. Ady, *Manajemen Psikologi dalam Investasi Saham, Kajian Fenomenologi dalam Sentuhan Behavioral Finance*, 1st ed. Jogja: CV. Andi Offset, 2015.
[6] S. U. Ady, "The Moral Values of Psychological Stability , Successful Key of Investment," in *1st International Conference on Intellectuals' Global Responsibility (ICIGR 2017)*, 2018, vol. 125, no. Icigr 2017, pp. 33–37.
[7] W. Jannah and S. U. Ady, "Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya," *Ekspektra J. Bisnis dan Manaj.*, vol. 1, no. 2, pp. 138–155, 2017, doi: 10.1007/BF00139728.5.
[8] S. U. Ady and A. Hidayat, "Do Young Surabaya's Investors Make Rational Investment Decisions ?," *Int. J. Sci. Technol. Res.*, vol. 8, no. 07, pp. 319–322, 2019, doi: https://www.ijstr.org/research-paper-publishing.php?month=july2019.
[9] S. U. Ady, A. Mulyaningtyas, and I. Farida, "Overconfidence : Technical Analysis in Trading , Investment or Gambling ?," in *Conference on Islamic and Technology*, 2020, doi: 10.4108/eai.21-9-2019.2293942.
[10] H. Shefrin, *Behavioral Corporate Finance: Decision That Create Value*, McGraw-Hil. 2007.
[11] M. M. Pompian, *Behavioral Finance and Wealth Management How to Build Optimal Portfolios That Account for Investor Biases*, 1st ed. New Jersey: John Wiley & Sons, 2006.
[12] R. J. Shiller, "Human Behavior and the Efficiency of the Financial System," MA 02138, 1998.
[13] H. Yiwen, "Impact of Investors' Loss Aversion and Overconfidence on Market Performance Evidence from China Stock Markets," *Proc. 2021 3rd Int. Conf. Econ. Manag. Cult. Ind. (ICEMCI 2021)*, vol. 203, no. Icemci 2021, pp. 2022–2025, 2022, doi: 10.2991/assehr.k.211209.330.
[14] L. Yang, "Loss Aversion in Financial Markets," *J. Mech. Inst. Des.*, vol. 4, no. 1, pp. 119–137, 2019, doi: 10.22574/jmid.2019.11.005.
[15] P. Shah, "Automated Stock Market Trading System," Ahmedabad, 2015.
[16] A. R. Azhikodan, A. G. K. Bhat, and M. V Jadhav, "Stock Trading Bot Using Deep," in *Innovations in Computer Science and Engineering*, 2019, no. May, pp. 41–49, doi: 10.1007/978-981-10-8201-6.
[17] T.-V. Pricope, "Deep Reinforcement Learning in Quantitative Algorithmic Trading: A Review," Edinburgh, 2021.
[18] H. Yang, X. Y. Liu, S. Zhong, and A. Walid, "Deep reinforcement learning for automated stock trading: An ensemble strategy," *ICAIF 2020 - 1st ACM Int. Conf. AI Financ.*, pp. 1–9, 2020, doi: 10.1145/3383455.3422540.

[19] R. A. Olsen, “Behavioral finance and implications volatility for stock-price volatility,” *Financ. Anal. J.*, vol. 54, no. 2, pp. 10–18, 1998.
[20] R. Nuroniyah, S. U. Ady, and Sugiyanto, “Market Anomalies of LQ 45 Companies Stock Return Listed On the Indonesia Stock Exchange,” *Ekspektra J. Bisnis dan Manaj.*, vol. 2, no. 2, pp. 103–120, 2018.
[21] D. Kahneman and M. W. Ripe, “Aspects of Investor Psychology,” *J. Portf. Manag.*, vol. 24, no. 4, pp. 52–65, 1998, doi: DOI: https://doi.org/10.3905/jpm.1998.409643.
[22] J. Lakonishok, A. Shleifer, and R. W. Vishny, “Contrarian Investment, Extrapolation, and Risk,” *J. Finance*, vol. 49, no. 5, pp. 1541–1578, 1994, doi: 10.1111/j.1540-6261.1994.tb04772.x.
[23] H. Sismoro, *Pengantar Logika Informatika. Algoritma dan Pemrograman Komputer*, 1st ed. Jogjakarta: Andi Offset, 2005.
[24] N. Ashfaq, Z. Nawaz, and M. Ilyas, “A comparative study of Different Machine Learning Regressors For Stock Market Prediction,” Lahore, 2021.
[25] G. M. Caporale, L. Gil-Alana, A. Plastun, and I. Makarenko, “Intraday Anomalies and Market Efficiency: A Trading Robot Analysis,” *Comput. Econ.*, vol. 47, no. 2, pp. 275–295, 2015, doi: 10.1007/s10614-015-9484-9.
[26] N. Lu, “A Machine Learning Approach to Automated Trading,” Boston College Computer Science, 2016.
[27] E. Boehmer, K. Fong, and J. (Julie) Wu, “Algorithmic Trading And Market Quality: International Evidence,” *J. Financ. Quant. Anal.*, vol. 56, no. 8, pp. 2659–2688, 2021, doi: https://doi.org/10.1017/S0022109020000782.
[28] J. A. Ani Omuchesi and M. Bosire, “The Effect of Automation on Stock Market Price Volatility: A Case of Nairobi Securities Exchange,” *IOSR J. Econ. Financ.*, vol. 5, no. 3, pp. 71–79, 2014, doi: 10.9790/5933-0537179.
[29] M. D. A. Nunes, “Automated Trading Systems VS Manual Trading in Forex Exchange Market,” NOVA Information Management School, 2021.
[30] R. Bogdan and S. K. Biklen, *Qualitative Reseach for Education: an Introduction to theory and Method*, 4th ed. Boston: Pearson, 2003.
[31] B. G. Glaser and A. L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research*, vol. 1, no. 4. 1967.
[32] E. G. Guba and Y. S. Lincoln, “Competing paradigms in qualitative research,” *Approaches to qualitative research: A reader on theory and practice*. pp. 17–38, 2004, doi: http://www.uncg.edu/hdf/facultystaff/Tudge/Guba%20&%20Lincoln%201994.pdf.
[33] C. Daymon, I. Holloway, and C. Wiratama, *Metode-metode Riset Kualitatif dalam Public Relation dan Marketing Communiccation*. Jogjakarta: Bentang Pustaka, 2007.
[34] A. K. Shenton, “Strategies for ensuring trustworthiness in qualitative research projects,” *Educ. Inf.*, 2004, doi: 10.3233/EFI-2004-22201.
[35] C. Moustakas, *Phenomenological Research Methods*, 1st ed. USA: Sage Publication, 1994.
[36] J. W. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, vol. 2nd ed. 2007.
[37] D. Wira, “Robot Trading di Masa Depan,” *18 Juni 2021*, 2021. [Online]. Available: https://juruscuan.com/belajar/trading/523-robot-trading-di-masa-depan. [Accessed: 20-Jun-2022].
[38] R. Filbert, “Robot Trading juga Ada di Saham,” *23 Oktober 2021*, 2021. [Online]. Available: https://youtu.be/czEeKthG9mM. [Accessed: 12-Jul-2022].
[39] R. Filbert, “Robot Trading 1%/Hari, Yuk dibeli,” *27 November 2020*, 2020. [Online]. Available: https://youtu.be/B8bVDbz8DlE. [Accessed: 12-Jul-2022].

[40] S. U. Ady, "The Cognitive and Psychological Bias in Investment Decision-Making Behavior: (Evidence From Indonesian Investor's Behavior)," *J. Econ. Behav. Stud.*, vol. 10, no. 1, pp. 86–100, 2018, doi: 10.22610/jebs.v10i1.2092.

[41] S. U. Ady, A. M. Tyas, I. Farida, and A. W. Gunawan, "Immediate and Expected Emotions toward Stock Returns through Overconfidence and Cognitive Dissonance: The Study of Indonesian Investor Behavior," *PalArch's J. Archaelogy Egypt/Egyptology*, vol. 17, no. 3, pp. 1140–1165, 2020, doi: https://archives.palarch.nl/index.php/jae/article/view/238/241.

[42] Kim, O. (2020). Western-style capital market reforms in Russia: Implications for market efficiency and firms' financing decisions. *Risk Governance and Control: Financial Markets & Institutions, 10*(3), 62-74.

[43] Hamzah, H. (2018). Bilateral investment treaties (BITs) in Indonesia: A paradigm shift, issues and challenges. *journal of legal, ethical and regulatory issues, 21*(4), 1-13.

[44] Hani, S., Heru, S. S., & Isworo, E. S. (2020). The effect of investment education and investment experience on investment decision with financial knowledge as intervening variable. *Russian Journal of Agricultural and Socio-Economic Sciences, 99*(3), 143-150.

[45] Sima, V., Gheorghe, I. G., Subić, J., & Nancu, D. (2020). Influences of the industry 4.0 revolution on the human capital development and consumer behavior: A systematic review. *Sustainability, 12*(10), 40-55.

[46] Valverde, S. C., & Fernández, F. R. (2020). Financial digitalization: banks, fintech, bigtech, and consumers. *Journal of Financial Management, Markets and Institutions, 8*(01), 20-31.

[47] Uddin, S. M. S., Islam, A. N. M. M., & Rahat, M. R. (2021). Necessity of digitalization in the capital market of developing countries in current pandemic situation: The case of Bangladesh *The Digitalization of Financial Markets* (Vol. 3, pp. 38-56): Routledge.

[48] Spindler, G. (2019). Digitalization and corporate law–a view from Germany. *European Company and Financial Law Review, 16*(1-2), 106-148.

[49] Basrowi, & Utami, P. (2020). Building Strategic Planning Models Based on Digital Technology in the Sharia Capital Market. *J. Advanced Res. L. & Econ., 11*, 747-759.

[50] Kalbhor, A., & Jagannathan, U. K. (2020). Bailard, biehl and kaiser five-way model and behavioural biases influencing individual investors' decisions in the Indian capital market. *Mudra: Journal of Finance and Accounting, 7*(2), 1-30.

[51] Parveen, S., Satti, Z. W., Subhan, Q. A., & Jamil, S. (2020). Exploring market overreaction, investors' sentiments and investment decisions in an emerging stock market. *Borsa Istanbul Review, 20*(3), 224-235.

[52] Shaik, M. B., Kethan, M., Jaggaiah, T., & Khizerulla, M. (2022). Financial Literacy and Investment Behaviour of IT Professional in India. *East Asian Journal of Multidisciplinary Research, 1*(5), 777-788.

[53] Espinosa-Méndez, C., & Arias, J. (2021). COVID-19 effect on herding behaviour in European capital markets. *Finance Research Letters, 38*, 10-29.

[54] Haque, M. Z., Qian, A., Hoque, M. R., & Lucky, S. A. (2022). A unified framework for exploring the determinants of online social networks (OSNs) on institutional investors' capital market investment decision. *Technology in Society, 70*, 102-129.

[55] Madaan, G., & Singh, S. (2019). An analysis of behavioral biases in investment decision-making. *International Journal of Financial Research, 10*(4), 55-67.

[56] Sol, C. (2022). *Unbiased Investor: Reduce Financial Stress and Keep More of Your Money* (Vol. 36): John Wiley & Sons.
[57] Shahid, M. N., Aftab, F., Latif, K., & Mahmood, Z. (2018). Behavioral finance, investors' psychology and investment decision making in capital markets: an evidence through ethnography and semi-structured interviews. *Asia Pacific J. Emerg. Mark, 2*(1), 14-30.
[58] Shah, S. Z. A., Ahmad, M., & Mahmood, F. (2018). Heuristic biases in investment decision-making and perceived market efficiency: A survey at the Pakistan stock exchange. *Qualitative Research in Financial Markets, 2*, 1-14.
[59] Davoudi, A., Khozein, A., & Naderian, A. (2022). Investor Inclinations towards Capital Market: Recursive Analysis, Causes, and Factors. *Journal of Development and Capital, 2*, 29-41.
[60] Stiyono, S., & Perwitasari, A. W. (2020). Analisis persepsi rasionalitas investor di pasar modal indonesia analysis of perception of investor rationality in indonesia capital market. *Universitas, 4*, 21-39.
[61] Feng, Y., Wang, X., & Liang, Z. (2021). How does environmental information disclosure affect economic development and haze pollution in Chinese cities? The mediating role of green technology innovation. *Science of The Total Environment, 775*, 145-161.
[62] Kulathunga, K., Ye, J., Sharma, S., & Weerathunga, P. R. (2020). How does technological and financial literacy influence SME performance: Mediating role of ERM practices. *Information, 11*(6), 297-316.
[63] Susilawati, E., Khaira, I., & Pratama, I. (2021). Antecedents to student loyalty in Indonesian higher education institutions: the mediating role of technology innovation. *Educational Sciences: Theory & Practice, 21*(3), 40-56.
[64] Haritha, P. H., & Uchil, R. (2020). Influence of investor sentiment and its antecedent on investment decision-making using partial least square technique. *Management Research Review, 3*, 1-12.
[65] Upadhayay, D. (2019). A Study on Behavioral Finance in Investment Decisions of Investors in Ahmedabad. *IJNRD-International Journal of Novel Research and Development (IJNRD), 4*(7), 103-114.
[66] Bagheri, M., Mitchelmore, S., Bamiatzi, V., & Nikolopoulos, K. (2019). Internationalization orientation in SMEs: The mediating role of technological innovation. *Journal of International Management, 25*(1), 121-139.
[67] Khin, S., & Ho, T. C. F. (2018). Digital technology, digital capability and organizational performance: A mediating role of digital innovation. *International Journal of Innovation Science, 4*, 10-26.
[68] Wang, H., Yuan, H., Li, X., & Li, H. (2019). The impact of psychological identification with home-name stocks on investor behavior: An empirical and experimental investigation. *Journal of the academy of marketing science, 47*(6), 1109-1130.
[69] Stanovich, K. E., & Toplak, M. E. (2019). The need for intellectual diversity in psychological science: Our own studies of actively open-minded thinking as a case study. *Cognition, 187*, 156-166.
[70] Janse van Rensburg, C., Rothmann, S., & Diedericks, E. (2018). Job demands and resources: Flourishing and job performance in South African universities of technology settings. *Journal of Psychology in Africa, 28*(4), 291-297.
[71] Youssef, A. B., Boubaker, S., Dedaj, B., & Carabregu-Vokshi, M. (2021). Digitalization of the economy and entrepreneurship intention. *Technological Forecasting and Social Change, 164*, 1-13.

[72] Hossnofsky, V., & Junge, S. (2019). Does the market reward digitalization efforts? Evidence from securities analysts' investment recommendations. *Journal of Business Economics*, *89*(8), 965-994. doi: https://doi.org/10.1007/s11573-019-00949-y

[73] Chen, W., Zhang, L., Jiang, P., Meng, F., & Sun, Q. (2022). Can digital transformation improve the information environment of the capital market? Evidence from the analysts' prediction behaviour. *Accounting & Finance*, *62*(2), 2543-2578. doi: https://doi.org/10.1111/acfi.12873.

[74] Kim, H. K., & Lee, C. W. (2021). Relationships among healthcare digitalization, social capital, and supply chain performance in the healthcare manufacturing industry. *International journal of environmental research and public health*, *18*(4), 1417-1429. doi: https://doi.org/10.3390/ijerph18041417.

[75] Škare, M., & Soriano, D. R. (2021). A dynamic panel study on digitalization and firm's agility: What drives agility in advanced economies 2009–2018. *Technological Forecasting and Social Change*, *163*, 1204-1219. doi: https://doi.org/10.1016/j.techfore.2020.120418

D. **STATUS LUARAN**: Tuliskan jenis, identitas dan status ketercapaian setiap luaran wajib dan luaran tambahan (jika ada) yang dijanjikan. Jenis luaran dapat berupa publikasi, perolehan kekayaan intelektual, hasil pengujian atau luaran lainnya yang telah dijanjikan pada proposal. Uraian status luaran harus didukung dengan bukti kemajuan ketercapaian luaran sesuai dengan luaran yang dijanjikan. Lengkapi isian jenis luaran yang dijanjikan serta mengunggah bukti dokumen ketercapaian luaran wajib dan luaran tambahan melalui BIMA.

Luaran Wajib : Publikasi di International Journal of eBusiness and eGovernment Studies, Status Publish (IJEBEG)

Luaran Tambahan 1. : Publikasi di Polish Journal of Management Studies, Status Publish (PJMS)

Luaran Tambahan 2. : Publikasi di Journal of World Economy: Transformations & Transitions (JOWET), Status Publish

Luaran Tambahan 3. : Presenter dalam International Conference on Business, Management, and Accounting, Status Accepted

Luaran Tambahan 4. : HKI, Hak Cipta Karya Ilmiah

E**. PERAN MITRA:** Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* (untuk Penelitian Terapan, Penelitian Pengembangan, PTUPT, PPUPT serta KRUPT). Bukti pendukung realisasi kerjasama dan realisasi kontribusi mitra dilaporkan sesuai dengan kondisi yang sebenarnya. Bukti dokumen realisasi kerjasama dengan Mitra diunggah melalui BIMA.

Tidak ada Mitra

F. **KENDALA PELAKSANAAN PENELITIAN**: Tuliskan kesulitan atau hambatan yang dihadapi selama melakukan penelitian dan mencapai luaran yang dijanjikan, termasuk penjelasan jika pelaksanaan penelitian dan luaran penelitian tidak sesuai dengan yang direncanakan atau dijanjikan.

Kendala yang dihadapi adalah:

1. Keputusan pendanaan penelitian yang terlambat membuat peneliti mengalami kurang persiapan dan waktu yang lebih panjang terutama untuk memenuhi luaran Wajib.

2. Kesulitan mendapatkan informan investor individu pengguna robot trading yang bersedia terlibat dalam penelitian dan diwawancarai, karena pada saat itu sedang viral kasus penipuan investasi bodong berbasis Robot trading.

3. Kondisi pandemi yang masih berlangsung membuat peneliti harus berhati-hati dalam melakukan pencarian data di lapangan, sehingga peneliti juga sempat terkena sakit batuk pilek dan demam yang mengganggu proses penelitian.

G. **RENCANA TAHAPAN SELANJUTNYA:** Tuliskan dan uraikan rencana penelitian di tahun berikutnya berdasarkan indikator luaran yang telah dicapai, rencana realisasi luaran wajib yang dijanjikan dan tambahan (jika ada) di tahun berikutnya serta *roadmap* penelitian keseluruhan. Pada bagian ini diperbolehkan untuk melengkapi penjelasan dari setiap tahapan dalam metoda yang akan direncanakan termasuk jadwal berkaitan dengan strategi untuk mencapai luaran seperti yang telah dijanjikan dalam proposal. Jika diperlukan, penjelasan dapat juga dilengkapi dengan gambar, tabel, diagram, serta pustaka yang relevan. Jika laporan kemajuan merupakan laporan pelaksanaan tahun terakhir, pada bagian ini dapat dituliskan rencana penyelesaian target yang belum tercapai.

BAB I. PENDAHULUAN

1.1. Latar Belakang Masalah

Harga saham tercipta karena adanya perilaku dari para pelaku pasar. Jika perilaku mereka optimis, maka harga saham akan naik, dan begitu juga sebaliknya, jika perilaku pelaku pasar pesimis akan menciptakan penurunan harga secara umum di pasar. Sehingga dapat disimpulkan bahwa harga saham terjadi lebih banyak karena faktor psikologis pelaku pasar dibandingkan rasional seperti yang seharusnya. [3]; [4]; [5]; [6]; [7]; [8]; [9]

Diantara perilaku bias para investor adalah *representativeness, loss aversion*, dan *self attribution bias* [3]; [5]. Shefrin, (2007) menyatakan bahwa *representativeness bias* adalah pengambilan keputusan berdasarkan pemikiran stereotip atau analogi, dan akan menyebabkan investor membuat keputusan keuangan yang tidak meningkatkan perolehan return.

Loss aversion adalah dorongan yang lebih besar untuk menghindari kerugian daripada mendapatkan keuntungan [11]. *Loss Aversion* membuat investor sangat menghindari resiko ketika mengevaluasi kemungkinan keuntungan, menyebabkan investor memegang saham yang rugi dan menjual saham-saham yang menguntungkan sehingga menjadikan *return* portofolio menjadi tidak optimal. [5]; [3]

Self attribution bias adalah kecenderungan untuk mendiskripsikan kesuksesan yang dialami karena faktor dari dalam diri, sementara kegagalan yang dialami, Karena faktor-faktor dari luar. Bias ini akan menyebabkan: (1) *Overconfidence* [5], (2) investor berdagang terlalu sering (*overtrading*), [7]; [8], (3) investor hanya mendengar apa yang ingin didengar, [6], (4) memegang portofolio yang *underdiversified* [9].

Pandemic Covid-19 telah menambah kepanikan investor secara psikologis. Kondisi ini menyebabkan mereka melakukan aksi yang lebih ekstrim untuk menghindari kerugian atau justru memanfaatkan peluang untuk mendapatkan untung besar dengan melakukan berbagai aksi yang mungkin merupakan moral hazard atau semakin membahayakan pasar modal.

Menghadapi kondisi ketidakpastian dan pandemic Covid-19 yang belum menunjukkan titik terang kapan akan berakhir, banyak investor beralih menggunakan aplikasi robotic dalam

melakukan trading saham rangka untuk meminimalkan risiko dan meningkatkan return. Digitalisasi ekonomi telah membuat para pelaku pasar menggunakan cara yang dianggap lebih simple dalam memprediksi harga saham ke depan. Kondisi ini memunculkan minat dan ketertarikan peneliti untuk melakukan ekplorasi mengenai perilaku investor dalam melakukan trading/investasi saham menggunakan aplikasi dengan tujuan untuk mengurangi psikologi trading.

Pandemi meningkatkan gairah perdagangan saham dan investasi, khususnya di kalangan generasi muda. Robot-robot trading berbasis algoritma pun bermunculan. Pada masa pandemi banyak kegiatan ekonomi seperti pertokoan hingga perkantoran terganggu. Rakyat Indonesia yang mengalami pukulan ekonomi akibat pandemi, berusaha mencari berbagai alternatif untuk menghasilkan uang. Salah satu cara populer yang sudah tidak asing adalah jual beli saham dan valuta asing. Tetapi pasar saham dan valuta asing menuntut kemampuan dan pengalaman yang mapan agar bisa untung. Orang yang baru terjun ke dunia saham tidak sebanding dengan orang yang sudah lama menyelaminya.

Untuk mengatasi kekurangan pengetahuan dan kemampuan tersebut, banyak pihak menawarkan produk-produk seperti robot trading atau *automated trading* yang mampu melakukan kegiatan trading secara otomatis. Teknologi dan algoritma canggih yang dimiliki robot trading mampu memberikan keuntungan tanpa kendali penuh dari trader. Walaupun pengalaman Anda sedikit, robot trading mampu memberikan keuntungan setara trader profesional.

Tentu robot trading menjadi suatu alternatif yang menggiurkan bagi trader muda. Bahkan banyak trader muda yang berani terjun ke dunia saham dengan anggapan bahwa robot trading mampu membantu mereka sepenuhnya. Tetapi apakah benar robot trading mampu bekerja sangat efisien hingga kita dapat mempercayai sepenuhnya? Apakah di masa depan kegiatan trading akan dikendalikan oleh robot?

Penelitian ini merupakan implementasi dari **Renstra Penelitian Universitas Dr. Soetomo** pada bidang **Teknologi konservasi dan Pembangunan Ekonomi Berkelanjutan**, pada topik riset "**meningkatkan peran pasar modal dalam investasi global dalam rangka meningkatkan perekonomian rumah tangga dan daya saing bangsa berbasis nilai-nilai dan kearifan lokal"** dan sesuai dengan salah satu dari lima (5) bidang Fokus utama penelitian pada tahun ini yaitu **Teknologi digital atau digitalisasi ekonomi**. Adapun tujuan khusus dari penelitian ini pada tahun ke 2 adalah melakukan uji comparansi penggunaan berbagai aplikasi robotic dengan menggunakan uji Chi square. Sedangkan pada tahun ke 3 dilakukan

Pengembangan model yang dihasilkan di tahun ke-1 dan tahun ke-2 menghasilkan model Efektivitas penggunaan aplikasi robotic di pasar modal.

Rencana realisasi Luaran

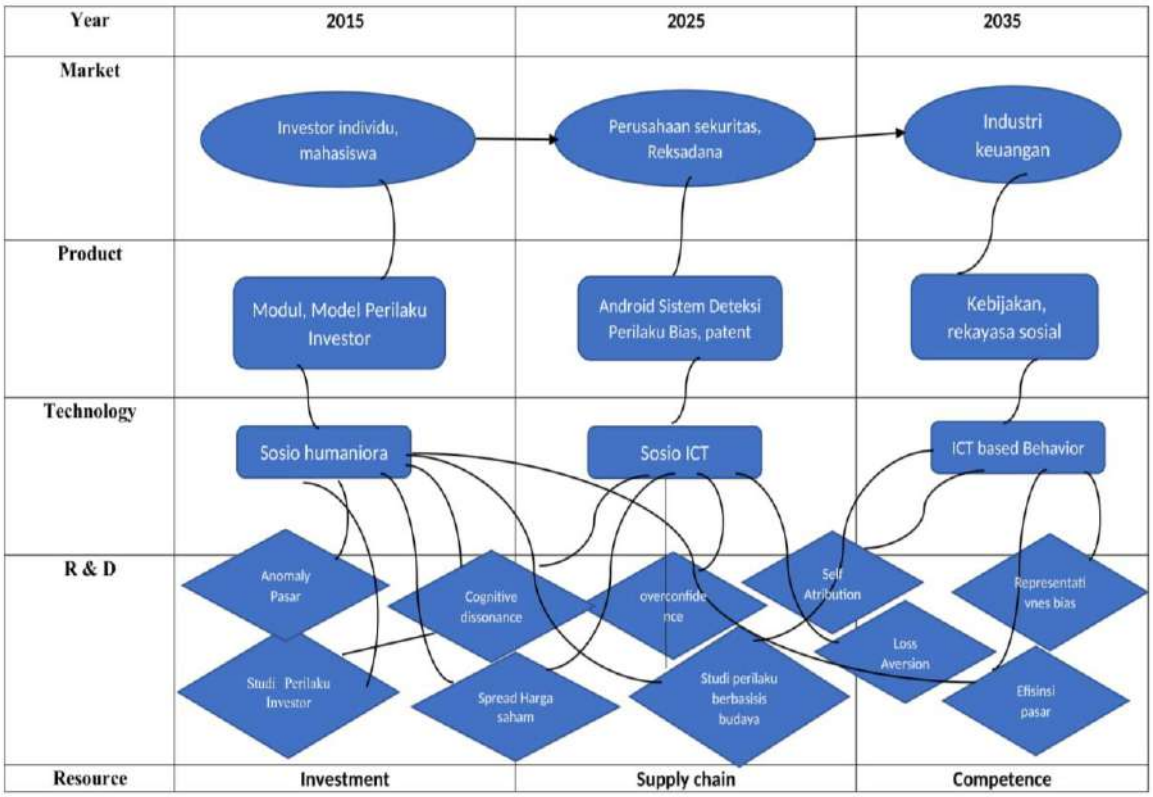
Pada tahun ke dua dihasilkan:

1. Jurnal Internasional (wajib), 2. Hasil Uji komparansi penggunaan berbagai aplikasi robotik, 3. Prosiding Seminar nasional, 4. Draft buku Ajar

Pada tahun ketiga dihasilkan:

1. Jurnal Internasional (wajib) 2. Model Efektivitas penggunaan aplikasi robotic di pasar modal 3. Prosiding Seminar nasional, 4. buku Ajar editing 5. Hak cipta terdaftar

BAB 2. ROADMAP PENELITIAN



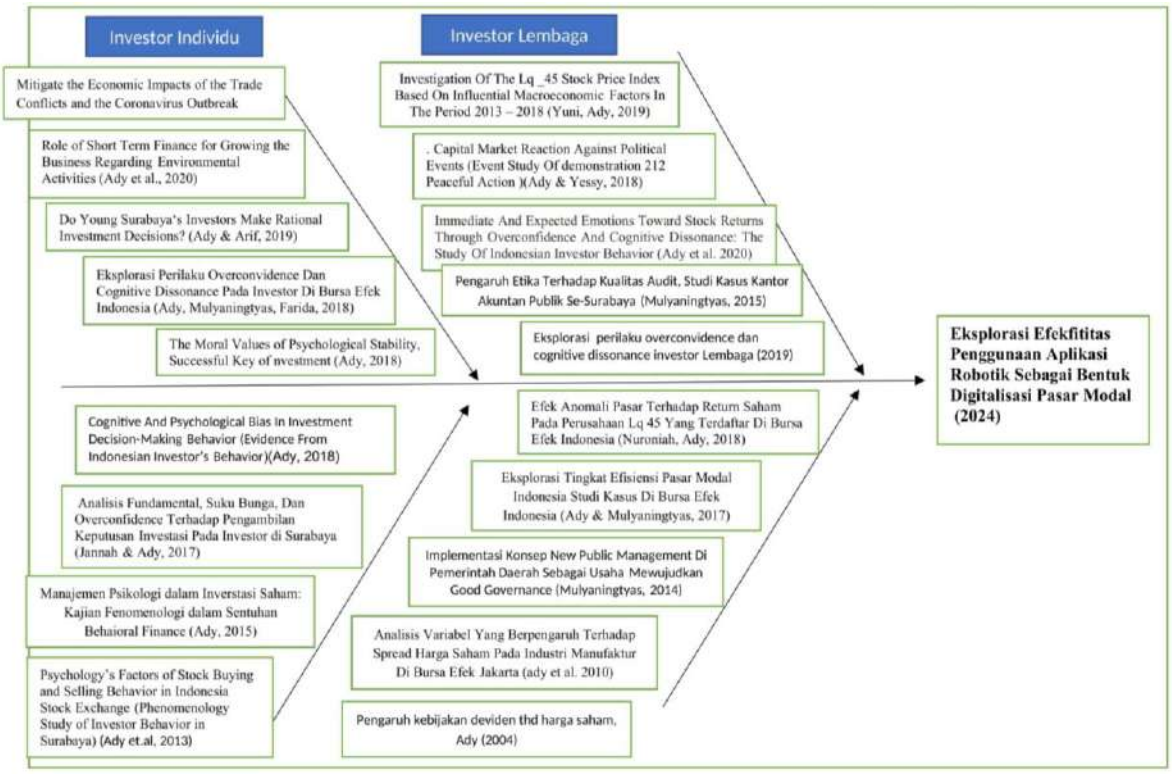
Gambar 2.1. Roadmap Penelitian Keuangan Perilaku (Behavioral Finance)

Roadmap ini berisi tentang rencana penelitian pengusul sampai dengan tahun 2035, berdasarkan sumberdaya berupa investasi, supply chain, dan kompetensi, meliputi tahap-tahap R&D, Technologi yang digunakan, produk yang dihasilkan dan pasar yang ditargetkan.

Tabel 2.1. Peta Jalan (Roadmap) Sri Utami Ady

Tahun	Penelitian Dasar	Penelitian Terapan	Penelitian Pengembangan
2021		The Effect Of World Oil Prices, Gold Prices, And Other Energy Prices On The Indonesian Mining Sector With Exchange Rate Of Indonesian Rupiah As The Moderating Effect	Does the combining effects of energy and consideration of financial development lead to environmental burden: social perspective of energy finance?
2020	1. Role of Short Term Finance for Growing the Business Regarding Environmental Activities (Ady et al., 2020) 2. Mitigate the Economic Impacts of the Trade Conflicts and the Coronavirus Outbreak (Wijanarko et al., 2020)	1. The Financial Equilibrium Based on a Marginal Approach to Improve the Financial Performance of the State Electricity Company (PLN) (Assegaf et al., 2020)	Corporate Governance and Earnings Management Evidence from Listed Non-Financial Firms (Sadik et al 2020)
2019	1. E-Money As A Payment System Tool In Flazz Bca Card Users In Surabaya (Muhaimin & Ady, 2019) 2. Quality and University Governance in Indonesia (Nur Sayidah et al., 2019) 3. Review of Project Risk Management and Risk Assessment (Lilis et al., 2019)	1. Do Young Surabaya's Investors Make Rational Investment Decisions? (Ady & Arif, 2019) 2. Investigation Of The Lq _45 Stock Price Index Based On Influential Macroeconomic Factors In The Period 2013 – 2018 (Yuni et al., 2019)	
2018	1. Cognitive And Psychological Bias In Investment Decision-Making Behavior (Evidence From Indonesian Investor's Behavior)(Ady, 2018) 2. The Moral Values of Psychological Stability, Successful Key of nvestment (Ady, 2018) 3. Eksplorasi Perilaku Overconvidence Dan Cognitive Dissonance Pada Investor Di Bursa Efek Indonesia (Ady, Mulyaningtyas, Farida, 2018)	1. Capital Market Reaction Against Political Events (Event Study Of Demonstration 212 Peaceful Action)(Ady & Yessy, 2018) 2. Market Anomalies Of Lq 45 Companies Stock Return Listed On The Indonesia Stock Exchange (Nuroniah, Ady, 2018)	
2017	Eksplorasi Tingkat Efisiensi Pasar Modal Indonesia Studi Kasus Di Bursa Efek Indonesia (Ady & Mulyaningtyas, 2017)	1. Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor di Surabaya (Jannah & Ady, 2017) 2. Analisis Kinerja Keuangan Primer Koperasi STKIP PGRI Bangkalan (Farida, 2017)	
2015	Manajemen Psikologi dalam Inverstasi Saham: Kajian Fenomenologi dalam Sentuhan Behaioral Finance (Ady, 2015)	Pengaruh Etika Terhadap Kualitas Audit, Studi Kasus Kantor Akuntan Publik Se-Surabaya (Mulyaningtyas, 2015)	
2014		Implementasi Konsep New Public Management Di Pemerintah Daerah Sebagai Usaha Mewujudkan Good Governance (Mulyaningtyas, 2014)	
2013	Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya) (Ady et.al, 2013)		
2010		Analisis Variabel Yang Berpengaruh Terhadap Spread Harga Saham Pada Industri Manufaktur Di Bursa Efek Jakarta (ady et al. 2010)	
2004		Pengaruh kebijakan deviden thd harga saham, Ady (2004)	

Tabel 2.1. menunjukkan peta jalan penelitian yang telah dilakukan oleh pengusul sampai dengan saat ini pada bidang yang diusulkan.

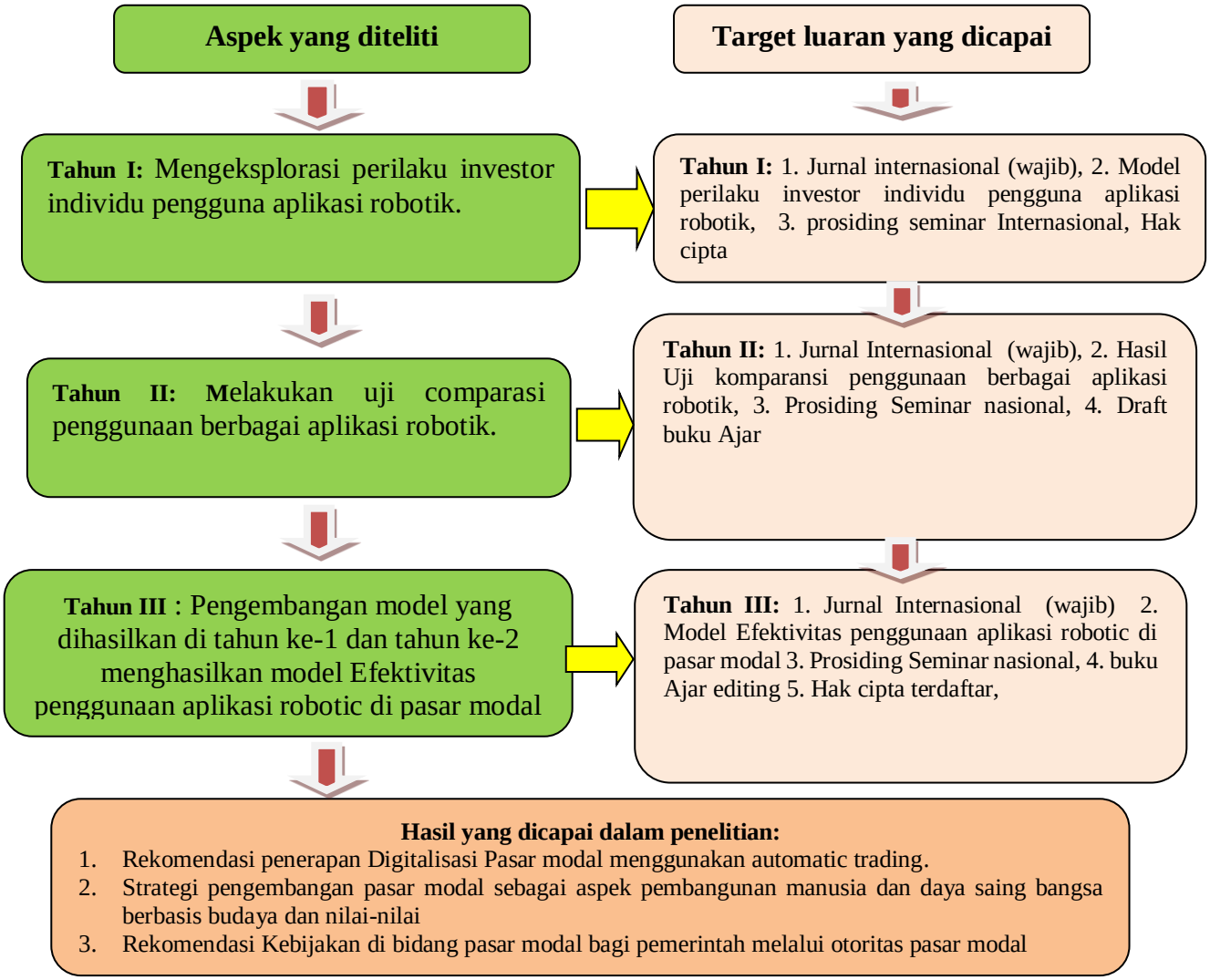


Gambar 2.2. Fishbone Penelitian yang Sudah Dilakukan dan Penelitian yang akan Datang

Gambar 2.2. menunjukkan arah penelitian yang sudah dilakukan Tim pengusul menunju kearah topik penelitian yang diusulkan saat ini.

BAB.3. METODE PENELITIAN

3.1. Bagan Alir Penelitian



3.2. Metode Penelitian

Pelaksanaan Penelitian	Rancangan	Metode Penelitian	Indikator	Tugas Tim Peneliti
TAHUN KE-2				
1. melakukan uji comparasi penggunaan berbagai aplikasi robotik	Menggunakan rancangan penelitian Kuantitatif	1. Metode penelitian kuantitatif 2. Pengumpulan data dengan penyebaran Questioner 3. Analisis data menggunakan anova atau Chi Square	1.Hasil Uji komparasi penggunaan berbagai aplikasi robotik	1. Ketua : Penanggungjawab kegiatan 2. Anggota 1: Koordinator Pengumpulan data 3. Anggota 2: Koordinator analisis data kuantitatif
TAHUN KE-3				
Implementasi model tahun ke-1 dan ke-2 menjadi model Efektivitas penggunaan aplikasi robotik	Menggunakan Rancangan metode Kuantitatif	1. Metode penelitian kuantitatif 2. Pengumpulan data dengan penyebaran Questioner 3. Analisis data menggunaka SEM	1. model Efektivitas penggunaan aplikasi robotik 2. Pengambilan keputusan investasi lebih rasional	1. Ketua : Penanggungjawab kegiatan 2. Anggota 1: Koordinator Pengumpulan data 3. Anggota 2: Koordinator analisis data kuantitatif

Pada tahun ke-2 Metode yang dipakai adalah kuantitatif. untuk melakukan uji komparansi dari berbagai aplikasi robotic dalam rangka untuk menilai aplikasi yang terbaik.

Pada tahun ke-3 metode yang dipakai adalah metode kuantitatif, dengan menggunakan hasil yang diperoleh pada tahun pertama dan kedua, menciptakan model Efektivitas penggunaan aplikasi robotik

3.3. Lokasi Pelaksanaan Penelitian

Lokasi pelaksanaan penelitian adalah di Bursa Efek Indonesia, investor individu di tiga perusahaan sekuritas di Surabaya (Danareksa securities, Panin Securities, Pintraco Securities).

3.4. Teknik Pengumpulan Data

Teknik pengumpulan data pada tahun ke-2 adalah :

1. menggunakan data primer melalui penyebaran kuesioner pada investor individu di 3 perusahaan sekuritas.
2. Menggunakan studi pustaka untuk mendapatkan data sekunder melalui berita di internet, jurnal, buku dan sebagainya.

3. 5. Analisis yang Dilakukan

Metode analisis yang dilakukan adalah menggunakan uji beda Chi square untuk melihat apakah ada perbedaan antara return menggunakan robot trading 1 dan robot trading 2. Dan untuk melihat apakah ada perbedaan anatara return menggunakan robot trading dan manual trading.

3.6. Indikator Capaian yang Terukur

Indikator dari capaian penelitian ini adalah:

Pada tahun ke dua dihasilkan:

1. Jurnal Internasional (wajib), 2. Hasil Uji komparansi penggunaan berbagai aplikasi robotik, 3. Prosiding Seminar nasional, 4. Draft buku Ajar

Pada tahun ketiga dihasilkan:

1. Jurnal Internasional (wajib) 2. Model Efektivitas penggunaan aplikasi robotic di pasar modal 3. Prosiding Seminar nasional, 4. buku Ajar editing 5. Hak cipta terdaftar

BAB 5. JADWAL

5.1. Jadwal Penelitian

Jadwal Kegiatan Penelitian

No	Uraian	Tahun II						Tahun III					
		2	4	6	8	10	12	2	4	6	8	10	12
1.	Persiapan, survey pendahuluan	■						■					
2.	Studi Pustaka		■						■				
3.	Penyebaran Kuesioner		■	■					■	■			
4.	Analisis sampel		■	■	■				■	■	■		
5.	Analisis data			■	■					■	■		
6.	Interpretasi Hasil				■	■					■	■	
7.	Pembuatan Laporan				■	■	■				■	■	■
8.	Penulisan Jurnal Ilmiah				■	■	■				■	■	■

H. DAFTAR PUSTAKA: Penyusunan Daftar Pustaka berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada laporan kemajuan yang dicantumkan dalam Daftar Pustaka.

1. [1] S. U. Ady, S. Mohamad, A. A. Pantamee, K. O. C. H. V M, and K. W. Chong, "Effects of Ceo Incentives and Corporate Social Responsibilities on Financial Performance," *Polish J. Manag. Stud.*, vol. 25, no. 2, pp. 9–20, 2022, doi: 10.17512/pjms.2022.25.2.01.

2. [2] M. Sadiq, A. A. Pantamee, S. Mohamad, T. M. Aldeehani, and S. U. Ady, “Corporate governance and earnings management: Evidence from listed non-financial firms,” *Polish J. Manag. Stud.*, vol. 22, no. 2, pp. 456–469, 2020, doi: 10.17512/pjms.2020.22.2.30.
3. [3] S. U. Ady, M. Sudarma, U. Salim, and S. Aisyah, “Psychology’s Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya),” *IOSR J. Bus. Manag.*, vol. 7, no. 3, pp. 11–22, 2013, doi: 10.9790/487X-0731122.
4. [4] S. U. Ady, “Nilai-nilai dibalik Kestabilan Psikologis, Kunci Sukses Berinvestasi (Studi pada Perilaku Investor di Bursa Efek Indonesia,” in *Simposium Riset Ekonomi VI-2014*, 2014, pp. 323–334.
5. [5] S. U. Ady, *Manajemen Psikologi dalam Investasi Saham, Kajian Fenomenologi dalam Sentuhan Behavioral Finance*, 1st ed. Jogja: CV. Andi Offset, 2015.
6. [6] S. U. Ady, “The Moral Values of Psychological Stability , Successful Key of Investment,” in *1st International Conference on Intellectuals’ Global Responsibility (ICIGR 2017)*, 2018, vol. 125, no. Icigr 2017, pp. 33–37.
7. [7] W. Jannah and S. U. Ady, “Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya,” *Ekspektra J. Bisnis dan Manaj.*, vol. 1, no. 2, pp. 138–155, 2017, doi: 10.1007/BF00139728.5.
8. [8] S. U. Ady and A. Hidayat, “Do Young Surabaya’s Investors Make Rational Investment Decisions ?,” *Int. J. Sci. Technol. Res.*, vol. 8, no. 07, pp. 319–322, 2019, doi: https://www.ijstr.org/research-paper-publishing.php?month=july2019.
9. [9] S. U. Ady, A. Mulyaningtyas, and I. Farida, “Overconfidence : Technical Analysis in Trading , Investment or Gambling ?,” in *Conference on Islamic and Technology*, 2020, doi: 10.4108/eai.21-9-2019.2293942.
10. [10] H. Shefrin, *Behavioral Corporate Finance: Decision That Create Value*, McGraw-Hil. 2007.

LAMPIRAN

INTERNATIONAL JOURNAL OF eBUSINESS AND eGOVERNMENT STUDIES
Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137
Received: 21.03.2022 | **Accepted:** 27.08.2022 | **Published Online:** 15.09.2022

-RESEARCH ARTICLE-

THE ROLE OF INVESTORS' BEHAVIOR AND PSYCHOLOGICAL UNBIASEDNESS ON THE DIGITIZATION OF THE CAPITAL MARKET IN INDONESIA: MEDIATING ROLE OF TECHNOLOGY ADVANCEMENT

Sri Utami Ady

Economic and Business Faculty, University of Dr. Soetomo
Email: sri.utami@unitomo.ac.id
https://orcid.org/0000-0002-2093-4383

Ilya Farida

Economic and Business Faculty, University of Dr. Soetomo
Email: ilya.farida@unitomo.ac.id
https://orcid.org/0000-0001-9395-5882

Mustika Winedar

Economic and Business Faculty, University of Dr. Soetomo
Email: mustika.winedar@unitomo.ac.id
https://orcid.org/0000-0001-8143-6284

Alvy Mulyaningtyas

Economic and Business Faculty, University of Dr. Soetomo
Email: alvymt@gmail.com
https://orcid.org/0000-0003-4600-64235

Dicken Okta Sandra Susena

Economic and Business Faculty, University of Dr. Soetomo
Email: dickenoktasansu17@gmail.com
https://orcid.org/0000-0001-9826-6867

Citation (APA): Ady, S. U., Farida, I., Winedar, M., Mulyaningtyas, A., Susena, D. O. S., Pratama, A. H. (2022). The Role Of Investors' Behavior and Psychological Unbiasedness on The Digitization of The Capital Market in Indonesia: Mediating Role of Technology Advancement. *International Journal of eBusiness and eGovernment Studies*, 14 (2), 350-368. doi:10.34111/ijebeg. 202214137

INTERNATIONAL JOURNAL OF eBUSINESS and eGOVERNMENT STUDIES
Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

Adiel Herdi Pratama

Faculty of Agriculture and Fisheries, University of Muhammadiyah Malang, Indonesia
Email; adielherdi.sby@gmail.com
https://orcid.org/0000-0002-1259-5879

─Abstract─

Recently, the digitalization of the financial markets is the requirement of the modern world that requires the attention of regulators and researchers. Hence, the current article investigates the impact of investors' behavior towards technology adoption and psychological unbiasedness about technology advancement on the digitalization of the capital market in Indonesia. The study also examines the mediating role of technology advancement among investors' behavior toward technology adoption, psychological unbiasedness about technology advancement and digitalization of the capital market in Indonesia. The article used questionnaires to collect the data from the selected respondents. The study also applied the PLS-SEM to test the association between the variables using smart-PLS. The results indicated that the investors' behavior towards technology adoption and psychological unbiasedness about technology advancement have positive relationships with the digitalization of the capital market in Indonesia. The findings also exposed that the technology advancement mediates among investors' behavior and psychological unbiasedness and digitalization of the capital market in Indonesia. The study guides the policymakers in establishing policies related to the digitalization of the capital market by promoting the investors' behavior and psychological unbiasedness towards technology adoption.

Keywords: Digitalization of capital market, psychological unbiasedness, technology advancement, investors' behavior

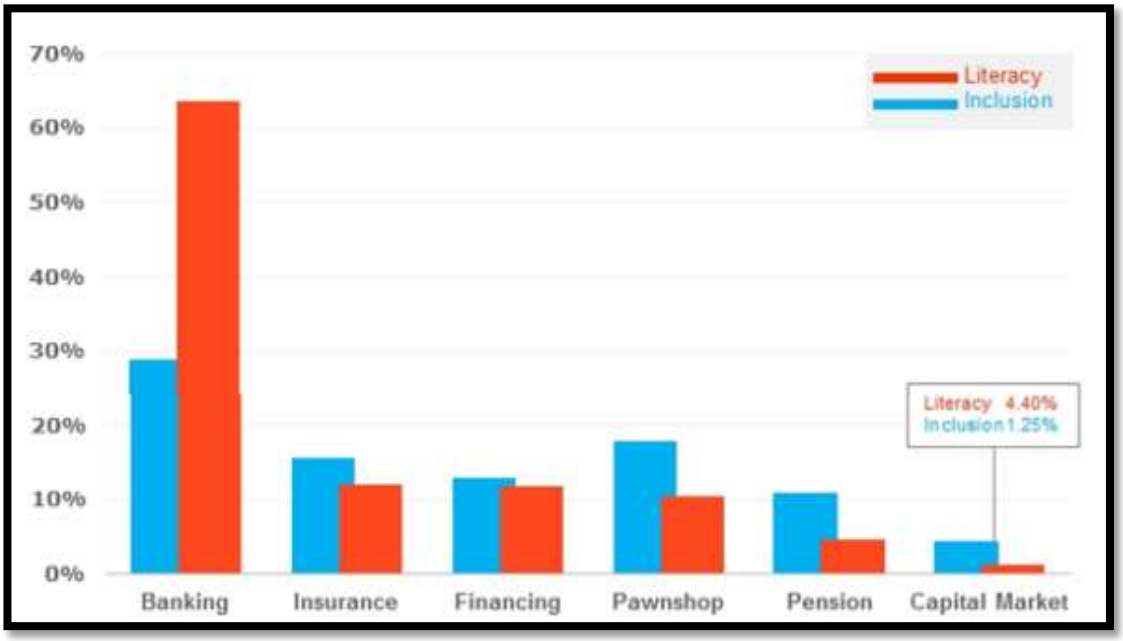
1. INTRODUCTION

The capital market of any country is one of the key supporters and contributors to the country's economy. The capital market is also the indicator of foreign direct investment, whether to invest in the country or not. As the capital market is an organized physical location where securities are exchanged (O. Kim, 2020; Żebrowska-Suchodolska et al., 2018). It is essential to realize that the stock market is a structured system that connects direct and indirect sellers and purchasers of securities. Over the past few years, one of the factors which affected the financial markets all around the globe is Covid pandemic. As the Covid-19 pandemic put a lot of pressure on Indonesia's stock market throughout 2020, the number of investors in the market has seen a significant increasing trend. With

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) **(pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

the frequency of the increased transactions, the total number of investors in the capital market climbed to 3.88 million, there is a 56% increase from the previous year. The number of investors continued to rise to 4 million investors till January 2021. According to KSEI statistics from October 2020, a fintech trading agent attracted over 49.75 percent of capital market participants (Hamzah, 2018; Hani et al., 2020). These statistics demonstrate how a change in consumer behavior affects the industry's move to digital platforms. Thus, there is an association between consumer behavior (which build from the individual psyche) and the digitalization of any industry in the country (Sima et al., 2020; Valverde et al., 2020).

Despite that, there are numerous challenges faced by the investors regarding digitalization of the capital market like investor resistance in terms of avoidance of market digitalization, investor psyche, and country's economic as well as political circumstances. The present study will address the investor's role in capital market digitalization. The retention of the investors is the ultimate aim of the capital market. Market while having decision analyze every aspect of the decision to avoid any sort of resistance. Indonesia is a developing country, therefore, likewise, the developed countries it's not fully digitalized. With the view to meet international clients the capital market gets itself digitalized. This digitalization is expressing the effect on that people. The factors like investor behavior along with psychological biasedness are the key element in the entire process (Ady, 2018, 2019; Ady et al., 2013). Therefore, the present study will address the investor's role in the digitalization of the capital market. Indonesian capital market conditions are given in figure 1.



Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

Figure 1: Indonesian capital market conditions

The present study will address some gaps does exist in the literature like 1) as a result of globalization the technological revolution has enforced every aspect of society to adopt it. Similar is the case with the financial market. Now the investors also prefers to operate their investment from anywhere, although the capital market adopted the digitalization but still there are number of investors who still not accept this digitalization, being one of the important and highlighted factors although its researched although but still there are number of factors yet to explore, 2) Uddin et al. (2021), worked on the necessity of the capital market digitalization in Bangladesh while Pandemic situation, whereas the present study will check it with investors behavior and psychology in Indonesian perspective with the fresh data set, 3) Spindler (2019), investigated the capital market digitalization from corporate law point of view, whereas the present study will investigate it with investors behavior, psychological unbiasedness and also with the addition of moderation effect in Indonesian perspective with the fresh data set, 4) Basrowi et al. (2020), worked on the Islamic Sharia Capital market along with digital technology, whereas the present study will check it in traditional capital market with the addition of moderating variable i.e. technological advancement from Indonesian perspective, 5) the model consist of investors behavior, psychological unbiasedness, technological advancement and digitalization of the capital market is not tested before in Indonesian in the recent time, 6) Kalbhor et al. (2020), worked on the capital market and investor decision making in India, whereas the present study will check the capital market from digitalization perspective along with addition of moderating variable technological advancement in Indonesia. The significance of the study is 1) will highlight the importance of capital market digitalization for the market expansion as well as for the investors particularly in Indonesia, 2) will be helpful for the capital market related professional to revamp their policies with the view to convincing the investors to accept the digitalization in the capital market, and 3) will help the researchers to explore more aspects of capital market digitalization in particularly in Indonesia.

Structurally the paper is divided into different chapters. In the first chapter, the overall introduction of the study including the study gap and significance will be presented. The second phase will present the evidence about investor's behavior, psychological unbiasedness, technological advancement, and digitalization of the capital market in connection with past studies will be discussed. The third chapter of the study will provide the methodology, i.e., the collection of data about investor behavior, psychological unbiasedness, technological advancement, and digitalization of the capital market. After that will, the validity of the data will be analyzed. The results received after data analysis will be presented in the fourth chapter. Finally, the study conclusion, implications, and recommendations will be presented.

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

2. LITERATURE REVIEW

Over the past few decades, the financial markets also witnessed different changes as a result of advancement. There are different factors that affect the capital market decision making like digitalization or any other sort of technological changes. The market forces while having any decision ensure maximum analysis of investors who are the ultimate effect of these changes. The digitalization of the market has different effects on different investors. Investors who avoid much technology involvement usually avoid any such changes. But the market forces ensure the proper support of such individuals as the individual behavior affects the capital market (Kalbhor et al., 2020; Parveen et al., 2020). As the investors of the capital market play a vital role in the overall performance of the capital market. The market is the combination of investors like well-literate or less literate (Ady, 2019). The behavior of the investors who changes themselves with the technological and other changes is different from those who ignored the adoption of the change. Factors like financial literacy affect individual behavior which further affects the capital market and any sort of decision like digitalization. In this context, Shaik et al. (2022) worked on the association between financial literacy and the behavior of the investor, particularly in India. The data set of 100 respondents was collected and tested with the help of SPSS. The results of the study revealed that there are a number of factors that affect the investor psyche and one of them is financial literacy. Financial literacy helped the investor for a better understanding of the capital market which further affects individual behavior in any sort of decision-making pertaining to the capital market (Ady, 2019). Investors that exhibit herding behavior replicate the behaviors of others (Ady et al., 2020; Hartani et al., 2021). The Covid pandemic has affected herding behavior in two different ways investors first take into account the information available to maintain and/or invest in the capital markets based on their beliefs and then they consider other agents who are more informed and adapt their behavior. This is done in response to the economy's decline and the medical and social uncertainties. In this context, Espinosa-Méndez et al. (2021)**,** worked on the relationship between herding behavior and the capital market as a result of the Covid pandemic. The study was conducted in Europe. The data set of 20 years like from 2000 to 2020 was collected and tested. The results of the study revealed that the Covid pandemic has resulted in increase in the herding behavior in the capital market of France, Germany, Italy, UK and Spain. Thus, the investor's behavior effects the capital market. Thus, the hypotheses derived from the above debate is as under:

H1: Investors' behavior significantly influences the digitalization of the capital market.

The investors are the ultimate stakeholders of any financial market. Similar is the case with the capital market. Investor involvement decides the future of any market. Over time the capital markets change themselves with the view to facilitate their investors with the aim to support their investors. The investor psyche plays a vital role in its decision making which further affects the market decisions like digitalization (Haque et

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

al., 2022; Madaan et al., 2019). With the passage of time, every financial market adopts digitalization in order to meet rapidly changing technological needs. The investor's psyche pays to affect the capital market in terms of its decision-making. In this context, Kalbhor et al. (2020), worked on individual behavior and decision-making in the capital market. The study was conducted in the Indian capital market. The data set of 241 respondents were collected and tested with the help of SEM. The results of the study revealed a substantial association between the personalities of Individualist and guardian and all three biases like a celebrity and straight arrow and both anchoring and herding biases, and adventurer and just herding bias. Furthermore, it is discovered that all of the personalities, with the exception of the straight arrow, have a substantial association with demographics. While having decisions regarding the capital market the individual should remain unbiased as biases can cause impulsive decision-making. Individual psychosocial unbiasedness plays a vital role in the case of capital market decision-making (Sol, 2022; Uddin et al., 2021). Similarly, Shahid et al. (2018), worked on the investor's psychology and capital market. The study was conducted in Pakistan. The data set of 30 interviews were conducted. The results of the study revealed that investor behavioral biases affect the investor's decision-making. The investor's decisions with unbiasedness can lead to a good decision on the other hand any sort of biases can lead to adverse decision making. The psychology is one of the strong tools for the individual behavior. The behaviors biasness based on the psychology. An investor with positive psychology will lead to an unbiased decision making. In this context, Shah et al. (2018) worked on the biases in investor decision-making and their effect on the capital market performance. The study was conducted in Pakistan. The data set of 143 investors were collected and tested with the help of the PS technique. The results of the study revealed an empirical understanding of how investment choices, heuristic biases, and perceived market efficiency are related. Thus, the hypotheses derived from the above debate is as under:

H2: Psychological unbiasedness significantly influences the digitalization of the capital market.

The investor's behavior regarding investment and the financial market changes over time. There are multiple reasons for it like individual behavior, psyche, market conditions, and market internal and external force's reaction. If the investment is in good flow for the investor the one avoids any sort of changes in the market that might affect the investment (as per investor developed opinion) (Davoudi et al., 2022; Perwitasari et al., 2020). The world is getting more digitalized which also expresses its effect on the capital market. The markets are getting digitalized with the view to meet world demand. There is a mixed response from investors reporting on such digitalization. The investors who like the changes usually accept them wholeheartedly but on the other hand, the investors who prefer the traditional ways avoid them. Thus, technological changes get affected by investor behavior which further affects the digitalization of the capital

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

market; thus, technological advancement can act as an active mediator. In this context, Feng et al. (2021) worked on the mediating role of technological innovation in the relationship between environmental information and economic development. The study was conducted in China. The data set of 10 years like from 2008 to 2018 was collected and tested. The results of the study revealed that technological advancement in terms of innovation significantly acts as a mediator in the relationship. Moreover, Kulathunga et al. (2020), also investigated the mediating role of technological advancement in terms of enterprise resource planning (ERP). The study was conducted on SMEs. The data set of 319 SME employees was collected and tested. The results of the study revealed that technological innovation in terms of innovation significantly acts as a mediator. Similarly, Susilawati et al. (2021), also explored the technological advancement mediating role in terms of technological innovation. The study was conducted in Indonesia. The results of the study revealed that technological innovation significantly act as a mediator. Thus, the hypotheses derived from the above debate is as under:

H3: Technological advancement significantly acts as a mediator in the relationship between investors' behavior and the digitalization of the capital market.

There are numerous factors that affect individual decisions and one of the prime factors is individual psychology. The individual psyche leads to biasness or unbiasedness in one's decision-making. The individual psyche further gets affected by many factors like an individual opinion regarding any practice. Once an individual is satisfied with any practice then any deviation from that practice may lead that individual to express biases and change will affect his comfort zone in terms of running practice. Similar is the case with the investor. If an investor is comfortable with any capital market practice, then any change in that practice will affect the investor psyche. Thus, the changes which impact the individual psyche lead to biasness decision-making (P.H et al., 2020; Upadhayay, 2019). Many investors in the market avoid excessive digitalization. Thus, they express biased decision-making. The investor's unbiased decision-making will support digitalization in the capital market. Better awareness of technological changes will lead to a change the investor psychology regarding digitalization. In this context, Bagheri et al. (2019) investigated the mediating role of technological innovation in the relationship between international orientation in SMEs. The results of the study revealed that technological innovation significantly acts as a mediator in the relationship. Moreover, Khin et al. (2020), also explored the mediating role of digital innovation in the relationship between digital technology and organization performance. The results of the study revealed that digital innovation positively mediates the relationship between digital technology and organization performance particularly in Malaysia. Thus, the hypotheses derived from the above debate is as under:

H4: Technological advancement significantly acts as a mediator in the relationship between psychological unbiasedness and the digitalization of the capital market.

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

3. RESEARCH METHODS

The article investigates the impact of investors' behavior and psychological unbiasedness about technology advancement on the digitalization of the capital market and also examines the mediating role of technology advancement among investors' behavior, psychological unbiasedness about technology advancement and digitalization of capital market in Indonesia. The article used questionnaires to collect the data from the selected respondents. The items were used to measure the variables of the study. These items are taken from past studies, for example, investors' behavior was measured with six items taken from H. Wang et al. (2019), psychological unbiasedness was measured with eight items taken from Stanovich et al. (2019), technology advancement measured with five items extracted from Janse van Rensburg et al. (2018) and digitalization of capital market measured with ten items taken from Youssef et al. (2021).

The investors of the capital market are the respondents of the study. They were selected based on simple random sampling. The surveys were distributed to the selected investors through the mail. The researchers distributed the 570 surveys to the respondents, but only 290 were received after one month. These surveys have an approximately 50.88 per cent response rate. Moreover, the study also applied the PLS-SEM to test the association between the variables using smart-PLS. This tool is suitable when the data is collected from questionnaires. It provides reliable results in the case of small and large data sets. PLS-SEM is also a suitable technique that provides reliable results even when researchers use complex frameworks. The study used two predictors, investors' behavior (IB) and psychological unbiasedness (PUB) about technology advancement. In addition, the article also used one mediating variable, such as technology advancement (TAD) and also took one dependent variable named digitalization of capital market (DCM). These constructs are presented in the framework in Figure 2.

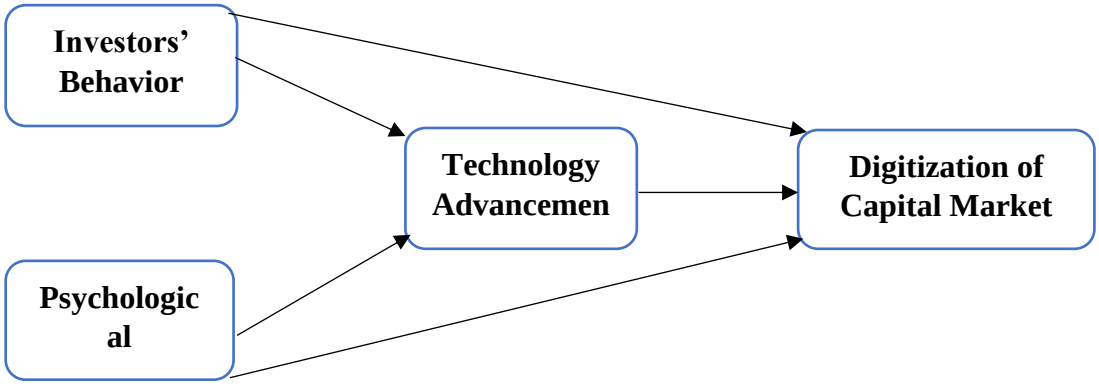


Figure 2: Theoretical Model

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

4. RESEARCH FINDINGS

The study shows the convergent validity that shows the correlation between the items. The study used composite reliability (CR) and Alpha to check the reliability. The results indicated that the values are higher than 0.70 and exposed valid reliability. In addition, the study used the factor loadings and average variance extracted (AVE) to check the validity. The results indicated that the values were higher than 0.50 and exposed valid convergent validity. These values are given in Table 1.

Table 1. Convergent Validity

Constructs	Items	Loadings	Alpha	CR	AVE
Digitalization of Capital Market	DCM1	0.807	0.907	0.924	0.579
	DCM10	0.641			
	DCM2	0.795			
	DCM3	0.821			
	DCM4	0.805			
	DCM5	0.788			
	DCM7	0.773			
	DCM8	0.802			
	DCM9	0.577			
Investors' Behavior	IB1	0.836	0.893	0.919	0.655
	IB2	0.849			
	IB3	0.705			
	IB4	0.768			
	IB5	0.838			
	IB6	0.849			
Psychological Unbiasedness	PUB1	0.901	0.975	0.979	0.869
	PUB2	0.928			
	PUB3	0.956			
	PUB4	0.944			
	PUB6	0.911			
	PUB7	0.953			
	PUB8	0.929			
Technology Advancement	TAD1	0.844	0.917	0.938	0.751
	TAD2	0.881			
	TAD3	0.874			
	TAD4	0.834			
	TAD5	0.900			

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) **(pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

The study shows the discriminant validity that shows the correlation between the variables. Cross-loadings and Fornell Larcker were used to check the discriminant validity. The results indicated that the values that show the association between the variable itself are bigger than the values that show the association with other variables. These results exposed low association among variables and valid discriminant validity. These values are given in Table 2 and Table 3.

Table 2: Fornell Larcker

	DCM	IB	PUB	TAD
DCM	0.761			
IB	0.508	0.809		
PUB	0.471	0.494	0.932	
TAD	0.381	0.425	0.415	0.867

Table 3: Cross-Loadings

	DCM	IB	PUB	TAD
DCM1	**0.807**	0.358	0.305	0.292
DCM10	**0.641**	0.260	0.341	0.211
DCM2	**0.795**	0.373	0.325	0.332
DCM3	**0.821**	0.403	0.332	0.326
DCM4	**0.805**	0.350	0.306	0.286
DCM5	**0.788**	0.455	0.393	0.301
DCM7	**0.773**	0.460	0.429	0.335
DCM8	**0.802**	0.447	0.406	0.305
DCM9	**0.577**	0.304	0.358	0.184
IB1	0.405	**0.836**	0.384	0.334
IB2	0.451	**0.849**	0.451	0.346
IB3	0.361	**0.705**	0.317	0.339
IB4	0.394	**0.768**	0.400	0.360
IB5	0.401	**0.838**	0.378	0.335
IB6	0.448	**0.849**	0.456	0.351
PUB1	0.420	0.455	**0.901**	0.388
PUB2	0.459	0.444	**0.928**	0.356
PUB3	0.441	0.471	**0.956**	0.406
PUB4	0.417	0.476	**0.944**	0.415
PUB6	0.430	0.462	**0.911**	0.384
PUB7	0.445	0.468	**0.953**	0.402
PUB8	0.462	0.446	**0.929**	0.358

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

TAD1	0.339	0.309	0.346	**0.844**
TAD2	0.352	0.390	0.357	**0.881**
TAD3	0.335	0.374	0.346	**0.874**
TAD4	0.303	0.391	0.382	**0.834**
TAD5	0.323	0.376	0.369	**0.900**

The study shows the discriminant validity using Heterotrait Monotrait (HTMT) ratio. The results indicated that the values are lower than 0.85. These results exposed low association among variables and valid discriminant validity. These values are given in Table 4.

Table 4: Heterotrait Monotrait Ratio

	DCM	IB	PUB	TAD
DCM				
IB	0.555			
PUB	0.499	0.527		
TAD	0.414	0.470	0.439	

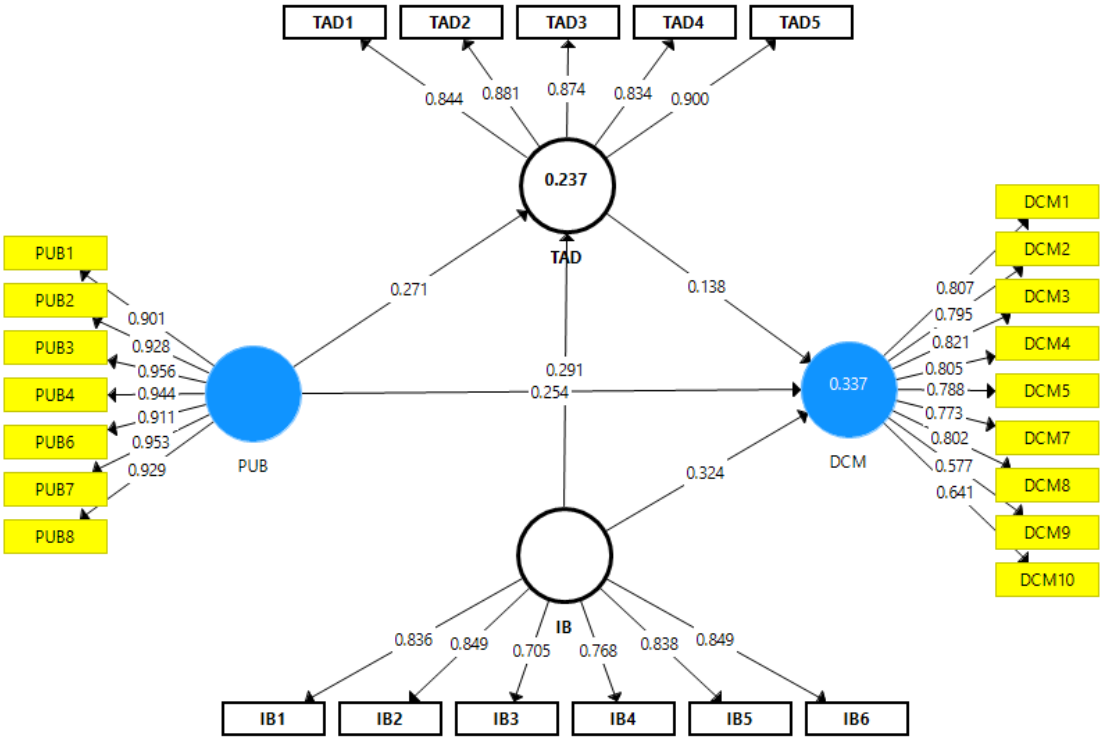


Figure 3: Measurement Model Assessment

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

The results indicated that the investors' behavior towards technology adoption and psychological unbiasedness about technology advancement have positive relationships with the digitalization of the capital market in Indonesia and accept H1 and H2. The findings also exposed that technological advancement mediates among investors' behavior and psychological unbiasedness, and the digitalization of the capital market in Indonesia and accept H3 and H4. These values are given in Table 5.

Table 5. Path Analysis

Relationships	Beta	S.D.	T Statistics	P Values
IB -> DCM	0.324	0.062	5.202	0.000
IB -> TAD	0.291	0.073	3.965	0.000
PUB -> DCM	0.254	0.070	3.613	0.000
PUB -> TAD	0.271	0.062	4.378	0.000
TAD -> DCM	0.138	0.069	1.995	0.024

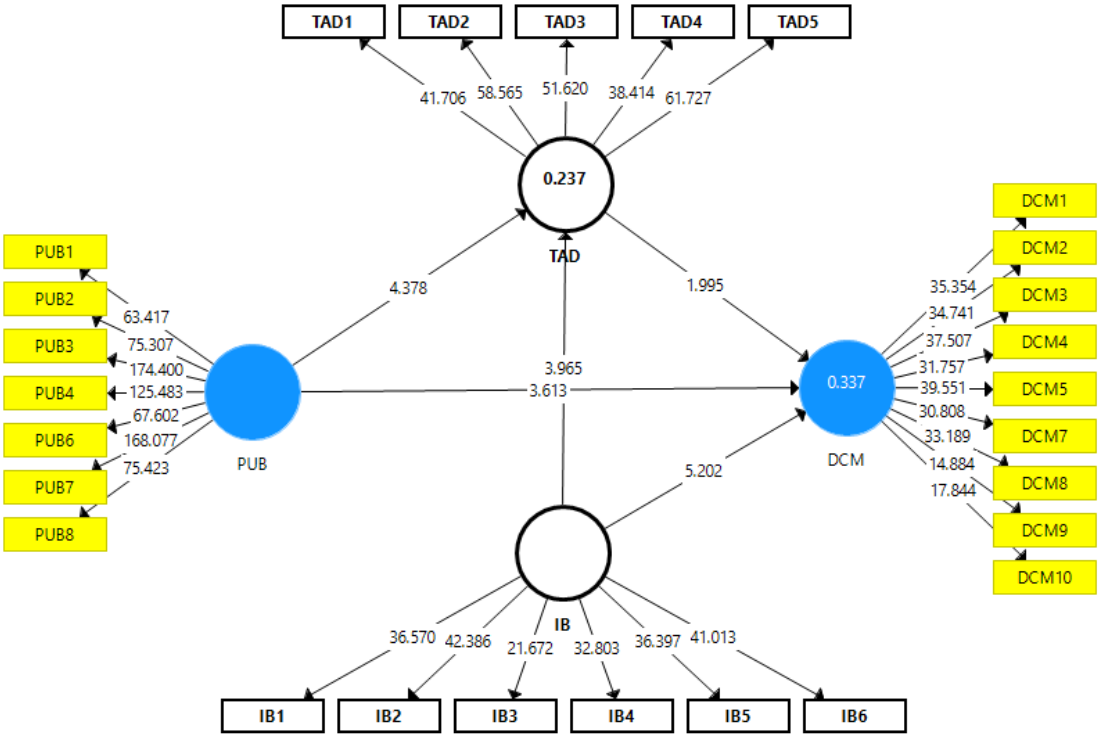


Figure 4: Structural Model Assessment

5. DISCUSSIONS

The results revealed that investors' behavior has a positive association with the digitalization of the capital market. These results are in line with the past study of

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

Hossnofsky et al. (2019). The study posits that the performance of the capital market depends on investors' behavior when the investors have good behaviors to know about the innovations, interact with the new technologies, and acquire the skills required for running that technology. In this way, the use of technologies within the capital market increases. These results also agree with the study of Chen et al. (2022), which highlights that when investors bring positivity to their behaviors while going to adopt new technology, it becomes possible to digitalize the capital market. The results revealed that investors' psychological unbiasedness has a positive association with the digitalization of the capital market. These results are in line with the past study of H. K. Kim et al. (2021), which explains that one of the great hurdles in technology adoption is the users' biasedness. Investors who are not the subject of psychological biasedness have a wide acceptance of novel technologies. It is the source of the digitalization of the capital market. These results also agree with the study of Škare et al. (2021), which shows that when investors have the least psychological biasedness, they can think freely about the ease and usefulness of technologies. This thinking encourages the digitalization of the capital market.

The results revealed that technological advancement is a significant mediator between investors' behavior and the digitalization of the capital market. These results are in line with the past study of Estrin et al. (2022), which claims that the positivity in investors' behavior about the usefulness and adoption of technologies encourages them to move towards technological advancement and this technological advancement leads to the digitalization of the capital market. These results also agree with the study of J. Wang et al. (2019), which states that technological advancement in a country is triggered by users' positive behaviors. Investors with positive behavior enhance technological advancement, which further assures the digitalization of the capital market. The results revealed that technological advancement is a significant mediator between investors' psychological unbiasedness and the digitalization of the capital market. These results are in line with the past study of Ricci et al. (2020). This literary workout states that the investors' psychological unbiasedness improves perception about technology use, and this allows technological advancement and, thereby, encourages the digitalization of the capital market. These results also agree with the study of Zaborovskaia et al. (2020), which highlights that investors' psychological unbiasedness motivates them to the adoption of technologies and encourages them to move towards technological advancement and this technological advancement leads to the digitalization of the capital market.

6. THEORETICAL IMPLICATIONS

The current study has guidelines for academics because it has a significant contribution to the literature. The study analyzes the influences of investors' behavior and psychological unbiasedness on the digitalization of the capital market. The previous literature has a discussion about the impacts of investors' behavior and psychological

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

unbiasedness on the digitalization of the capital market. But a single study has discussed the role of either the investors' behavior or the investors' psychological unbiasedness in the digitalization of the capital market. With the simultaneous analysis of these factors' relationship, the current study adds to the literature. One major contribution is to explore the mediating impacts of technological advancement between investors' behavior and psychological unbiasedness and the digitalization of the capital market. This study extends the literature in the sense that it analyzes investors' behavior and psychological unbiasedness role in the digitalization of the capital market for Indonesia.

EMPIRICAL IMPLICATIONS

This study has considerable significance to emerging economies like Indonesia. It addresses the critical issue of the economy in the contemporary era, which is the digitalization of the capital market. This study throws light on the ways to promote digitalization in the capital market that is a source of finance and its circulation. The study guides the economists and actors of the capital market in that they must struggle to develop positivity in investors' behavior towards different types of technology designed for communication, information and data management, and financial administration. This would be helpful in the digitalization of the capital market. It also suggests that psychological unbiasedness must be developed in investors to enhance the digitalization of the capital market. The study guides the policymakers in establishing policies related to the digitalization of the capital market by promoting the investors' behavior and psychological unbiasedness towards technology adoption. Furthermore, the study conveys that the policymakers and regulators should motivate the investors for positive behavior and psychological unbiasedness to promote technological advancement and digitalization of the capital market.

7. CONCLUSION

The objective of the study was to explore the influences of investors' behavior and psychological unbiasedness on the digitalization of the capital market. It was also to check what the role of technological advancement is in the association between investors' behavior, psychological unbiasedness, and digitalization of the capital market. The authors collected information on investors' behavior, investors' psychological unbiasedness, technological advancement, and digitalization of the capital market in Indonesia. They inferred that investors' behavior and psychological unbiasedness positively influence the digitalization of the capital market. The results showed that when the investors adopt a positive behavior toward the selection and use of modern technologies in order to perform their functions and achieve goals, the use of digital technologies increases within the capital market. The results also indicated that the investors have psychological unbiasedness, not only sticking to typical techniques of communication, information management, and financial management. But they are ready to accept novel technologies, and the actual adoption of technologies enhances the

Vol: 14 **No:** 2 **Year:** 2022 **ISSN**: 2146-0744 (Online) (**pp.** 350-368) **Doi:** 10.34109/ijebeg. 202214137

digitalization of the capital market. The results highlighted that technological advancement mediates the relationship between investors' behavior and psychological unbiasedness and the digitalization of the capital market. When the investors have positive behavior and psychological unbiasedness, there is demand and encouragement for technological advancements. The increasing technological advancements encourage the digitalization of the capital market.

8. LIMITATIONS

There are some limitations still associated with the current study. These limitations are likely to be removed in future literature, and the same study can be improved. This study examines only two factors, investors' behavior and psychological unbiasedness, which influence the digitalization of the capital market. As a result, the study is limited, and it is recommended that scholars they must explore more factors that have an influence on the digitalization of the capital market. Moreover, the results about the relationship of investors' behavior and psychological unbiasedness to the digitalization of the capital market are not general because the data were collected from the Indonesian capital market alone. In the future, authors must collect information about different economies for more valid and general results.

9. ACKNOWLEDGEMENT

This research was funded by the Directorate of Research, Technology and Community Service, Directorate General of Higher Education, Research and Technology, Ministry of Education, Culture, Research and Technology for the fiscal year 2022, Number SP DIPA-023.17.1.690523/2022 2nd revision, April 22nd, 2022.

REFERENCES

Ady, S. U. (2018). The Cognitive and Psychological Bias in Investment Decision-Making Behavior:(Evidence From Indonesian Investor's Behavior). *Journal of Economics and Behavioral Studies, 10*(1), 86-100. Retrieved from http://repository.unitomo.ac.id/id/eprint/888

Ady, S. U. (2019). Do Young Surabaya's Investors Make Rational Investment Decisions? *International Journal of Scientific & Technology Research, 8*(7), 319-322. Retrieved from http://repository.unitomo.ac.id/id/eprint/1880

Ady, S. U., Sudarma, M., Salim, U., & Aisyah, S. (2013). Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya). *IOSR (International Organization of Scientific Research)-Journal of Business and Management, 7*(3), 11-22. Retrieved from http://repository.unitomo.ac.id/id/eprint/228

Ady, S. U., Tyas, A. M., Farida, I., & Gunawan, A. W. (2020). Immediate and Expected Emotions Toward Stock Returns Through Overconfidence and Cognitive Dissonance: the Study Of Indonesian Investor Behavior. *PalArch's Journal of*

Archaeology of Egypt/Egyptology, 17(3), 1140-1165. Retrieved from https://archives.palarch.nl/index.php/jae/article/view/238

Bagheri, M., Mitchelmore, S., Bamiatzi, V., & Nikolopoulos, K. (2019). Internationalization orientation in SMEs: The mediating role of technological innovation. *Journal of International Management, 25*(1), 121-139. doi: https://doi.org/10.1016/j.intman.2018.08.002

Basrowi, & Utami, P. (2020). Building Strategic Planning Models Based on Digital Technology in the Sharia Capital Market. *J. Advanced Res. L. & Econ., 11*(3), 747. Retrieved from https://heinonline.org/HOL/LandingPage?handle=hein.journals/jarle11&div=83&id=&page=

Chen, W., Zhang, L., Jiang, P., Meng, F., & Sun, Q. (2022). Can digital transformation improve the information environment of the capital market? Evidence from the analysts' prediction behaviour. *Accounting & Finance, 62*(2), 2543-2578. doi: https://doi.org/10.1111/acfi.12873

Davoudi, A., Khozein, A., & Naderian, A. (2022). Investor Inclinations towards Capital Market: Recursive Analysis, Causes, and Factors. *Journal of Development and Capital*(2), 29-41. doi: https://doi.org/10.22103/jdc.2022.19575.1253

Espinosa-Méndez, C., & Arias, J. (2021). COVID-19 effect on herding behaviour in European capital markets. *Finance research letters, 38*, 101787. doi: https://doi.org/10.1016/j.frl.2020.101787

Estrin, S., Khavul, S., & Wright, M. (2022). Soft and hard information in equity crowdfunding: network effects in the digitalization of entrepreneurial finance. *Small Business Economics, 58*(4), 1761-1781. doi: https://doi.org/10.1007/s11187-021-00473-w

Feng, Y., Wang, X., & Liang, Z. (2021). How does environmental information disclosure affect economic development and haze pollution in Chinese cities? The mediating role of green technology innovation. *Science of The Total Environment, 775*, 145811. doi: https://doi.org/10.1016/j.scitotenv.2021.145811

Hamzah, H. (2018). Bilateral investment treaties (BITs) in Indonesia: A paradigm shift, issues and challenges. *Journal of Legal, Ethical and Regulatory Issues, 21*(4), 1-13. Retrieved from http://repository.lppm.unila.ac.id/id/eprint/8307

Hani, S., Heru, S. S., & Isworo, E. S. (2020). The effect of investment education and investment experience on investment decision with financial knowledge as intervening variable. *Russian Journal of Agricultural and Socio-Economic Sciences, 99*(3), 143-150. doi: https://doi.org/10.18551/rjoas.2020-03.16

Haque, M. Z., Qian, A., Hoque, M. R., & Lucky, S. A. (2022). A unified framework for exploring the determinants of online social networks (OSNs) on institutional investors' capital market investment decision. *Technology in Society, 70*, 102061. doi: https://doi.org/10.1016/j.techsoc.2022.102061

Hartani, N. H., Haron, N., & Tajuddin, N. I. I. (2021). The impact of strategic alignment on the sustainable competitive advantages: Mediating role of it implementation

success and it managerial resource. *International Journal of eBusiness and eGovernment Studies, 13*(1), 78-96. Retrieved from https://sobiad.org/menuscript/index.php/ijebeg/article/view/393

Hossnofsky, V., & Junge, S. (2019). Does the market reward digitalization efforts? Evidence from securities analysts' investment recommendations. *Journal of Business Economics, 89*(8), 965-994. doi: https://doi.org/10.1007/s11573-019-00949-y

Janse van Rensburg, C., Rothmann, S., & Diedericks, E. (2018). Job demands and resources: Flourishing and job performance in South African universities of technology settings. *Journal of Psychology in Africa, 28*(4), 291-297. doi: https://doi.org/10.1080/14330237.2018.1501881

Kalbhor, A., & Jagannathan, U. K. (2020). Bailard, biehl and kaiser five-way model and behavioural biases influencing individual investors' decisions in the Indian capital market. *Mudra: Journal of Finance and Accounting, 7*(2), 1-30. doi: http://dx.doi.org/10.17492/jpi.mudra.v7i2.722027

Khin, S., & Ho, T. C. F. (2020). Digital technology, digital capability and organizational performance. *International Journal of Innovation Science, 11*(2), 177-195. doi: https://doi.org/10.1108/IJIS-08-2018-0083

Kim, H. K., & Lee, C. W. (2021). Relationships among healthcare digitalization, social capital, and supply chain performance in the healthcare manufacturing industry. *International Journal of Environmental Research and Public Health, 18*(4), 1417. doi: https://doi.org/10.3390/ijerph18041417

Kim, O. (2020). Western-style capital market reforms in Russia: Implications for market efficiency and firms' financing decisions. *Risk Governance and Control: Financial Markets & Institutions, 10*(3), 62-74. doi: https://doi.org/10.22495/rgcv10i3p5

Kulathunga, K., Ye, J., Sharma, S., & Weerathunga, P. (2020). How does technological and financial literacy influence SME performance: Mediating role of ERM practices. *Information, 11*(6), 297. doi: http://dx.doi.org/10.3390/info11060297

Madaan, G., & Singh, S. (2019). An analysis of behavioral biases in investment decision-making. *International Journal of Financial Research, 10*(4), 55-67. Retrieved from https://d1wqtxts1xzle7.cloudfront.net/84194078/9807

P.H, H., & Uchil, R. (2020). Influence of investor sentiment and its antecedent on investment decision-making using partial least square technique. *Management Research Review, 43*(11), 1441-1459. doi: https://doi.org/10.1108/MRR-06-2019-0254

Parveen, S., Satti, Z. W., Subhan, Q. A., & Jamil, S. (2020). Exploring market overreaction, investors' sentiments and investment decisions in an emerging stock market. *Borsa Istanbul Review, 20*(3), 224-235. doi: https://doi.org/10.1016/j.bir.2020.02.002

Perwitasari, A. W., & Kusuma, I. H. (2020). Analysis of Investors' Perceptions of Rationality in the Indonesian Capital Market. *SEGMEN Jurnal Manajemen dan Bisnis, 16*(3).

Ricci, F., Scafarto, V., Ferri, S., & Tron, A. (2020). Value relevance of digitalization: The moderating role of corporate sustainability. An empirical study of Italian listed companies. *Journal of Cleaner Production, 276*, 123282. doi: https://doi.org/10.1016/j.jclepro.2020.123282

Shah, S. Z. A., Ahmad, M., & Mahmood, F. (2018). Heuristic biases in investment decision-making and perceived market efficiency. *Qualitative Research in Financial Markets, 10*(1), 85-110. doi: https://doi.org/10.1108/QRFM-04-2017-0033

Shahid, M. N., Aftab, F., Latif, K., & Mahmood, Z. (2018). Behavioral finance, investors' psychology and investment decision making in capital markets: an evidence through ethnography and semi-structured interviews. *Asia Pacific J. Emerg. Mark, 2*(1), 14. Retrieved from https://www.researchgate.net/profile/Muhammad-Shahid-28/publication/334760660

Shaik, M. B., Kethan, M., Jaggaiah, T., & Khizerulla, M. (2022). Financial Literacy and Investment Behaviour of IT Professional in India. *East Asian Journal of Multidisciplinary Research, 1*(5), 777-788. doi: https://doi.org/10.55927/eajmr.v1i5.514

Sima, V., Gheorghe, I. G., Subić, J., & Nancu, D. (2020). Influences of the industry 4.0 revolution on the human capital development and consumer behavior: A systematic review. *Sustainability, 12*(10), 4035. doi: http://dx.doi.org/10.3390/su12104035

Škare, M., & Soriano, D. R. (2021). A dynamic panel study on digitalization and firm's agility: What drives agility in advanced economies 2009–2018. *Technological Forecasting and Social Change, 163*, 1204-1219. doi: https://doi.org/10.1016/j.techfore.2020.120418

Sol, C. (2022). *Unbiased Investor: Reduce Financial Stress and Keep More of Your Money*: John Wiley & Sons. Retrieved from https://books.google.co.in/books?hl=en&lr=&id=ze-KEAAAQBAJ&oi=fnd&pg=PR1&dq=Sol,+C

Spindler, G. (2019). Digitalization and corporate law–a view from Germany. *European Company and Financial Law Review, 16*(1-2), 106-148. doi: https://doi.org/10.1515/ecfr-2019-0009

Stanovich, K. E., & Toplak, M. E. (2019). The need for intellectual diversity in psychological science: Our own studies of actively open-minded thinking as a case study. *Cognition, 187*, 156-166. doi: https://doi.org/10.1016/j.cognition.2019.03.006

Susilawati, E., Khaira, I., & Pratama, I. (2021). Antecedents to student loyalty in Indonesian higher education institutions: the mediating role of technology

innovation. *Educational Sciences: Theory & Practice*, *21*(3), 40-56. Retrieved from https://jestp.com/index.php/estp/article/view/1461

Uddin, S. S., Islam, A. M., & Rahat, M. R. (2021). Necessity of digitalization in the capital market of developing countries in current pandemic situation: The case of Bangladesh. In *The Digitalization of Financial Markets* (pp. 38-56): Routledge, 38-56. Retrieved from https://www.taylorfrancis.com/chapters/edit/10.4324/9781003095354-3.

Upadhayay, D. (2019). A Study on Behavioral Finance in Investment Decisions of Investors in Ahmedabad. *IJNRD-International Journal of Novel Research and Development (IJNRD)*, *4*(7), 103-114?>-103-114?>. Retrieved from https://www.ijnrd.org/papers/IJNRD1907016.pdf

Valverde, S. C., & Fernández, F. R. (2020). Financial digitalization: banks, fintech, bigtech, and consumers. *Journal of Financial Management, Markets and Institutions*, *8*(01), 2040001. doi: https://doi.org/10.1142/S2282717X20400010

Wang, H., Yuan, H., Li, X., & Li, H. (2019). The impact of psychological identification with home-name stocks on investor behavior: An empirical and experimental investigation. *Journal of the academy of marketing science*, *47*(6), 1109-1130. doi: https://doi.org/10.1007/s11747-019-00677-3

Wang, J., Xie, Z., Li, Q., et al. (2019). Effect of digitalized rumor clarification on stock markets. *Emerging Markets Finance and Trade*, *55*(2), 450-474. doi: https://doi.org/10.1080/1540496X.2018.1534683

Youssef, A. B., Boubaker, S., Dedaj, B., & Carabregu-Vokshi, M. (2021). Digitalization of the economy and entrepreneurship intention. *Technological Forecasting and Social Change*, *164*, 120043. doi: https://doi.org/10.1016/j.techfore.2020.120043

Zaborovskaia, O., Nadezhina, O., & Avduevskaya, E. (2020). The impact of digitalization on the formation of human capital at the regional level. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 184. doi: https://doi.org/10.3390/joitmc6040184

Żebrowska-Suchodolska, D., & Mentel, G. (2018). Testing Market Efficiency: Empirical Investigation of Polish Capital Market. *International Journal of Business & Society*, *19*(3), 699-708. Retrieved from http://www.ijbs.unimas.my/images/repository/pdf/Vol19-no3-paper9.pdf

EFFECTS OF CEO INCENTIVES AND CORPORATE SOCIAL RESPONSIBILITIES ON FINANCIAL PERFORMANCE

Ady S.U., Mohamad S., Pantamee A.A., Keong O.C. Hieu V.M., Chong K.W.*

Abstract: Banking financial performance is necessary for economic growth globally because the banking sector is the backbone of the economy. Recent economic uncertainty requires examining the banking sector's financial performance and improving accordingly. The present research, thereby, aims to scrutinize the influence of chief executive officers (CEO) incentives, corporate social responsibilities (CSR) such as social and environmental responsibilities, liquidity, and capital structure on the banking financial performance in ASEAN countries. Data from the hundred commercial banks (ten from each country) were taken in the time period of 2016-2020. Moreover, fixed effect model (FEM) was applied to test the association between the constructs. The findings revealed that the CEO incentives, social and environmental responsibilities, liquidity and capital structure are positively and significantly associated with banking financial performance in ASEAN countries. The regulators get help from the current study in formulating the regulation related to the banking sector performance by focusing on the CEO incentives and CSR responsibilities.

Key words: CEO incentives, corporate social responsibilities, banking financial performance, liquidity

DOI: 10.17512/pjms.2022.25.2.01

Article history:
Received April 03, 2022; *Revised* May 05, 2022*; Accepted* June 16, 2022

Introduction

In recent times, the concept of corporate governance, as well as corporate social responsibility, is accelerating at a rapid pace in the world and all the industries, including the banking sector. This is all because of globalisation and social development appeals in the firms. Firms all around the globe are practising CSR to improve their social and environmental performance. CSR differs from firm to firm and country to country according to the need. Different factors impact the banking sector's reputation but inform, but in the past few times, it has also been witnessed that the banking system's reputation is improving as a result of CSR (Twum, Kosiba, Abdul-Hamid, & Hinson, 2022). In CSR, the firm supports the society through different means like financially etc. Thus, CSR connects the firms with the community. Accordingly, CSR results in the betterment of the banking sector's

*__Sri Utami Ady,__ Economic and Business Faculty, University of Dr. Soetomo, Indonesia, __Shafi Mohamad, Abdurrahman Adamu Pantamee, Ooi Chee Keong,__ School of Accounting and Finance, Faculty of Business and Law, Taylor's University Malaysia, __Vu Minh Hieu__, Faculty of Business Administration, Van Lang University, Vietnam __Kwong Wing Chong,__ School of Professional Studies, Taylor's College, Subang Jaya, Selangor, Malaysia.
✉ corresponding author: hieu.vm@vlu.edu.vn

reputation. The CSR of any firm is decided by the governing body of the firm. Here corporate governance plays its role. The world has been witnessing financial discrepancies over the past few decades, enhancing corporate governance's importance. The governments of the countries pay special attention to corporate governance, especially in the financial sector like banking etc. Although all the financial intuitions play a vital role in the country's economy, banking system is considered the key to being directly associated with the community. Corporate governance and Corporate Social Responsibility (CSR) in banks have grown in popularity worldwide. Banks from around the globe now support educational, cultural, and environmental efforts, as well as health initiatives, by recognizing CSR. Furthermore, they carry out sponsorship campaigns for disadvantaged communities and philanthropic charity organizations. Thus, there is a core need to investigate this nexus of CG and CSR, especially in the banking sector.

The banking sector of any country is almost the backbone of the country's economy. Similar is the case with ASEAN. As ASEAN is a combination of developing and developed nations, most of them are developing countries. There is a huge difference between ASEAN nations in terms of language, level of development, population size, related religion, and legal requirements. The performance of the country's economy can be predicted from the banking sector of the country. Further, especially the financial sector of the country reflects the well-being of the community by analyzing its CS activities. The more the firms involved in CSR activities, the more the chances the society is getting its benefit. Usually, the firm avoids practicing CSR activities. The corporate body of the company is the ultimate responsibility for designing the company policies (Twum et al., 2022). Forgoing in view: the ASEAN can be an interesting area for research in terms of the financial sector. Thus, the aim of the present study is to investigate the CSR and CG effect on the banking sector of all the countries of ASEAN.

The present study will address some gaps that exist in the literature like 1) being one of the important topics like corporate governance along with corporate social responsibility in the banking sector although researched although but still not reached its peak, 2) Ruiz and García (2021), worked on the corporate social responsibility in banking system whereas the present study will also work on corporate social responsibility with addition of CEO incentives in all the economies of ASEAN, 3) Nguyen and Nguyen (2020), worked on the corporate social responsibility perception in online banking system whereas the present study will work on corporate social responsibility with addition of CEO incentives in whole banking industry of ASEAN, 4) Tulcanaza-Prieto, Shin, Lee, and Lee (2020), worked on corporate social responsibility in financial and non-financial institutions whereas the present study will test the corporate social responsibility and CEO incentives effect in ASEAN banking system with a new data set, 5) the present study will check the model from ASEAN perspective with new data set, 6) Boyallian and Ruiz-Verdú (2018), CEO incentives and banking system whereas the present study will add the variable like corporate social responsibility and test the model with new

data set in ASEAN. The significance of the study are to 1) highlight the importance of corporate governance and corporate social responsibility for the betterment of the ASEAN banking system, 2) help professional to revamp their policies for the better controlling of corporate governance and implementation of corporate social responsibility in the banking system, and 3) help the researchers to identify and explore the more aspects of corporate governance and corporate social responsibility from a banking point of view.

Literature Review

CEO incentives and return on equity

Financial performance has been the main objective and motive of every company for the past few decades. The world has acknowledged the reservations of business individuals who are taking various measures and feasibilities to earn more return on their invested capital. In this context: Mersland, Beisland, and Pascal (2019) examined the origin and performance of chief executive officers that are more important and an asset to the hybrid businesses. For the achievement of desired objectives, the role of business owners could not be neglected, and the role of directors is also promotive. Thus, Altarawneh, Shafie, Ishak and Ghaleb (2022) discussed the relationship between discretionary accruals, incentives and characteristics of chief executive officers and their roles in an emerging economy. Additionally, Huang, Sadiq, and Chien (2021) analyzed the narrowing gender pay and shattered glass for the salaries and incentives related to chief executives that impact the return on equity. For this purpose, the chief executive officers are given incentives for their working achievements. These incentives are considered motivations for the chief executive officers who strive hard in the companies to achieve their goals. The desired incentives given to the chief executive officers could create a promotive environment for the employees and companies. This incentive technique not only raises the company's wealth but also raises the higher return on their equity. Return on equity is specifically influenced by the meaningful growth as well as the strategies applied by the elected chief executive officers (Hartani, Haron, & Tajuddin, 2021).

H1: There is a relationship between CEO initiatives and return on equity

Social responsibilities and return on equity

The growing importance of companies over the past few years has retained the ramping up their emphasis focus on social responsibility. Social responsibility in any organization tends to be a major objective for achieving the desired objectives. These objectives are more precisely dependent on the amount that has been invested in the organizations. Therefore, Y. Li, Chiu, Wu, Li, and Lin (2021), enumerated the efficiency of company management according to the dynamic social responsibility perspective for returns. These amounts are also dependent on the structure of social responsibilities, which must be performed by the organizational members. Mostly the members and staff of the companies are responsible for maintaining the social responsibility in an organization. Thought, Twum et al. (2022) investigated the

importance of corporate social responsibility in enhancing political marketing that could create higher returns. Return on equity is the main element upon which every company applies its social elements to perform best. In pursuing the goals and objectives, the business obligations assert some social responsibilities. Various projects are established and organized in the organizations which entail the social responsibilities of their staff and owners. These staff and owners basically strive according to the safety and higher returns on their equity. Customer social responsibility is the main element in the company that help the social environment to retain its customers as well as its employees. It is dependent on the invested equity, which more likely attracts the talent that can perform improvingly for more productive approaches (Hamsal, Ichsan, Utomo, Fahira & Wetik, 2021) .

H2: There is a relationship between social responsibilities and return on equity

Environmental responsibilities and return on equity

Environmental responsibilities trend in the corporate environment with significant and better values that improve the relationships with stakeholders. Usually, the stakeholders are more suspicious about their return from the invested equity in their businesses. Therefore, the companies are mostly required to maintain their environment according to the public and competitive environment demands. In this context, Chien, Hsu, Ozturk, Sharif, and Sadiq (2022), elaborated on the relationship between environmental responsibility and board of directors' globalization and its contribution toward return on equity. The companies that are organized according to the return on equity could perform better than the expected returns. In order to achieve a better and splendid return from equity, the sustainability and maintainability of the environment are compulsory. Thus, Wang and Wang (2019) discussed the linkage between corporate environmental responsibility, local economic priority and state-enterprise relations that is important for return on equity. Mostly, the banking environment is best organized according to the competitive environment to last significant impact on the moods of customers. Those customers that are highly influenced by the mood and need attainment according to the required environment results in better return from equity. Therefore, Olkkonen (2018) assessed the business, corporate and journalistic responsibilities and their implication for attaining and finishing return on equity. Similarly, Atilgan, Demirtas, and Gunaydin (2021) investigated the predicted returns on equity that have certain impacts on emerging market environments. Therefore, the reduction of financial costs in a competitive environment, less use of energy over the market and more energy over the environment could benefit the return. Huge returns are expected by organizing the environmental responsibilities in organizations. Effective policies and maintaining environmental responsibilities approach are progressive for the more return on equity.

H3: There is a relationship between environmental responsibilities and return on equity

Liquidity and return on equity

The world has started using the feasible elements, which are important for easy and growing return on equity. Liquidity refers to the elements easily convertible into cash and liquid money that directly impact the return. In this context, Kontuš and Mihanović (2019) analyzed the relationship between the management of liquid assets and liquidity in SMEs and their returns on equity. When the banking companies and organizations lack returns, they usually invest the liquid capital into markets for better and fast returns from the market. It also refers to the efficiency of an asset and security that directly impacts the return, and efficaciously, the return on equity attains higher performance from the banking markets. Thus, Dutto Giolongo and Carlevaro (2019) investigated the provisions and demands of liquidity in the banking systems and its impact on the returns. Most of the banking sector uses liquid elements which are easily acquirable and easily applicable to the market for retaining higher profits. From the applicability of liquidity, the returns and market performance gain higher growth in a short period. Therefore, Toh, Gan, and Li (2019) revisited the impacts of liquidity with the creation of liquidity creation and its contribution toward the uplifting of return on equity. Finally, the dividends among investors and payouts induce a return on equity and liquidity. In other words, the assets and things that are easily moveable and easily bought and sold retain and reflect more intrinsic value in the market. This relates to the collectables, fine art and financial assets that are relatively more important in the eyes of companies than real estate (Widodo & Hayu, 2021).

H4: There is a relationship between liquidity and return on equity

Debt to equity and return on equity

In every organization, the risk is associated with the return, and higher debts always exist with a higher return in the organizations. Some companies invest more in the setups to attain higher performance and higher returns, and the capital structure is more important for this. Therefore, Soyeh, Kim, and Gyamfi-Yeboah (2021) discussed the role and impacts of debt inequity on the values of net assets in return. When the companies avail more debt from the financing institutions, the policies and rules of investments involve higher risks. These risks, however, are important in the devaluation of ownership structure and value in the market due to higher debt but somehow also refer to high profits. It is dependent on the cash flows of companies that are more frequent in investing and earning more profits with the investment of equity. Additionally, Liu et al. (2021) elaborated on the impact of debt transmission and external sovereignty on the interest rate and equity market. Anyhow, equity refers to the capital, which has been invested by the banking companies, but most of the capital belongs to the loans. These loans induce a greater risk of insolvency and bankruptcy, but the efficacious settlements and arrangement of capital in a short time could eliminate the risks of insolvency. The debt to equity ratio also refers to and indicates that the company's debts actually belong to the shareholders' values. These shareholders are the main owner of a company due to their investment that actually depicts the debt to equity.

H5: There is a relationship between Debt to equity and return on equity

Research Methodology

The research examines the impact of CEO incentives, social and environmental responsibilities, liquidity, and capital structure on the banking financial performance in ASEAN countries. The current research has extracted the data from the hundred commercial banks (ten from each country) from 2016 to 2020. The present article has applied the FEM to test the association between the constructs. The equation of the article with understudy constructs is given below:

$$ROE_{it} = \alpha_0 + \beta_1 CEOI_{it} + \beta_2 SR_{it} + \beta_3 ENR_{it} + \beta_4 LQ_{it} + \beta_5 DE_{it} + e_{it} \quad (1)$$

Where ROE stands for return on equity, CEOI means chief executive officers' incentives, SR stands for social responsibilities, ENR means environmental responsibilities, LQ stands for liquidity, and DE stands for debt to equity (capital structure).

The current research has taken the banking financial performance as the predictive variable measured as the return on equity (ROE) (Pointer & Khoi, 2019). Moreover, the current article has used three predictors such as CEO incentives measured as the ratio of CEO incentives to total incentives (Sadiq, Mohamad, & Kwong, 2019), social responsibilities measured as the ratio of expenditures on social activities (Nuseeb et al., 2021; Raju & Rangaswamy, 2017), and total expenditures and environmental responsibilities measured as the ratio of expenditures on environmental activities and total expenditures (Khan, Zhang, Kumar, Zavadskas, & Streimikiene, 2020). Finally, two control variables have been used: liquidity, measured as the ratio of current assets to current liabilities (Husna & Satria, 2019), and capital structure, measured as the ratio of debts and equity.

Research Results

The current research has examined the correlation matrix, highlighting the directional linkage among variables. The results revealed that the CEO incentives, social and environmental responsibilities, liquidity and capital structure are positively and significantly associated with banking financial performance in ASEAN countries. Table 1 presents the correlation matrix.

Table 1. Matrix of correlations.

Variables	ROE	CEOI	SR	ENR	LQ	DE
ROE	1.000					
CEOI	0.382	1.000				
SR	0.522	0.333	1.000			

ENR	0.432	-0.532	0.311	1.000		
LQ	0.653	0.372	0.543	2.833	1.000	
DE	0.400	0.553	0.182	3.711	2.983	1.000

Moreover, the research also investigates the multicollinearity assumption using VIF. The results indicated that the VIF values are not bigger than five and that the reciprocal of VIF values is bigger than 0.20. These values indicated that no multicollinearity exists. Table 2 presents VIF results.

Table 2. VIF.

	VIF	1/VIF
ROE	2.382	0.420
CEOI	3.102	0.322
SR	1.321	0.757
ENR	3.209	0.304
LQ	1.994	0.502
DE	3.773	0.265
Mean VIF	2.630	.

In addition, the article has also applied the Hausman test to check the suitable model. The findings indicated that the probability value is less than 0.05 and that the FEM model is appropriate because the null hypothesis related to the random-effect model is appropriate and is rejected. Table 3 presents the Hausman test results.

Table 3. Hausman test.

	Coef.
Chi-square test value	4.352
P-value	0.012

The results of FEM have revealed that the CEO incentives, social and environmental responsibilities, liquidity and capital structure have a positive and significant association with banking financial performance in ASEAN countries. In addition, R square 0.612 indicated that the 61.2 per cent changes in the ROE are due to CEO incentives, social and environmental responsibilities, liquidity and capital structure. Table 4 presets the FEM results.

Table 4. Fixed effect model.

ROE	Beta	S.D.	t-value	p-value	L.L.	U.L.	Sig
CEOI	3.873	1.214	3.190	0.012	0.873	2.992	**

SR	2.353	0.922	2.552	0.029	0.933	2.982	**
ENR	0.986	0.431	2.288	0.043	0.103	1.982	**
LQ	0.699	0.181	3.862	0.006	1.992	3.992	**
DE	1.948	0.499	3.904	0.003	1.002	3.209	**
Constant	6.200	2.916	2.126	0.048	1.146	2.102	**
R-sq		0.612	**Number of obs**				500
F-test		3.200	**Prob > F**				0.011

Source: Authors estimations.

Discussion

The present study aims to evaluate the CEO incentives and corporate social responsibility's role on banking financial performance. Findings revealed that CEO incentives positively impact return on equity, which determines financial performance. These results show consistency with Velte (2019), which explains that the business firms, where CEO is given particular incentives like performance compensation, bonuses, extra salary, and handsome salary increment, show much serious behavior towards the improvement in firms' performance and take an active role in improving businesses, raising marketing for the products and services, and enhancing the rate of profitability. So, an increase in CEO incentives enhances return on equity. The results showed that social responsibilities positively impact return on equity, which determines financial performance. These results are supported by Siueia, Wang, and Deladem (2019), which throws light on the social responsibilities' contribution to firm financial performance. The study implies that when firms are engaged in considering and meeting the responsibilities by law or ethically imposed on them, they can improve their reputation in society and raise marketing. So, profitability increases, leading to higher financial performance. These results are also in line with Oyewumi, Ogunmeru, and Oboh (2018), which highlight that the return on equity increases when firms fulfill their social responsibilities honestly as in such situation, the same variables give more productivity (Ewa Jadwiga Lipińska, 2021). The results indicated that environmental responsibilities positively impact return on equity, which determines bank financial performance. These results are supported by Fijałkowska, Zyznarska-Dworczak and Garsztka (2018), which posits that the business enterprises involved in the banking sector or others have to take care of the environmental quality while making any decision about the infrastructure, transportation activities and other technologies. If the enterprises meet their environmental responsibilities, they enjoy more return on equity because of increased reputation and marketing. These results are also supported by Nizam, Ng, Dewandaru, Nagayev, and Nkoba (2019), highlighting that fulfilling environmental responsibilities reduces pollution emissions, and a clean work environment enhances return on equity. The results revealed that liquidity positively impacts return on

equity, which shows financial performance. Effective business plans lead the firms to achieve a high return on equity. These results are supported by Ullah, Pinglu, Ullah, Zaman, and Hashmi (2020), which reveal that the debt-to-equity ratio shows how much the value of the total liabilities is against the firms' total equity. This represents the leverage power of the firm. The increase in debt-to-equity ratio means they can put large finances into the business and expand its marketing, which brings more profits. Hence, an increase in the debt-to-equity ratio enhances the return on equity.

Conclusion

The study has large theoretical implications because of its contribution to economic literature. The current study examines the banks' financial performance and uses return on equity to measure financial performance. Moreover, the authors check the impacts of CEO incentives, social responsibilities, environmental responsibilities, liquidity, and debt-to-equity ratio on return on equity in ASEAN countries. The study has much empirical significance in the rapidly emerging economies as it addresses the financial performance of enterprises operating in the banking sector, which has backbone importance in any economy. The study provides a guideline to economists on how they can promote banking practices within the country and the management of business firms by suggesting that the banks' financial performance can be increased by increasing CEO incentives, implementing social and environmental responsibilities, and increasing liquidity and debt-to-equity ratio. The results indicated that the banks where CEOs are granted incentives try their best to carry the business operations in the right way, reducing the risks, finding opportunities, and enhancing the business profitability. Similarly, fulfilling environmental responsibilities reduces pollution emissions and assures quality environment and productivity, ultimately enhancing return on equity. The results indicated that banks with high liquidity and debt-on-equity ratio could better finance banking practices and achieve a higher return on equity.

The current study has some limitations despite its theoretical and empirical importance. These limitations are likely to be removed in future literature. The present study examines the impact of limiting factors like CEO incentives, social responsibilities, environmental responsibilities, liquidity and debt-to-equity ratio on return on equity. The use of limited factors having a similar nature makes this study limited in reliability. Future authors are recommended to enhance the number of factors for a more comprehensive study. The study is based on the data acquired from ASEAN economies which are limited in number and have specific banking policies. For a general study, authors must collect information from countries worldwide.

References

Altarawneh, M., Shafie, R., Ishak, R. and Ghaleb, B. A. A., (2022). Chief executive officer characteristics and discretionary accruals in an emerging economy. *Cogent Business & Management, 9*(1), 2024117.

Atilgan, Y., Demirtas, K. O. and Gunaydin, A. D., (2021). Predicting Equity Returns in Emerging Markets. *Emerging Markets Finance and Trade, 57*(13), 3721-3738.

Boyallian, P., Ruiz-Verdú, P., (2018). Leverage, CEO risk-taking incentives, and bank failure during the 2007–10 financial crisis. *Review of Finance, 22*(5), 1763-1805.

Chien, F., Hsu, C.-C., Ozturk, I., Sharif, A. and Sadiq, M., (2022). The role of renewable energy and urbanization towards greenhouse gas emission in top Asian countries: Evidence from advance panel estimations. *Renewable Energy, 186*, 207-216.

Dutto Giolongo, M. L., Carlevaro, E. A., (2019). Liquidity Provision on Demand in the Argentine Banking System. *Emerging Markets Finance and Trade, 55*(3), 634-654.

Fijałkowska, J., Zyznarska-Dworczak, B. and Garsztka, P., (2018). Corporate social-environmental performance versus financial performance of banks in Central and Eastern European countries. *Sustainability, 10*(3), 772-793.

Hamsal, M., Ichsan, M., Utomo, A. R., Fahira, A. A. and Wetik, R. E., (2021). The Relationship Analysis Between Knowledge & Skills, Organizational Drivers, and Perceived Success in Implementation of Agile Project Management: Case Study of PT XYZ. *International Journal of Operations and Quantitative Management, 27*(2), 111-126.

Hartani, N. H., Haron, N. and Tajuddin, N. I. I., (2021). The impact of strategic alignment on the sustainable competitive advantages: Mediating role of it implementation success and it managerial resource. *International Journal of eBusiness and eGovernment Studies, 13*(1), 78-96.

Huang, S.-Z., Sadiq, M. and Chien, F., (2021). The impact of natural resource rent, financial development, and urbanization on carbon emission. *Environmental Science and Pollution Research, 28*(1), 1-13.

Husna, A., Satria, I., (2019). Effects of return on asset, debt to asset ratio, current ratio, firm size, and dividend payout ratio on firm value. *International Journal of Economics and Financial Issues, 9*(5), 50-61.

Khan, S. A. R., Zhang, Y., Kumar, A., Zavadskas, E. and Streimikiene, D., (2020). Measuring the impact of renewable energy, public health expenditure, logistics, and environmental performance on sustainable economic growth. *Sustainable development, 28*(4), 833-843.

Kontuš, E., Mihanović, D., (2019). Management of liquidity and liquid assets in small and medium-sized enterprises. *Economic Research-Ekonomska Istraživanja, 32*(1), 3247-3265.

Li, Y., Chiu, Y.-H., Wu, M., Li, Y. and Lin, T.-Y. (2021). Chinese liquor company management efficiency from a social responsibility perspective: a two stage dynamic directional distance function. *Economic Research-Ekonomska Istraživanja, 34*(1), 2085-2114.

Mersland, R., Beisland, L. A. and Pascal, D., (2019). The Origin of Chief Executive Officers and Performance in Hybrid Businesses: The Case of Microfinance. *Journal of Small Business Management, 57*(4), 1578-1594.

Nguyen, V. A., Nguyen, T. P. T., (2020). An integrated model of CSR perception and TAM on intention to adopt mobile banking. *The Journal of Asian Finance, Economics, and Business, 7*(12), 1073-1087.

Nizam, E., Ng, A., Dewandaru, G., Nagayev, R. and Nkoba, M. A., (2019). The impact of social and environmental sustainability on financial performance: A global analysis of the banking sector. *Journal of Multinational Financial Management, 49*, 35-53.

Olkkonen, L., (2018). Separation or integration of journalistic and business responsibilities? Corporate responsibility in Finnish media companies. *Journal of Media Business Studies, 15*(3), 169-187.

Oyewumi, O. R., Ogunmeru, O. A. and Oboh, C. S., (2018). Investment in corporate social responsibility, disclosure practices, and financial performance of banks in Nigeria. *Future Business Journal, 4*(2), 195-205.

Pointer, L. V., Khoi, P. D., (2019). Predictors of return on assets and return on equity for banking and insurance companies on Vietnam stock exchange. *Entrepreneurial Business and Economics Review, 7*(4), 185-198.

Raju, K., Rangaswamy, S., (2017). Forecasting volatility in the Indian equity market using return and range-based models. *Applied Economics, 49*(49), 5027-5039.

Ruiz, B., García, J. A., (2021). Analyzing the relationship between CSR and reputation in the banking sector. *Journal of Retailing and Consumer Services, 61*, 102552.

Sadiq, M., Mohamad, S. and Kwong, W. C. G., (2019). Do CEO Incentives mediate the relationship between political influences and financial reporting quality? *International Journal of Asian Social Science, 9*(3), 276-284.

Siueia, T. T., Wang, J. and Deladem, T. G., (2019). Corporate Social Responsibility and financial performance: A comparative study in the Sub-Saharan Africa banking sector. *Journal of Cleaner Production, 226*, 658-668.

Soyeh, K. W., Kim, D. and Gyamfi-Yeboah, F., (2021). The Role of Debt in REIT Equity Issuance at a Discount to Net Asset Values. *Journal of Real Estate Research, 43*(2), 226-247.

Toh, M. Y., Gan, C. and Li, Z., (2019). Revisiting the Impact of Stock Market Liquidity on Bank Liquidity Creation: Evidence from Malaysia. *Emerging Markets Finance and Trade, 55*(8), 1776-1802.

Tulcanaza-Prieto, A. B., Shin, H., Lee, Y. and Lee, C. W., (2020). Relationship among CSR Initiatives and Financial and Non-Financial Corporate Performance in the Ecuadorian Banking Environment. *Sustainability, 12*(4).

Twum, K. K., Kosiba, J. P., Abdul-Hamid, I. K. and Hinson, R., (2022). Does Corporate Social Responsibility Enhance Political Marketing? *Journal of Nonprofit & Public Sector Marketing, 34*(1), 71-101.

Velte, P., (2019). Does CEO power moderate the link between ESG performance and financial performance? A focus on the German two-tier system. *Management Research Review, 43*(5), 497-520.

Wang, X., Wang, L., (2019). State-enterprise relation, local economic priority, and corporate environmental responsibility. *Applied Economics, 51*(10), 995-1009.

Widodo, S., Hayu, R. S., (2021). The role of performance and new services development on sustainable competitive advantage in Indonesian private universities. *International Journal of eBusiness and eGovernment Studies, 13*(1), 117-141.

WPŁYW ZACHĘT DLA DYREKTORÓW GENERALNYCH I SPOŁECZNEJ ODPOWIEDZIALNOŚCI BIZNESU NA WYNIKI FINANSOWE

Streszczenie: Wyniki finansowe banków są niezbędne dla wzrostu gospodarczego na świecie, ponieważ sektor bankowy jest kręgosłupem gospodarki. Ostatnia niepewność gospodarcza wymaga zbadania wyników finansowych sektora bankowego i odpowiedniej poprawy. Niniejsze badanie ma zatem na celu zbadanie wpływu zachęt dyrektorów generalnych (CEO), odpowiedzialności społecznej przedsiębiorstw (CSR), takich jak odpowiedzialność społeczna i środowiskowa, płynność i struktura kapitału na wyniki finansowe banków w krajach ASEAN. Dane ze stu banków komercyjnych (po dziesięć z każdego kraju) zostały zebrane w okresie 2016-2020. Ponadto zastosowano model efektów stałych (FEM) do testowania powiązania między konstruktami. Wyniki ujawniły, że zachęty dla dyrektorów generalnych, obowiązki społeczne i środowiskowe, płynność i struktura kapitału są pozytywnie i znacząco powiązane z wynikami finansowymi banków w krajach ASEAN. Regulatorzy uzyskują pomoc z obecnego badania w formułowaniu regulacji związanych z funkcjonowaniem sektora bankowego, koncentrując się na zachętach dla prezesów i obowiązkach CSR.

Słowa kluczowe: zachęty dla dyrektorów generalnych, społeczna odpowiedzialność biznesu, wyniki finansowe banków, płynność

CEO 激励和企业社会责任对财务绩效的影响

摘要：银行业的财务业绩对于全球经济增长是必要的，因为银行业是经济的支柱。最近的经济不确定性需要检查银行业的财务表现并相应地改进。因此，本研究旨在审查首席执行官 (CEO) 激励措施、企业社会责任 (CSR) 如社会和环境责任、流动性和资本结构对东盟国家银行业财务业绩的影响。 100 家商业银行（每个国家 10 家）的数据取自 2016-2020 年期间。此外，应用固定效应模型（FEM）来测试结构之间的关联。调查结果显示，CEO 激励、社会和环境责任、流动性和资本结构与东盟国家的银行财务业绩呈正相关且显着相关。监管机构从当前的研究中获得帮助，通过关注 CEO 激励和 CSR 责任来制定与银行业绩效相关的监管

关键词: CEO激励, 企业社会责任, 银行财务绩效, 流动性

ARTICLE

Check for updates

INVESTMENT DECISION-MAKING UNDER COVID-19 PANDEMIC PRESSURE BASED ON DEMOGRAPHIC VARIABLES

Mohammad Tomi Adi SURYA, Sri Utami ADY*

Management Study Program, Faculty of Economics and Business, University Dr. Soetomo, Indonesia.
**Corresponding author (sri.utami@unitomo.ac.id)*

PUBLISHED: 26/09/2022 Accepted: 19/09/2022 Submitted: 25/08/2021

CITE THIS PAPER:

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" *Journal of World Economy: Transformations & Transitions (JOWETT)* 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

ABSTRACT

The covid-19 Pandemic has made many people work from home to have much time to trade in the capital market. Through the "Yuk Nabung Saham" program, Indonesia Stock Exchange (IDX) tries to introduce the capital market to young investors through a partnership with the university. This study aimed to analyze the effect of demographic variables (age, gender, and experience) on investment decision-making through risk perceptions and risk attitudes in the Indonesia Stock Exchange under the Covid-19 pandemic pressure. Used SEM-PLS analysis with Mediation effects, 160 Surabaya's Investors as respondents analyzed. This study showed that age, gender, and experience affect investment decision-making through risk perception and risk attitude. In the Covid-19 pandemic, market conditions were very dynamic and erratic, resulting in investors' perceptions and risk attitudes changing, thus changing their behaviour to become more speculative and reactive to take advantage of the market. Students' respondents were currently young investors who may not yet have mature financial capabilities, so they had behaviour with a high psychological bias. But in the next ten years, these investors would have grown into professional investors who strengthened the Indonesia Stock Exchange.

KEYWORDS

Investment decision-making; demographic variables; risk perception; risk attitude, COVID-19, Indonesia.

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

1. INTRODUCTION

At the beginning of 2020, there was a Covid-19 pandemic outbreak that hit the world. This pandemic has had an impact on all sectors, especially the economy. One reflection of the Covid-19 pandemic effects is visible in capital markets worldwide, including Indonesia. The Indonesian capital market is more volatile and uncertain than a developing market.

The widespread financial spread of the Covid-19 pandemic has become a negative sentiment affecting the global market. That caused investors to exit the domestic financial market, primarily stocks and government securities (SBN). According to data from Johns Hopkins University, the virus spread from Wuhan, China, until March 27, 2020, had infected more than 531 thousand people in 175 countries (Sidik, 2020).

The Financial Service Authority (FSA) noted that from early March 2020 to March 24, 2020, investors were leaving the stock market, and SBN amounted to Rp.6.11 trillion Rp. 98.28 trillion, respectively. The total funds that came out of the Indonesian capital market reached Rp. 104.39 trillion. Under these conditions, the stock market weakened significantly by 27.79% Month to date or 37.49% Year to date to 3,937.6, followed by a weakening in the SBN market with average yields rising by 118.8 bps Month to date or 95bps year to date. This weakening caused investors who feared the coronavirus, which impacted the performance of listed companies in Indonesia.

The impact of the Covid-19 pandemic occurred in almost all countries, including Indonesia. The Indonesian economy is one of the largest in Southeast Asia and can develop in the current era. The capital market's uncertain condition should every individual to have sufficient knowledge to manage their financial resources and wealth to survive. However, many investors in Indonesia are still influenced by foreign investors, causing the Composite Stock Price Index (CSPI) to drop due to foreign and local investors' sales of shares. Investments lead to speculation, where many investors turn to day traders to take advantage of uncertain market conditions.

Ady (2021) showed that the decision to invest in the capital market was tricky because it involves risk and uncertainty. The behaviour of these investors also influences investment decision-making. The actions of these investors often showed irrational behaviour by making decisions based on unreasonable assessments (Ady, 2015); (Jannah & Ady, 2017); (Nuroniyah et al., 2018)(Ady, 2018); (Ady et al., 2020). Nosi'c & Weber (2010) found that investor behaviour in decision-making influenced the subjective attitude they have towards risk. In this case, the personal factors influencing investment decisions are risk perception and risk attitude.

Perception is the definition of building and interpreting motor sensory impressions to give meaning to the environment (Robbins et al., 2008). Risk perception can be socially shaped. Williamson & Weyman (2005) suggest that risk perception results from various factors based on differences in decision-making regarding the possibility of a loss. According to Ady (2015), the factors affecting investor decision-making were perception, attitude, intention, and experience. It can say that perceptions and risk attitudes can influence investment decision-making. Due to various conditions, including the Covid-19 pandemic, drastic market changes have caused investors' risk perception and risk attitudes.

Risk perception will influence investors in dealing with a chance. The risk attitudes show whether the investor is more courageous or avoids when faced with a threat. Risk attitudes can influence investment decisions making investors. Harris et al. (2006) revealed that individual risk attitudes were fundamental to understanding risk and were good predictors of investment behaviour and choices.

Demographic factors are estimated to influence risk perceptions and risk attitudes. Demographic characteristics in this study are gender, age, and experience. In the last five years, some research has shown that women's dominance has begun to increase stock trading, and even investment decision-making done by online trading (Ady, 2015). Jayathilake (2013) showed that men and women have different behaviours in dealing with risks.

Experience also determines decision-making. If an investor has more experience than his partner, he will be careful to invest. Sometimes, making a decision uses intuition, where intuitive decision-making is a subconscious process created from experience. Alanko (2009); Ady et al. (2013) explained that experience had the most significant explanatory power on risk tolerance. The more experienced an investor was, the greater the risk's patience or awareness.

On the other hand, age is also often associated with a direct influence on risk-averse behaviour. Research linking age and risk perceptions and risk attitudes has shown mixed results. The general opinion regarding risk-averse behaviour was that the older a person was, the more likely he would avoid risk (Amaefula et al., 2012); (Kaufman et al., 2010). Besides, the risk aversion behaviour will decrease as age increases. In other words, the older the individual will prefer the risk. Rolison et al. (2014) showed that risk-taking behaviour decreases with increasing age in older men, but not for women, raising young to middle-aged people.

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

The differences in research results allow for more extensive research in this study. The research urgency is gripping because of the Covid-19 pandemic conditions as a background that causes many young investors transactions to experience based on panic buying or selling. This research focuses on young Surabaya investors' behaviour as the effect. Using two intervening variables of risk perception and risk attitudes can prove Ajzen's planning behaviour theory (Ajzen, 2005), especially for financial behaviour among young investors in Surabaya. This study has three objectives. First, examine the influence of age, gender, and experience on risk perceptions and attitudes. Second, examine the effect of risk perceptions and risk attitudes on investment decision-making on the Indonesia Stock Exchange (IDX). The third is to investigate the influence of age, gender, and experience on investment decision-making through risk perception on risk attitudes.

The novelty of this research is finding the influence of demographic variables (age, gender, experience) on investment decision-making through risk perception and risk attitudes for young Surabaya investors during the Covid-19 Pandemic.

1.1.Relationship of Risk Perception, Risk Attitude, and Investment Decisions

The essential things in investing decisions are return and risk. Because understanding the relationship between the expected return and the risk is a unidirectional or simultaneous relationship. The greater the expected profit, the greater the chance faced. To minimize risk, it is necessary to understand rationally and carefully in the decision-making process (Pratiwi, 2015).

The risk describes all financial investment types based on expected return and actual return variability. The concept of risk perception means the way investors perceive the risk of financial assets based on their understanding and experience. Perception of risk is an essential factor that affects investors' investment decisions (Sindhu & Kumar, 2014).

Financial risk tolerance was a concept with two significant differences (Roszkowski & Davey, 2010); (Venter & Michayluk, 2012). Another definition of financial risk tolerance was a relatively stable behaviour that didn't change significantly (Gerrans et al., 2015; Roszkowski & Davey, 2010; Venter & Michayluk, 2012). The first finding was that personal characteristics and situational factors influenced financial risk tolerance (Yao et al., 2003); (Hoffmann et al., 2013). More importantly, based on their findings, Roszkowski & Davey (2010); Venter & Michayluk (2012) combine the two different views on financial risk tolerance discussed above by adding that (1) Financial risk tolerance is a personal behaviour in general but can change over time and (2) Changes in financial risk tolerance were caused by external factors.

Ady et al. (2013) showed that deciding to invest in the capital market was complex because it involves risk and uncertainty. Therefore, investors' investment decisions must be rational and follow investment management theory and the investor's investment objectives. However, research in behavioural finance showed a very determining psychological role in investors' investment decisions, besides risks and returns. (Hagstrom, 2010) showed that psychology affects 60% of investors' investment decision-making and 40% of rationale.

1.2.Demographic Factors in Investor Decision Making

Demographic factors play an essential role in determining investment decisions—the influence of demographic factors considered in any decision-making. Investment decisions often involve more than one individual in the investment analysis process. Individuals with different knowledge, skills, and experiences applied throughout the investment process, from planning and monitoring to coordinating investment plans (Pratiwi, 2015).

Demographic factors are factors that a person has and are a differentiator between one individual and another. In this case, demographic variables include employment status, marital status, income, type of work, age, gender, work experience, and education level (Aminatuzzahra, 2014). Bairagi & Chakraborty (2018) said that investors' risk perception is influenced by several factors that could lead to poor investment decision-making, such as differences in personality between men and women and even age differences.

Some research related to demographic factors on risk attitudes, perceptions, and investment decisions were age and risk tolerance. There were controversial findings related to age and risk tolerance for financial risk. Many studies indicated risk tolerance increases with age (Grable, 2000); (Kourtidis et al., 2011); (Wang & Hanna, 1997). However, several other researchers reported that younger respondents had a higher risk tolerance than older respondents (Selcuk et al., 2010); (Grable et al., 2004). Embrey & Fox (1997); Estes & Hosseini (2010); Ady (2015); Bairagi & Chakraborty (2018); Ady (2018); Ady & Hidayat (2019) found that age didn't have a significant effect on investors' risk perceptions when making investment decisions. However, in contrast (Charness & Gneezy, 2011); (Onsomu, 2015); (Lutfi, 2011); (Maheshwari & Mittal, 2017) found that there was a significant relationship between age and investment decision-making.

Gender and risk tolerance. Research that links gender to decision-making conducted by Bashir et al. (2013); Embrey & Fox (1997); Olsen & Cox (2001) showed that there was no significant relationship between gender and decision-making. However, in contrast, Schubert et al. (1999); and

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

Dwyer et al. (2002) showed that women were lower in risk-taking than men, and the risk tendency of men and women in financial choices was highly dependent on the decision-making framework. The majority of studies report that men had a higher risk tolerance than women (Grable, 2000); (Selcuk et al., 2010); (Anbar & Eker, 2010). One explanation for this gender difference was women's role as mothers because she prefers a stable income with a small amount to a significant, uncertain income. He et al. (2007) also found that women were estimated to choose wins and losses differently than men. And it was more important for women to avoid defeat than men. The role of gender in this risk perception can also be different due to cultural differences. Maxfield et al. (2010), Fellner & Maciejovsky (2007), and Lo et al. (2005) also reported that the higher a person's risk aversion level was negatively related to trading frequency, where women's trading activity was lower than men's. It showed an indicator that women were more risk-averse than men. That was different from the findings of Ady et al. (2013); Ady (2015); Ady (2018), which showed that women prefer risk to men by choosing to be day trading that conducts daily transactions with high frequency.

The relationship between experience and risk perception also shows differences in research results. Investors with more extended experience tend to have a lower risk perception than novice investors who are still careful in taking risks. In line with Septyanto & Adhikara (2014), Andriani Samsuri et al. (2019), and Amaefula et al. (2012) showed that the level of experience regarding stock market operations had an essential role in accepting risks to investment decision-making. In contrast (Estes & Hosseini, 2010) showed that experience didn't significantly affect investment decision-making.

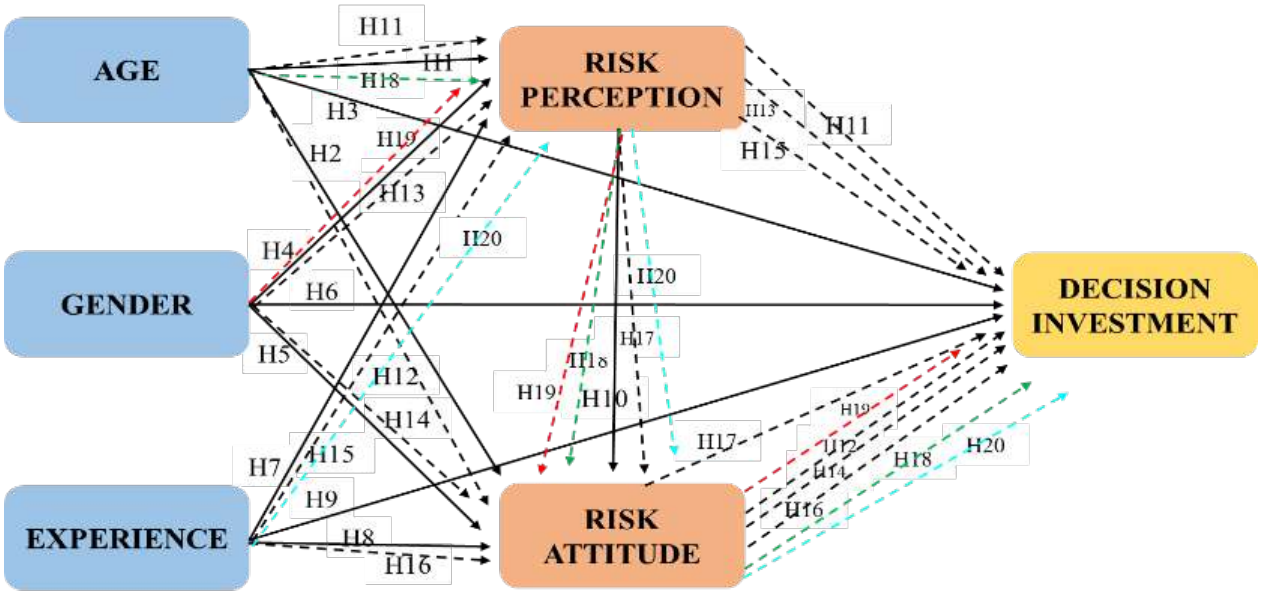
1.3.Risk Perceptions and Risk Attitude toward Decision Making

Perception is how individuals organize and interpret motor sensory impressions to give meaning to the environment (Robbins et al., 2008). Risk perception is socially shaped. The results of Williamson & Weyman (2005) suggest that risk perception results from various factors that were the basis of differences in decision-making regarding the possibility of a loss. Ady (2015) showed that risk perceptions affect risk attitudes and risk attitudes affect decision-making.

Risk perceptions will influence investors in dealing with risk. The risk attitude shows whether the investor is more courageous or avoids when faced with a threat. Risk attitudes can influence investors in investment decisions making. Harris et al. (2006) revealed that individual risk attitudes were essential in understanding risk-related behaviour and decisions and were good predictors of risk-

related behaviour and choices. However, Ady & Hidayat (2019) showed that risk tolerance didn't affect decision-making.

1.4.Conceptual Framework



The formula of the hypothesis in this study is as follows:

H1: Age has a significant effect on risk perception.

H2: Age has a significant effect on risk attitudes.

H3: Age has a significant effect on investment decisions.

H4: Gender has a significant effect on risk perception.

H5: Gender has a significant effect on risk attitudes.

H6: Gender has a significant effect on investment decisions.

H7: Experience has a significant effect on risk perception.

H8: Experience has a significant effect on risk attitudes.

H9: Experience has a significant effect on investment decisions.

H10: Risk perception has a significant effect on risk attitudes.

H11: Age has a significant effect on investment decision-making through risk perception

H12: Age has a significant effect on investment decision-making through risk attitude

H13: Gender has a significant effect on investment decision-making through risk perception

H14: Gender has a significant effect on investment decision-making through risk attitude

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

H15: Experience has a significant effect on investment decision-making through risk perception

H16: Experience has a significant effect on investment decision-making through risk attitude

H17: Risk perception has a significant on investment decisions through risk attitude

H18: Age has a significant effect on investment decision-making through risk perception and risk attitude

H19: Gender has a significant effect on investment decision-making through risk perception and risk attitude

H20: Experience has a significant effect on investment decision-making through risk perception and risk attitude

2. RESEARCH METHOD

This research is an explanatory study. According to Malhotra (2009), descriptive analysis is the show to explain a causal approach to finding evidence of a causal relationship through the influence of the research variables and testing the formulated hypothesis. The method used in this research is a survey method with a quantitative approach to explain the relationship between age, gender, and experience towards investment decisions making through risk perception and risk attitude. The analysis technique used SEM-PLS analysis with Mediation effects.

The unit analysis is an individual investor. The population in this study is Surabaya's investors. The reason for taking the city of Surabaya as the population is because Surabaya is the largest city in East Java. Most of the investors in East Java come from Surabaya. According to Sugiyono (2016), the sample is part of this population's number and characteristics. If the population is large, and the researcher can't take all of the people because of limited funds, time, and energy, the researcher can use a sample taken from that population. The sampling method used the Slovin formula to determine the research sample.

The data was collected using a questionnaire conducted online to 160 respondents. 160 questionnaires can be processed and analyzed. Methodologically, this number has reached the requirements for quantitative analysis. Roscoe (1975) provides guidelines for determining the number of samples more significant than 30 and less than 500. We can see the profile of the respondents in Table 1.

Table 1. Profile of Respondents

Profile	Highest Percentage	Percent %
Gender	Male	52,50
Age	17-27 years	47,50
Profession	Student	37,42
How long have you been an investor in the capital market	3-6 years	39,13
Monthly Income	3-7 million	33,75

Source: Primary data (2020)

3. RESULTS AND DISCUSSION

3.1. Outer Model Testing Results

3.1.1. *Convergent Validity Test*

The convergent validity value is the loading factor value on the latent variable with its indicators. The expected value exceeds > 0.5, as the minimum limit of the factor loading value.

Table 2. Convergent Validity

Variable	X1	X2	X3	M1	M2	Y
X1.1	0,532					
X1.2	0,567					
X1.3	0,715					
X2.1		0,563				
X2.2		0,723				
X2.3		0,645				
X3.1			0,710			
X3.2			0,756			
X3.3			0,732			
M1				1,000		
M2					1,000	
Y1.1						0,653
Y1.2						0,745

Source: Primary data (2020)

From the data processing results with SEM PLS, shown in Table 2, all indicators of all variables have a loading value greater than 0.50, which means that they have a high level of convergent validity.

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

3.1.2. Discriminant Validity Test

Table 3 shows *Discriminant Validity Test*. The expected AVE value exceeds > 0.5. The Average Variance Extracted (AVE) method for each constructor latent variable can be seen to evaluate the discriminant validity. The model has better discriminant validity if AVE's square root for each construct is greater than > 0.5.

Table 3. Average Variance Extracted (AVE)

Construct	Average Variance Extracted (AVE)
Age (X1)	1,000
Gender (X2)	1,000
Experience (X3)	0,910
Risk Perception (M1)	1,000
Risk Attitude (M2)	1,000
Investment Decision (Y)	0,564

Source: Data processing with PLS (2020)

3.1.3. Composite Reliability Test

Data that has composite reliability > 0.7 has high reliability. The outer model is not the only measure for assessing convergent validity and discriminant validity. We can also do it by looking at the construct reliability or latent variables measured by looking at the indicator block's composite reliability value measuring the construct. The output results of PLS for composite reliability values show in the following Table 4:

Table 4. Composite Reliability Value

Construct	Composite Reliability Value
Age (X1)	1,000
Gender (X2)	1,000
Experience (X3)	0,953
Risk Perception (M1)	1,000
Risk Attitude (M2)	1,000
Investment Decision (Y)	0,846

Source: Data processing with PLS (2020)

3.1.4. Cronbach Alpha Test

The reliability test is the strength of Cronbach's alpha. The expected values exceed > 0.6 for all constructs. The outer model is not only measured by assessing the convergent validity and discriminant validity. We can also do it by looking at the construct reliability or latent variables measured by the Cronbach alpha value of the indicator block measuring the construct. The construct is reliable if the Cronbach alpha value is more than 0.60. The Cronbach's alpha value is provided in Table 5.

Table 5. Cronbach Alpha Value

Construct	Composite Reliability Value
Age (X1)	1,000
Gender (X2)	1,000
Experience (X3)	0,902
Risk Perception (M1)	1,000
Risk Attitude (M2)	1,000
Investment Decision (Y)	0,734

Source: Data processing with PLS (2020)

3.2.Inner Model Test Results

3.2.1. *R^2 or R-Square Analysis Test*

The value R^2 indicates the level of determination of the exogenous variable on its endogenous. The greater the value, the better the level of resolution.

Table 6. Value of R-Square

Construct	R-Square
Risk Perception (M1)	0,335
Risk Attitude (M2)	0,495
Investment Decision (Y)	0,128

Source: Data processing with PLS (2020)

The calculation results of R^2 for each endogenous latent variable in Table 6 show that the value of R^2 of M1 and Y constructs is the weak category (0.335 and 0.128). In contrast, the M2 construct is the Moderate category (0.495).

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

3.2.2. Q^2 Analysis Test

The value of Q^2 structural model testing is done by looking at the value of Q^2 (predictive relevance). To calculate Q^2 the formula can be used:

$$Q^2 = 1 - (1 - R_1^2) (1 - R_2^2) (1 - R_3^2)$$
$$Q^2 = 1 - (1\text{-}0{,}104) (1\text{-}0{,}130) (1\text{-}0{,}100)$$
$$Q^2 = 1 - (0{,}896) (0{,}870) (0{,}900)$$
$$Q^2 = 1 - 0{,}701568$$
$$Q^2 = 0{,}298432$$

The results of the calculation of Q^2 show that the value of $Q^2$is 0.298432. According to Ghozali (2014), the value of Q^2 can measure how well the model and its parameter estimates generate the observed value. A Q^2 value greater than 0 indicates that the model is good enough, while a Q^2 value less than 0 means that the model has less predictive relevance. In this research model, the construct or endogenous latent variable has a value of Q^2 that is more excellent than 0 so that the predictions made by the model are considered relevant.

3.3.Evaluation of Direct Effects

Table 7 shows the result of the hypothesis test follows is as follows:

Table 7. Hypothesis Test

Hypothesis	T-Statistics	T-Table	P-Value	Hypothesis Status (t-test)
X1 → M1	1.190	<1.655	0.117	Rejected
X1 → M2	3.741	>1.655	0.000	Accepted
X1 → Y	1.512	<1.655	0.065	Rejected
X2 → M1	2.262	>1.655	0.012	Accepted
X2 → M2	1.761	>1.655	0.039	Accepted
X2 → Y	2.023	>1.655	0.022	Accepted
X3 → M1	3.703	>1.655	0.000	Accepted
X3 → M2	2.394	>1.655	0.008	Accepted
X3 → Y	2.516	>1.655	0.006	Accepted
M1 → M2	1.857	>1.655	0.032	Accepted
M1→ Y	3.799	>1.655	0.000	Accepted
M2 → Y	1.083	<1.655	0.140	Rejected

Source: Data processing with PLS (2020)

Based on table 7:

1. Age to Risk Perception, the effect of age on risk perception is not significant because based on the P-value of 0.117, which is greater than 0.05, and based on the value of t-statistics <t-table, namely 1.190 <1.655, thus rejecting the hypothesis.
2. Age to Risk Attitude, age on risk attitudes is significant because based on the P-value of 0,000, which is smaller than 0.05, and based on the value of t-statistics> t-table, namely 3,741> 1,655 so that it accepts the hypothesis.
3. Age to Decision Investment, the effect of age on risk attitudes is not significant because based on the P-value of 0.065, which is greater than 0.05, and based on t-statistics <t-table, namely 1.512 <1.655, thus rejecting the hypothesis.
4. Gender to Risk Perception, the effect of gender on risk perceptions is significant because based on the P-value of 0.012, which is smaller than 0.05, and based on t-statistics> t-table, namely, 2.262> 1.655, accepting the hypothesis.
5. Gender to Risk Attitude, the influence of gender on risk attitudes is significant because based on the P-value of 0.039, which is smaller than 0.05, and based on the value of t-statistics> t-table, namely 1.761> 1.655 so that it accepts the hypothesis.
6. Gender to Investment Decision, the effect of gender on investment decisions is significant because based on the P-value of 0.022, which is smaller than 0.05, and based on the value of t-statistics> t-table, namely 2.023> 1.655, it accepts the hypothesis.
7. Experience to Risk Perception, the effect of experience on risk perceptions is significantly based on the P-value of 0.000, more diminutive than 0.05. Accepting the hypothesis is based on the value of t-statistics> t-table, namely 3.703> 1.655.
8. Experience to Risk Attitude, the effect of experience on risk attitudes is significant because based on the P-value of 0.008, which is smaller than 0.05 and based on t-statistics> t-table, namely 2.394> 1.655, we accept the hypothesis.
9. Experience to Decision Investment*:* The effect of experience on investment decisions is significant because it is based on the P-value of 0.006, which is smaller than 0.05, and based on t-statistics> t-table, namely 2.516> 1.655 so that it accepts the hypothesis.
10. Risk Perception to Risk Attitude*,* the effect of risk perception on risk attitudes is significant because based on the P-value of 0.032, which is smaller than 0.05, and based on t-statistics> t-table, namely 1.857> 1.655, so accepts the hypothesis.

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

11. Risk Perception to Decision Investment, the effect of risk perception on investment decisions is significant because based on the P-value of 0,000, which is smaller than 0.05 and based on t-statistics> t-table, namely 3,799> 1.655, accepts the hypothesis.
12. Risk Attitude to Decision Investment, the effect of risk attitudes on investment decisions is not significant because based on the P-value of 0.140, which is more than 0.05, and based on t-statistics <t-table, namely 1.083 <1.655, thus rejecting the hypothesis.

3.4.Evaluation of Indirect Effects

Table 8 shows the evaluation of Indirect Effect based on data processing with PLS:

Table 8. Indirect Effect

Notation (axb)	Indirect Effect (T-Statistics axb)	Direct Effect (c)	Mediation Effect Status
(X1 to M1)(M1 to Y) (1.190)(3.799)	4.521 (Significant)	(X1 to Y) (1.512) (Not Significant)	Indirect Only (Full Mediation)
(X2 to M1)(M1 to Y) (2.262)(3.799)	8.593 (Significant)	(X2 to Y) (2.023) (Significant)	Direct and Indirect
(X3 ke M1)(M1 ke Y) (3.703)(3.799)	14.07 (Significant)	(X3 to Y) (2.516) (Significant)	Dirrect and Indirect
(X1 ke M2)(M2 ke Y) (3.741)(1.083)	4.052 (Significant)	(X1 to Y) (1.512) (Not Significant)	Indirect Only (Full Mediation)
(X2 to M2)(M2 to Y) (1.761)(1.083)	1.907 (Significant)	(X2 to Y) (2.023) (Significant)	Direct and Indirect
(X3 ke M2)(M2 ke Y) (2.394)(1.083)	2.593 (Significant)	(X3 to Y) (2.516) (Significant)	Dirrect and Indirect
(M1 to M2)(M2 to Y) (1.857)(1.083)	2.011 (Significant)	(M1 to Y) (3.799) (Significant)	Direct and Indirect
(X1 to M1)(M1 to M2)(M2 to Y) (1.190)(1.857)(1.083)	2.393 (Significant)	(X1 to Y) (1.512) (Not Significant)	Indirect Only (Full Mediation)
(X2 to M1)(M1 to M2)(M2 to Y) (2.262)(1.857)(1.083)	4.549 (Significant)	(X2 to Y) (2.023) (Significant)	Direct and Indirect
(X3 to M1)(M1 to M2)(M2 to Y) (3.703)(1.857)(1.083)	7.447 (Significant)	(X3 to Y) (2.516) (Significant)	Direct and Indirect

Source: Data processing with PLS (2020)

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" Journal of World Economy: Transformations & Transitions (JOWETT) 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

According to Table 8 we can see that:

The Effect of Age on Investment Decisions through Risk Perceptions - the direct effect of age on an investment decision does not significantly affect it. Still, the indirect impact on risk perception toward investment decisions has a significant impact. It means that risk perceptions can mediate the impact of age on investment decisions. Age can only influence investment decisions through risk perception (full mediation).

The Effect of Gender on Investment Decisions through Risk Perceptions - the influence of gender on investment decisions, both directly and indirectly, has a significant impact on risk perception. Risk perceptions can mediate and influence gender on investment decisions (direct and indirect).

The Effect of Experience on Investment Decisions through Risk Perceptions - the effect of experience on investment decisions, either directly or indirectly, by perceived risk has a significant impact. It means that risk perceptions can mediate and influence experience on investment decisions (direct and indirect).

The Effect of Age on Investment Decisions through Risk Attitude - the direct effect of age on investment decisions is insignificant. Still, the indirect impact on investment decisions through a risk attitude is significant. It means that the risk attitude can mediate the effect of age on investment decisions (full mediation).

The Effect of Gender on Investment Decisions through Risk Attitude - we know that the influence of gender on investment decisions, either directly or indirectly, is through a significant risk attitude. Risk attitudes can mediate and influence gender on investment decisions (direct and indirect).

The Effect of Experience on Investment Decisions through Risk Attitude - the effect of experience on investment decisions, either directly or indirectly, is the impact of significant risk attitudes. It means that risk attitudes can mediate and influence experience on investment decisions (direct and indirect).

The Effect of Risk Perception on Investment Decisions through Risk Attitude - risk perception on investment decisions, either directly or indirectly, has a significant effect through risk attitudes. It means that risk attitudes can mediate and impact risk perception on investment decisions (direct and indirect).

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

The Effect of Age on Investment Decisions through Risk Perception and Risk Attitude - the direct effect of age on investment decisions is not significant. Still, the indirect impact of age on investment decisions has a substantial impact on risk Attitude and risk perceptions. It means that risk perceptions and attitudes can mediate the impact of age on investment decisions. Age can only influence investment decisions through risk perceptions and attitude (full mediation).

The Effect of Gender on Investment Decisions through Risk Perception and Risk Attitude - the influence of gender on investment decisions, either directly or indirectly, is significant through risk perception and attitudes. It means that risk perceptions and attitudes can mediate and affect the influence of gender on investment decisions (direct and indirect).

The Effect of Experience on Investment Decisions through Risk Perception and Risk Attitude - the effect of experience on investment decisions, either directly or indirectly, is significant through risk perception and risk attitudes. It means that risk perceptions and attitudes can mediate the impact of experience on investment decisions (direct and indirect).

3.5. Discussion

3.5.1. *The Effect of Age on Investment Decisions through Perceptions of Risk*

There is no significant direct effect between age and investment decisions because a person's age does not determine his investment decision without risk perception. The risk perception itself influences by various factors such as education (Obamuyi, 2013; Fachrudin & Fachrudin, 2016), experience (Slovic, 2000; Williamson & Weyman, 2005; Sindhu & Kumar, 2014), personality (Cohen et al., 2007; Aren & Canikli, 2019) and knowledge (Williamson & Weyman, 2005). This study follows Estes & Hosseini (2010) and Bairagi & Chakraborty (2018), who found that age didn't significantly affect investors' risk perceptions in decision-making.

However, it is different from Onsomu (2015) and Maheshwari & Mittal (2017), who found a significant relationship between age and decision-making. Likewise, Lutfi (2011) showed that investors' age positively correlates with investment decision-making. (Arora & Kumari, 2015) showed that the elderly people were more reluctant to lose and regretful than the younger ones. The reason was that the elderly people have less time to recover from losses and do not have enough income to save for retirement and are less likely to take on investment risks.

The indirect effect of age on investment decisions through perceived risk is significant because a person's decision-making is based on the risk perception for the investment itself. The higher the

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" Journal of World Economy: Transformations & Transitions (JOWETT) 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

knowledge, education, and experience of investors, the better investors perceive risks to minimize lousy investment decision-making. Likewise, the character of the investor itself will affect the risk perception.

This study's results were followed by Amaefula et al. (2012), who found that age significantly affected risk perception. The older the individual was, the more likely he would react to the identified risks. In other words, risk-liking behaviour would increase. Likewise, Bellante & Green (2004); Chang et al. (2004); Rolison et al. (2012) showed that the older a person was, the more he would avoid the risks, and tend to be more conservative, both in assessing and responding to threats. (Arora & Kumari, 2015) showed that the effect of age on risk-taking was achieved through investor behaviour bias (avoiding regret). So, the elderly were less likely to lose money and were less likely to bear investment risks than younger ones.

These research results contradict Bairagi & Chakraborty (2018); Kanagasabai and Aggarwal (2020), who found that age didn't significantly affect investors' risk perception in decision making. Likewise, Hibbert et al. (2008) showed that single women didn't have a higher risk of aversion than men.

3.5.2. The Effect of Gender on Investment Decisions through Perceptions of Risk

The significant direct influence between gender and investment decisions means that gender differences affect investment decisions, meaning that men and women perceive risk differently. The research results of Schubert et al. (1999) showed that the risk tendency of men and women in financial choices depends on the decision-making framework. Also, the research results of Dwyer et al. (2002) showed that women were lower in taking risks than men in the most significant and risky investment decisions making.

However, these research results contradicted Bairagi & Chakraborty (2018), who found that gender had no significant influence on investors' risk perception. Also, Bashir et al. (2013) showed no significant difference in responses between men and women in decision-making. Likewise, Embrey & Fox (1997) showed that gender was not essential for investment decision-making.

The influence of gender on investment decisions through perceived risk is significant. This research indicates that risk perceptions strengthen the impact of gender on investment decision-making. It means that gender differences lead to risk perceptions that different investment decisions between men and women. This study's results are consistent with Olsen & Cox (2001), which found

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

that women were more risk-averse than men. Embrey & Fox (1997) also showed that women preferred inheritance and work and had higher net assets and risky investments. Likewise, Schubert et al. (1999) showed that the risk tendency (gender) appears in abstract risk. Men had a greater chance of getting benefits, while women were more prone to losses. (Dwyer et al., 2002); and (Hibbert et al., 2008) showed that women were more risk-averse than men.

3.5.3. The Effect of Experience on Investment Decisions through Perceptions of Risk

The significant direct effect between experience and investment decisions means that investors who have a lot of experience can more easily consider factors in investment decisions making and are more careful in investment decisions making to achieve maximum returns and avoid losses.

This result was consistent with Septyanto & Adhikara (2014) and Pak & Mahmood (2015), who showed that adequate experience in the stock market significantly affected decision-making. Likewise, Andriani Samsuri et al. (2019) showed that experience positively impacts investment decision-making. However, in contrast, Estes & Hosseini (2010) showed that experience didn't significantly affect investment decisions.

The effect of experience on investment decisions through perceived risk is significant. This research indicates that risk perception can moderate the impact of experience on investment decisions. That shows that an investor's experience influences investment decision-making through risk perception. This research follows Sindhu & Kumar (2014), which showed that the risk perception of an investor had a significant effect on investment decisions making. Veld & Veld-Merkoulova (2008) showed that most investors secretly use more than one risk measure in investment decision-making, including variance, semi-variance, and shortfall. Semi-variance most often reflects investors' risk perceptions. Still, it is different from Bairagi & Chakraborty (2018), which showed no significant difference in risk perception toward investment decision-making.

3.5.4. The Effect of Age on Investment Decisions through a Risk Attitude

Age has no significant direct effect on investment decisions because an investor's age does not determine his investment without being aware of the risk attitude. This result followed Estes & Hosseini (2010) and Bairagi & Chakraborty (2018), which showed that age didn't significantly affect investment decision-making.

However, the results of this research were different from Onsomu's (2015), which showed that there was a significant relationship between age and decision-making. Also, Lutfi (2011) also showed that investors' age positively correlated with investment decision-making. Likewise, Maheshwari & Mittal (2017) showed that age affects investment decision-making.

The effect of age on investment decisions through risk attitudes is significant. This research indicates that the risk attitude can moderate the impact of the relationship between age on investment decisions. The older a person is, the more someone is, and the more they like and respond to risk. This research, followed by Bellante & Green (2004), Chang et al. (2004), Rolison et al. (2012), and Amaefula et al. (2012), showed a significant effect on risk. The older, the more conservative they tended to respond to the threat. Also, Arora & Kumari (2015) showed that age had a significant effect on decision-making. So, the elderly were less likely to be loss-averse and less likely to bear investment risk than younger ones. Likewise, Hibbert et al. (2008) showed that the age of women, singles didn't have a higher risk aversion than men.

3.5.5. The Influence of Gender on Investment Decisions through Risk Attitudes

The significant direct influence of gender on investment decisions means that gender differences affect investment decisions, meaning that gender responds to risk differently. Female investors are still too afraid to make careful decisions because all factors are considered in their investment decisions.

This research followed Schubert et al. (1999), who showed that the risk tendency of men and women to take risks depends on the decision-making framework. Also, Dwyer et al. (2002), Ady (2015); Ady (2018); Ady & Hidayat (2019) showed that women take lower risks than men in investment decisions making. However, this contradicts Embrey & Fox (1997), which showed that gender was not an essential determinant of investment decision-making. Also, Bashir et al. (2013) and Bairagi & Chakraborty (2018) showed no significant relationship between gender and decision-making.

The influence of gender on investment decisions through risk attitudes is significant. This research indicates that risk attitudes can moderate the impact of gender on investment decision-making. This result followed Charness & Gneezy (2011), which showed that women have less risk of investing and are more likely to avoid risk than men. Also, Arora & Kumari (2015) showed that gender affects risk-taking in an investment decision, with women showing more reluctance and more regret than men. Likewise, Schubert et al. (1999) and Byrnes et al. (1999) showed that women generally didn't make a

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

risky investment choices as men, but this was not by Bashir et al. (2013), which indicated that there was no significant relationship between gender and investment decision making.

3.5.6. The Effect of Experience on Investment Decisions through a Risk Attitude

The direct influence of experience on investment decisions shows that the length of time an investor has invested affects determining the factors that must consider before making a decision. This result followed Pak & Mahmood (2015), which showed that an investor's adequate experience in investing had a significant effect on decision-making. Also, Septyanto & Adhikara (2014) and Andriani Samsuri et al. (2019) showed that experience positively affects investment decision-making. However, it differed from Estes & Hosseini (2010), which showed that experience didn't significantly affect investment decision-making.

The effect of experience on investment decisions through risk attitudes is significant. This research indicates that the risk attitude can moderate the impact of experience on investment decisions. That shows that many experiences influence an investor to make an investment decision by carefully considering all factors and responding to risk in investment decisions making. The results of this research were by Amaefula et al. (2012), who showed that experience was an essential factor in addressing risk. Also, Pak & Mahmood (2015) showed that adequate experience in investing significantly affected decision-making, but different from Bairagi & Chakraborty (2018), which indicated no significant difference in risk attitudes towards investment decision-making.

3.5.7. The Influence of Risk Perception on Investment Decisions through a Risk Attitude

There is a significant direct effect of risk perception on investment decisions. When a person invests, they determine his investment decision based on the perceived risk. Risk perception is a source of communication that can have implications and prepare investors for risk based on psychological factors (Rana et al., 2011). This result followed Nur Aini & Lutfi (2019), which showed that risk perception had a significant and negative effect on investment decision-making. Likewise, Farayibi (2015) showed that risk perception determined the level of investment decision-making.

The effect of risk perception on investment decisions through risk attitudes is significant. That suggests that the risk attitude can moderate the relationship between risk perception and investment decisions. When a person invests, they determine his investment decision based on the risk perception. This result followed Sitkin & Pablo (1992) and Sitkin & Weingart (1995), who showed that risk

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" Journal of World Economy: Transformations & Transitions (JOWETT) 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

attitude was an essential mediator in decision-making. Schubert et al. (1999) found that female investors showed more prejudice than facts in making investment decisions than men. Likewise, Sindhu & Kumar (2014) showed that investors' risk perception significantly affected investment decision-making. Still, it is different from Septyanto & Adhikara (2014) and Nur Aini & Lutfi (2019), which showed that risk perceptions negatively impact investment decision-making.

3.5.8. The Effect of Age on Investment Decisions through Risk Perception and Risk Attitude

Age has no significant direct effect on investment decisions because a person's age does not determine their investment decisions and makes investment decisions without risk perceptions and attitudes. Perception of risk itself is influenced by various factors such as education (Obamuyi, 2013; Fachrudin & Fachrudin, 2016), experience (Slovic, 2000; Williamson & Weyman, 2005; Sindhu & Kumar, 2014), personality (Cohen et al., 2007; Aren & Canikli, 2019) and knowledge (Williamson & Weyman, 2005).

The results of this study are followed by Estes & Hosseini (2010) and Bairagi & Chakraborty (2018). They found that age didn't significantly affect investors' risk perceptions in decision-making. However, it contradicts Lutfi (2011), Arora & Kumari (2015), Onsomu (2015), and Maheshwari & Mittal (2017), who found that there was a significant relationship between age and decision-making.

The indirect effect of age on investment decisions through risk perception and risk attitudes is significant. That is because a person's decision-making at the time of investing is based on risk perception and attitude. As a person gets older, it affects investors' risk perceptions and attitudes.

This study's results are followed by Sitkin & Pablo (1992) and Sitkin & Weingart (1995), which showed that risk perception and risk attitude were essential mediators in decision-making. Also, Hibbert et al. (2008) and Kanagasabai and Aggarwal (2020) showed that age didn't significantly affect investors' risk perception in decision-making.

However, Amaefula et al. (2012) and Arora & Kumari (2015) found that age significantly affected the risks. Likewise, Bellante & Green (2004); Chang et al. (2004); Rolison et al. (2012) showed that the older a person was, the more he would avoid the risks and tend to be more conservative, both in assessing and responding risks.

JOWETT 2022, 2(04), 18; https://doi.org/10.52459/jowett24180922

3.5.9. Gender Influence on Investment Decisions through Risk Perception and Risk Attitudes

The significant direct influence between gender and investment decisions means that gender differences affect investment decisions. It means that men and women perceive and respond to risk differently. The results of this study are followed by Schubert et al. (1999), which showed that the risk tendency of men and women in investment choices depends on the decision-making framework. Also, the research results of Dwyer et al. (2002) showed that women were lower in taking risks than men in the most significant and risky investment decisions making.

However, it differed from Embrey & Fox (1997), which showed that gender was not an essential determinant of investment decision-making. Also, Bashir et al. (2013) indicated no significant difference in responses between men and women in decision-making. Likewise, Bairagi & Chakraborty (2018) found that gender had no significant effect on investors' risk perceptions when investment decisions were made.

The influence of gender on investment decisions through risk perception and risk attitudes is significant. This research indicates that risk perceptions and risk attitudes can moderate the effect of the relationship between gender and investment decisions. It means that gender differences lead to different perceptions and risk attitudes when investment decisions differ between men and women.

This result followed Embrey & Fox (1997); Olsen & Cox (2001), who found that women were more risk-averse than men. Likewise, Dwyer et al. (2002) and Hibbert et al. (2008) showed that women were more risk-averse than men.

3.5.10. The Effect of Experience on Investment Decisions through Risk Perception and Risk Attitude

The significance of the direct influence between experience and investment decisions shows that an investor who has experience in investing determines the factors of investment decision-making.

This research followed Pak & Mahmood (2015), which showed that an investor's adequate experience in investing had a significant effect on decision making. Also, Septyanto & Adhikara (2014) and Andriani Samsuri et al. (2019) showed that experience positively affects investment decision-making.

The effect of experience on investment decisions through risk attitudes is significant. This research indicates that the risk attitude can moderate the impact of experience on investment decisions. An investor's experience will affect his investment decision-making without carefully considering the risk. This research followed Sitkin & Pablo (1992) and Sitkin & Weingart (1995), which showed that risk perception and risk attitude were essential mediators in decision-making. Also, Amaefula et al. (2012), Ady et al. (2013); Ady (2015); Ady (2018) showed that experience was an essential factor in addressing risk. Likewise, Pak & Mahmood (2015) showed that adequate investing experience significantly affected decision-making. Still, it differed from Bairagi and Chakraborty (2018), which indicated no significant impact of risk perception on investment decision-making.

4. CONCLUSION, LIMITATIONS, AND SUGGESTIONS

4.1. Conclusion

This study provides empirical evidence regarding the influence of age, gender, and experience on risk perceptions and attitudes in the Indonesia Stock Exchange (IDX) investment decisions. This study used a sample of 160 respondents who are registered as capital market investors in East Java, Indonesia. This study indicates that age, gender, and experience influence investment decision-making through risk perception and attitude.

In the Covid-19 pandemic conditions, risk perceptions can influence investors' behaviour in making investment decisions. Market conditions that are very dynamic and erratic have resulted in investors' risk perceptions and risk attitudes changing, making their behaviour more speculative to take advantage of market dynamism.

Young Investors targeted by IDX through the “Yuk Nabung Saham" program are currently young investors who have not yet mature financial capabilities, so they have a high psychological bias. But in the next ten years, they will have grown into a professional investor who strengthens the Indonesia Stock Exchange.

4.2. Limitation and suggestions

Although the researcher has tried to develop this research, there are still limitations that need revision in further study. Some securities do not support researchers asking for investor data, so the

sample is tiny. Likewise, obstacles in data collection are not accessible because the conditions of the Covid-19 pandemic require Large-Scale Social Restrictions.

Based on the research results, we consider several suggestions for investors: (1) Making experiences a learning process to improve perceptions and risk attitudes. (2) Avoid panic buying or selling when the market crash.

For further research, use a more developed model to provide a better picture and additional factors that influence investors' actions to invest or add other variables that give better results.

FUNDING: The authors did not receive any external funding.

CONFLICT OF INTEREST: The authors declare no conflict of interest

REFERENCES

Ady, S. U. (2015). Manajemen Psikologi dalam Investasi Saham: Kajian Fenomenologi dalam Sentuhan Behavioral Finance (M. Bendatu (ed.); 1st ed.). Andi. http://repository.unitomo.ac.id/231/

Ady, S. U. (2018). The Cognitive and Psychological Bias in Investment Decision-Making Behavior: (Evidence From Indonesian Investor's Behavior). Journal of Economics and Behavioral Studies, 10(1), 86–100. https://doi.org/10.22610/jebs.v10i1(J).2092

Ady, S. U. (2021). The Effect of World Oil Prices, Gold Prices, and Other Energy Prices on The Indonesian Mining Sector with Exchange Rate of Indonesian Rupiah as The Moderating Effect. International Journal of Energy Economics and Policy, 11(5), 369–376. http://hdl.handle.net/11159/7851

Ady, S. U., & Hidayat, A. (2019). Do Young Surabaya's Investors Make Rational Investment Decisions ? International Journal of Scientific & Technology Research, 8(07), 319–322. http://repository.unitomo.ac.id/id/eprint/1880

Ady, S. U., Sudarma, M., Salim, U., & Aisyah, S. (2013). Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in

Surabaya). IOSR Journal of Business and Management, 7(3), 11–22. https://doi.org/10.9790/487X-0731122

Ady, S. U., Tyas, A. M., Farida, I., & Gunawan, A. W. (2020). Immediate and Expected Emotions toward Stock Returns through Overconfidence and Cognitive Dissonance: The Study of Indonesian Investor Behavior. PalArch's Journal of Archaeology of Egypt/Egyptology, 17(3), 1140–1165. https://archives.palarch.nl/index.php/jae/article/view/238

Ajzen, I. (2005). Attitudes, Personality, and Behavior, Edisi Kedua. Open University Press.

Alanko, E. (2009). What Drives Investors ' Risk Appetite - Empirical Evidence from Private Finnish Investors 2007-2008 [Helsinki School of Economics (HSE)]. https://aaltodoc.aalto.fi/handle/123456789/249

Amaefula, C., Austin Okezie, C., & Mejeha, R. (2012). Risk Attitude and Insurance: A Causal Analysis. American Journal of Economics, 2(3), 26–32. https://doi.org/10.5923/j.economics.20120203.01

Aminatuzzahra. (2014). Persepsi Pengaruh Pengetahuan Keuangan, Sikap Keuangan, Sosial Demografi Terhadap Perilaku Keuangan Dalam Pengambilan Keputusan Investasi Individu (Studiekasus Pada Mahasiswa Magister Manajemana Universitas Diponegoro). Jurnal Bisnis Strategi, 23(2), 70–96. https://repofeb.undip.ac.id/7382/

Anbar, A., & Eker, M. (2010). An Empirical Investigation for Determining the Relation Between Personal Financial Risk Tolerance and Demographic Characteristic. Ege Academic Review, 10(2), 503–522. https://dergipark.org.tr/en/pub/eab/issue/39877/473204

Andriani Samsuri, Fitri Ismiyanti, & I Made Narsa. (2019). Effects of Risk Tolerance and Financial Literacy to Investment Intentions. International Journal of Innovation, Creativity and Change, 10(9), 40–54. https://www.ijicc.net/images/vol10iss9/10904_Samsuri_2019_E_R.pdf

Aren, S., & Canikli, S. (2019). Effect of Financial Literacy and Risk Perception On Individual Investors' Investment Choices. July 2018, 800–809. https://doi.org/10.15405/epsbs.2019.01.02.68

Arora, M., & Kumari, S. (2015). Risk Taking in Financial Decisions as a Function of Age, Gender: Mediating Role of Loss Aversion and Regret. International Journal of Applied Psychology, 5(4), 83–89. DOI:

Bairagi, P., & Chakraborty, A. (2018). Effect Of Gender, Age and Income On Investors' Risk Perception In Investment Decision: A Survey Study. IUJ Journal of Management, 6(2), 2–7. https://dx.doi.org/10.2139/ssrn.3843470

Bashir, T., Rasheed, U., Raftar, S., Fatima, S., & Maqsood, M. (2013). Impact of Behavioral Biases on Investors Decision Making: Male Vs Female. IOSR Journal of Business and Management, 10(3), 60–68. https://doi.org/10.9790/487x-1036068

Bellante, D., & Green, C. A. (2004). Relative risk aversion among the elderly. 13, 269–281. https://doi.org/10.1016/j.rfe.2003.09.010

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender Differences in Risk Taking: A Meta-Analysis. Psychological Bulletin, 125(3), 367–383. https://doi.org/10.1037/0033-2909.125.3.367

Chang, C.-C., DeVaney, S. A., & Chiremba, S. T. (2004). Determinants of Subjective and Objective Risk Tolerance. Journal of Personal Finance, 3(3), 53–67. Click here to access it.

Charness, G., & Gneezy, U. (2011). Strong Evidence for Gender Differences in Investment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.648735

Cohen, M., Etner, J., & Jeleva, M. (2007). Dynamic decision making when risk perception depends on past experience. Theory and Decision, 64(2–3), 173–192. https://doi.org/10.1007/s11238-007-9061-3

Dwyer, P. D., Gilkeson, J. H., & List, J. A. (2002). Gender Differences in Revealed Risk Taking: Evidence from Mutual Fund Investors. Economics Letters, 76(2), 151–158. https://doi.org/10.1016/S0165-1765(02)00045-9

Embrey, L. L., & Fox, J. J. (1997). Gender Differences in the Investment Decision-Making Process. Journal of Financial Counseling and Planning, 8(2), 33–40. Click here to access it.

Estes, R., & Hosseini, J. (2010). The Gender gap on Wall Street: An Empirical Analysis of Confidence in Investment Decision Making. Journal of Psychology: Interdisciplinary and Applied, 122(6), 577–590. https://doi.org/10.1080/00223980.1988.9915532

Fachrudin, K. R., & Fachrudin, K. A. (2016). The Influence Of Education And Experience Toward Investment Decision With Moderated By Financial Literacy. Polish Journal of Management Studies, 14(2), 51–60. https://doi.org/10.17512/pjms.2016.14.2.05

Farayibi, A. O. (2015). The Impact of Risk on Investment Decision in Nigeria. Research Journal of Finance and Accounting, 6(23), 52–59. Click here to access it.

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" Journal of World Economy: Transformations & Transitions (JOWETT) 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

Fellner, G., & Maciejovsky, B. (2007). Risk Attitude and Market Behavior: Evidence from Experimental Asset Markets. Journal of Economic Psychology, 28(3), 338–350. https://doi.org/10.1016/j.joep.2007.01.006

Gerrans, P., Faff, R., & Hartnett, N. (2015). Individual Financial Risk Tolerance and The Global Financial Crisis. Accounting and Finance, 55(1), 165–185. https://doi.org/10.1111/acfi.12053

Ghozali, I. (2014). Structural Equation Modeling, Metode Alternatif dengan Partial Least Square (PLS) (Edisi 4). Badan Penerbit Universitas Diponegoro.

Grable, J. (2000). Financial Risk Tolerance and Additional Factors That Affect Risk Taking in Everyday Money Matters. Entomologia Experimentalis et Applicata, 103(3), 239–248. https://link.springer.com/article/10.1023/A:1022994314982

Grable, J., Lytton, R., & O'Neill, B. (2004). Projection Bias and Financial Risk Tolerance. Journal of Behavioral Finance, 5(3), 142–147. https://doi.org/10.1207/s15427579jpfm0503_2

Hagstrom, R. G. (2010). The Warren Buffett Portfolio: Membedah Keunggulan Strategi Investasi Fokus. (1st ed.). Daras Books.

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender Differences in Risk Assessment: Why do Women Take Fewer Risks than Men? Judgment and Decision Making, 1(1), 48–63. http://www.albacharia.ma/xmlui/bitstream/handle/123456789/31957/jdm06016.pdf

He, X., Inman, J. J., & Mittal, V. (2007). Gender Jeopardy in Financial Risk Taking. Journal of Marketing Research, 45(4), 414–424. https://doi.org/10.1509/jmkr.45.4.414

Hibbert, A. M., Lawrence, E., & Prakash, A. (2008). Are Women more Risk-Averse than Men? June 2014, 1–56. https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.500.1334

Hoffmann, A. O. I., Post, T., & Pennings, J. M. E. (2013). Individual Investor Perceptions and Behavior During the Financial Crisis. Journal of Banking and Finance, 37(1), 60–74. https://doi.org/10.1016/j.jbankfin.2012.08.007

Jannah, W., & Ady, S. U. (2017). Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya. Ekspektra: Jurnal Bisnis Dan Manajemen, 1(2), 138–155. http://repository.unitomo.ac.id/657/

Jayathilake, P. M. B. (2013). Gender Effects On Risk Perception And Risk Behavior Of Entrepreneurs At Smes In Sri Lanka. Asia Pacific Journal of Marketing & Management Review, 2(2), 1–11. Click here to access it.

Kanagasabai, B. and Aggarwal, V. (2020). The Mediating Role of Risk Tolerance in the Relationship between Financial Literacy and Investment Performance. Colombo Business Journal, 14(4), 112–131. http://doi.org/10.4038/cbj.v11i1.58

Kaufman, Hughes, J. T. L., & Riccio, C. A. (2010). Handbook of education, training, and supervision of school psychologists in school and community, volume II. Taylor and Francis Group.

Kourtidis, D., Šević, Ž., & Chatzoglou, P. (2011). Investors' Trading Activity: A Behavioural Perspective and Empirical Results. Journal of Socio-Economics, 40(5), 548–557. https://doi.org/10.1016/j.socec.2011.04.008

Lo, A. W., Repin, D. V., Steenbarger, B. N., Laibson, D., Hirshleifer, D., & McCabe, K. (2005). Fear and Greed in Financial Markets: A Clinical Study of Day-Traders. American Economic Review, 95(2), 352–359. https://doi.org/10.1257/000282805774670095

Lutfi. (2011). The Relationship Between Demographic Factors and Investment Decision in Surabaya. Journal of Economics, Business, and Accountancy | Ventura, 13(3), 213–224. https://journal.perbanas.ac.id/index.php/jebav/article/view/13

Maheshwari, S., & Mittal, D. M. (2017). Effect of Age on Financial Decisions. IJARIIE, 3(6), 1445–1454. Click here to access it.

Malhotra, N. K. (2009). Riset Pemasaran PendekatanTerapan (Jilid 1). PT Index.

Maxfield, S., Shapiro, M., Gupta, V., & Hass, S. (2010). Gender and Risk: Women, Risk Taking and Risk Aversion. Gender in Management, 25(7), 586–604. https://doi.org/10.1108/17542411011081383

Nosi'c, A., & Weber, M. (2010). How riskily do i invest? The role of risk attitudes, risk perceptions, and overconfidence. Decision Analysis, 7(3), 282–301. https://doi.org/10.1287/deca.1100.0178

Nur Aini, N. S., & Lutfi, L. (2019). The Influence of Risk Perception, Risk Tolerance, Overconfidence, and Loss Aversion towards Investment Decision Making. Journal of Economics, Business & Accountancy Ventura, 21(3), 401. https://doi.org/10.14414/jebav.v21i3.1663

Nuroniyah, R., Ady, S. U., & Sugiyanto. (2018). Market Anomalies of LQ 45 Companies Stock Return Listed on the Indonesia Stock Exchange. Ekspektra: Jurnal Bisnis Dan Manajemen, 2(2), 103–120. http://dx.doi.org/10.25139/ekt.v2i2.414

Obamuyi, T. M. (2013). Factors Influencing Investment Decisions in Capital Market: a Study of Individual Investors in Nigeria. Organizations and Markets in Emerging Economies, 4(1), 141–161. https://doi.org/10.15388/omee.2013.4.1.14263

Olsen, R. A., & Cox, C. M. (2001). The Influence of Gender on the Perception and Response to Investment Risk. The Journal of Psychology and Financial Markets, 2(1), 29–36. https://doi.org/10.1207/S15327760JPFM0201_3

Onsomu, Z. N. (2015). Effect of Age on Investor Decisions. International Journal of Innovative Research & Development, 4(12), 120–123. http://www.internationaljournalcorner.com/index.php/ijird_ojs/article/view/135955

Pak, O., & Mahmood, M. (2015). Impact of Personality on Risk Tolerance and Investment Decisions: A Study on Potential Investors of Kazakhstan. International Journal of Commerce and Management, 25(4), 370–384. https://doi.org/10.1108/IJCoMA-01-2013-0002

Pratiwi, I. (2015). Pengaruh Faktor Demografi Terhadap Jenis Investasi Dan Perilaku Investor Pasar Modal Surabaya. http://jurnalmahasiswa.stiesia.ac.id/index.php/jirm/article/view/3448

Rana, H. M., Murtaza, S., Noor, F., & Inam-u-din. (2011). Effects of Demographic Factors on Risky Decision-Making Behavior. European Journal of Social Sciences, 1(26), 69–76. https://www.europeanjournalofsocialsciences.com/

Robbins, Stephen, P., & Judge, T. A. (2008). Perilaku Organisasi Edisi ke-12. Salemba Empat.

Rolison, J. J., Hanoch, Y., & Wood, S. (2012). Risky Decision Making in Younger and Older Adults : The Role of Leaming. 27(I), 129–140. https://doi.org/10.1037/a0024689

Rolison, J. J., Hanoch, Y., Wood, S., & Liu, P. J. (2014). Risk-taking differences across the adult life span: A question of age and domain. Journals of Gerontology - Series B Psychological Sciences and Social Sciences, 69(6), 870–880. https://doi.org/10.1093/geronb/gbt081

Roscoe, J. T. (1975). Fundamental research statistics for the behavioural sciences. (2nd ed.). Holt Rinehart & Winston.

Roszkowski, M. J., & Davey, G. (2010). Risk Perception and Risk Tolerance Changes Attributable to the 2008 Economic Crisis. Journal of Financial Service Professionals, June, 42–53. Click here to access it.

Schubert, R., Brown, M., Gysler, M., & Brachinger, H. W. (1999). Financial Decision-Making: Are Women Really More Risk-Averse? American Economic Review, 89(2), 381–385. https://doi.org/10.1257/aer.89.2.381

Selcuk, E., Zayas, V., & Hazan, C. (2010). Beyond Satisfaction: The Role of Attachment in Marital Functioning. Journal of Family Theory & Review, 2(4), 258–279. https://doi.org/10.1111/j.1756-2589.2010.00061.x

Septyanto, Dihin, Adhikara, Arrozi MF. (2014). Individual investors behavior in decision making on securities investment in Indonesia Stock Exchange (ISE) Journal of Economics, Business, & Accountancy, V.17 No.2. http://dx.doi.org/10.14414/jebav.v17i2.302

Sidik, S. (2020). Selama Maret, Asing Tarik Dana dari Pasar Modal RI Rp 104 T. Indonesia, CNBC. https://www.cnbcindonesia.com/market/20200327094728-17-147851/selama-maret-asing-tarik-dana-dari-pasar-modal-ri-rp-104-t

Sindhu, K., & Kumar, S. R. (2014). Influence of Risk Perception of Investors on Investment Decisions. Journal of Finance and Accounting, 2(2), 15–25. http://jfbmnet.com/journals/jfbm/Vol_2_No_2_June_2014/2.pdf

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the Determinants of Risk Behavior. The Academy of Management Review, 17(1), 9–38. https://doi.org/10.2307/258646

Sitkin, S. B., & Weingart, L. R. (1995). Determinants of Risky Decision-Making Behavior. Academy of Management Journal, 38(6), 1573–1592. https://doi.org/10.5465/256844

Slovic, P. (2000). The Perception of Risk. Earthscan.

Sugiyono. (2016). Metode Penelitian Kuantitatif, Kualitatif dan R&D. PT Alfabet.

Veld, C., & Veld-Merkoulova, Y. V. (2008). The Risk Perceptions of Individual Investors. Journal of Economic Psychology, 29(2), 226–252. https://doi.org/10.1016/j.joep.2007.07.001

Venter, G. Van de, & Michayluk, D. (2012). A Longitudinal Study of Financial Risk Tolerance. Society, 3(January), 464. https://doi.org/10.1016/j.joep.2012.03.001

VOA. (2020). Pasar Saham Rebound Setelah Aksi Jual Terkait Virus Corona. VOA Indonesia. https://www.voaindonesia.com/a/pasar-saham-rebound-setelah-aksi-jual-terkait-virus-corona/5322509.html

Wang, H., & Hanna, S. (1997). Does Risk Tolerance Decrease with Age? Journal of Financial Counseling and Planning, 8(2), 27–32. https://dx.doi.org/10.2139/ssrn.95489

Surya, Mohammad T. A.; Ady, Sri U. (2022). "Investment Decision-Making under Covid-19 Pandemic Pressure Based on Demographic Variables" Journal of World Economy: Transformations & Transitions (JOWETT) 2(04):18. DOI: https://doi.org/10.52459/jowett24180922

Williamson, J., & Weyman, A. (2005). Review of the Public Perception of Risk, and Stakeholder Engagement. Health and Safety Laboratory, 47. https://www.hse.gov.uk/Research/hsl_pdf/2005/hsl0516.pdf

Yao, R., Hanna, S. D., & Lindamood, S. (2003). Patterns of Financial Risk Tolerance: 1983 – 2001. 0932, 147–173. Click here to access it.

THE PHENOMENON OF TRADING ROBOTS AS THE DIGITIZATION OF THE CAPITAL MARKET, WILL CONVENTIONAL TRADERS VANISH?

Sri Utami Ady*[1], Mustika Winedar[2], Ilya Farida[3], Dicken Okta Sandra Susena[4], Fany Meyranda Putri[5]

[1,2,3,4,5,]Economic and Business Faculty, Universitas Dr. Soetomo, Indonesia

sri.utami@unitomo.ac.id, mustika.winedar@unitomo.ac.id, ilya.farida@unitomo.ac.id, dickenoktasansu17@gmail.com, fanymeyrandaa@gmail.com

***Abstract**:*

Many investors have adopted robotic applications in stock trading to reduce risk and maximize returns in uncertain economic conditions and the Covid-19 pandemic. Sophisticated technology and algorithms owned by trading robots are expected to be able to provide profits without the complete control of traders. Although trading experience is insufficient, trading robots are considered capable of providing benefits equivalent to professional traders. This study aimed to investigate how stock investors responded to digitalization, particularly in the financial and capital markets, and to examine the efficacy of trading robots in the capital market. This research used the qualitative phenomenological study to investigate investor behavior from an emic perspective. In-depth interviews, observation, and content analysis methods were carried out to gain an in-depth understanding to support the triangulation of the technique. The results indicated that trading robots were needed by short-term investors who traded in high frequency. Trading automation effectively reduces fear and greed that often overshadows trading, thus making investors' decisions more efficient. In some situations, trading robots won't be able to take over the function of humans in the market.

Keywords: *Phenomenology, automatic trading, investor behavior, qualitative, psychological bias.*

Abstrak

Menghadapi kondisi ketidakpastian dan pandemic Covid-19 yang belum menunjukkan titik terang kapan akan berakhir, banyak investor beralih menggunakan aplikasi robotic dalam melakukan trading saham, dalam rangka untuk meminimalkan risiko dan meningkatkan return. **T**eknologi dan algoritma canggih yang dimiliki robot trading, diharapkan mampu memberikan keuntungan tanpa kendali penuh dari trader. Walaupun pengalaman trading belum memadai, robot trading dianggap mampu memberikan keuntungan setara trader profesional. Tujuan penelitian ini adalah untuk mengeksplorasi perilaku investor saham dalam menyongsong digitalisasi terutama di bidang keuangan dan pasar modal. Untuk menggali lebih dalam seberapa efektif penggunakan robot trading dalam pasar modal. Penelitian ini menggunakan metode kualitatif fenomenologi untuk mengeksplorasi perilaku investor berdasarkan perspektif emik untuk memahami lebih dalam fenomena digitalisasi finansial. Metode wawancara mendalam, observasi dan content analisis dilakukan untuk mendapatkan pemahaman mendalam untuk mendukung triangulasi metode. Hasil penelitian menunjukkan bahwa Robot trading diperlukan oleh investor jangka pendek yang melakukan trading dalam frekuansi tinggi. Automasi trading akan sangat efektif untuk mengurangi fear and greed yang sering membayangi dalam trading, sehingga membuat keputusan investor menjadi lebih efisien. Robot trading tak akan mampu menggantikan peran manusia dalam trading dalam segala kondisi.

Keywords: *Phenomenology, automatic trading, investor behavior, qualitative, psychological bias.*

INTRODUCTION

The stock price is determined because of the behavior of market participants. When they are optimistic, the stock price rises, and vice versa. The market decline has resulted from damaging behavior. As a result, rather than being rational as it should be (Ady et al., 2022); (Sadiq et al., 2020), the stock price is more influenced by the psychological elements of market players. (Ady et al., 2013); (Ady, 2014); (Ady, 2015); (Sri Utami Ady, 2018b); (Jannah & Ady, 2017); (Ady & Hidayat, 2019); (Ady, Mulyaningtyas, et al., 2020)

Investors' discriminatory behavior includes representativeness, loss aversion, and self-attribution (Ady et al., 2013); (Ady, 2015). Shefrin, (2007) states that representativeness biases decision-making based on stereotypical thinking or analogy and will cause investors to make financial decisions that do not increase returns.

Loss aversion is a more incredible urge to avoid losses than to gain profits (Pompian, 2006). Loss Aversion makes investors risk-averse when evaluating possible profits because avoiding losses is more important than making profits (Shiller, 1998). When investments start to pay off, loss aversion individuals will quickly lock in profits and sell stocks because of fears that the market will reverse course and take profits. It causes investors to hold losing stocks and sell profitable stocks so that portfolio returns are not optimal (Sri Utami Ady, 2015); (Sri Utami Ady et al., 2013); (Yiwen, 2022). Loss aversion has made people avoid the stock market even though this market offers high returns. For example, in 1984, only 28% of US households owned shares, and only 12% owned shares of more than $10,000. Currently, families own 50% of the shares (L. Yang, 2019). This reluctance to invest in the stock market is associated with loss aversion. Investors are more sensitive to losses than gains, and because stock returns fluctuate, holding stocks will make investors often face losses, and thus they are reluctant to invest in the stock market (L. Yang, 2019).

Self-attribution bias is the tendency to describe the success experienced due to internal factors while the failure experienced due to external factors. This bias will cause: (1) Overconfidence (Ady, 2015), (2) overtrading (Jannah & Ady, 2017); (Ady & Hidayat, 2019), and (3) investors only hearing what they want to hear (Ady, 2018a), and (4) holding an underdiversified portfolio (Ady, Tyas, et al., 2020).

The Covid-19 epidemic has mentally paralyzed investors. It forces them to take more drastic measures to stop losses or seize chances to make large profits, which may create a moral hazard or put the capital market at further risk.

Many investors are resorting to automated stock trading programs to reduce risk and maximize profits in the face of uncertain market circumstances and the Covid-19 pandemic. Market participants are now using a method that is considered to be simpler for predicting future stock values as a result of the economy's digitization. Shah (2015) used data mining and machine learning approaches to create a prediction model to determine whether to purchase, sell, or keep shares. Azhikodan et al. (2019) offer automated swing trading utilizing deep reinforcement learning to identify whether to buy, sell, or hold positions. According to Pricope (2021), Deep Reinforcement Learning (DRL) in stock trading has excellent application potential and, under reasonable assumptions, can compete with expert traders (H. Yang et al., 2020). A set of trading strategies that use three basic algorithms, namely: Proximal Policy Optimization (PPO), Advantage Actor Critic (A2C), and Deep Deterministic Policy Gradient (DDPG), prove that the implementation of a set of strategies used in this study has succeeded in outperforming the Dow Jones industrial average and minimum variance portfolio allocation method, in terms of the Sharpe ratio by balancing risk and return under transaction costs. This condition raises the interest of the researchers to explore the behavior of investors in trading/investing stocks using applications to reduce trading psychology. Algorithm-based trading robots have also emerged. Sophisticated technology and algorithms owned by robots trading are expected to be able to provide profits without the complete control of traders. Even though the trading experience is not sufficient, trading robots are considered to be able to provide benefits equivalent to professional traders. However, is it true that trading robots can work so efficiently that we can fully trust them? Will robots control trade activities in the future? The specific purpose of this research is to explore the behavior of individual investors using robotic applications and attempt to answer the question: What is a Trading Robot? Why do Investors use trading robots? And how do investors do stock transactions using trading robots?

LITERATURE REVIEW

Behavioral Finance Theory

Behavioral finance is the application of psychology to financial science and has become a hot topic since the tech-stock bubble in March 2000 (Pompian, 2006). It is an investigative study that attempts to explain market inefficiencies using psychological theories. This theory observes that people often make mistakes and illogical assumptions regarding financial problems (Ady, 2015); (Ady, Mulyaningtyas, et al., 2020). Behavioral finance is a new paradigm in finance that provides a supplement to standard financial theory by introducing behavioral aspects of decision-making. It focuses on applying economic principles and principles to the development of financial decision-making (Olsen, 1998).

There are two topics in behavioral finance: (1) micro behavioral finance (BFMI), which examines the behavior or bias of individual investors that distinguishes them from rational individuals as in classical economic theory (Shefrin, 2005)(Ady et al., 2013); (Ady, 2015); (Jannah & Ady, 2017); (Ady, 2018a); (Ady & Hidayat, 2019); (Ady, Mulyaningtyas, et al., 2020), (2) macro behavioral finance (BFMA) which detects and describes anomalies in the efficient market hypothesis described in behavioral models (Nuroniyah et al., 2018); (Ady & Mulyaningtyas, 2017). This study focuses on BFMI, the study of individual investor behavior, to identify psychological biases and conduct behavioral investigations on asset allocation decisions to reduce bias in the investment process. The discriminatory behavior to be studied included Representativeness Bias, Loss Aversion, and Self Attribution Bias

Shefrin (2007) states that representativeness bias is decision-making based on stereotypical thinking or analogies and will cause investors to make wrong financial decisions. These, namely, financial choices, do not increase returns. Kahneman and Riepe (1998) stated in a similar review that investors who experience representativeness bias tend to overreact when processing information to make transaction decisions. Empirical evidence, including (Lakonishok et al., 1994); (Ady et al., 2013); (Ady, Tyas, et al., 2020), found that the representative way of thinking can mistakenly cause investors to think that a good company is a good investment.

Loss aversion is a tremendous urge to avoid loss than gain. A study of loss aversion has become a rule of thumb (psychologically); the probability of getting a loss has twice the motivational power of the likelihood of getting the same profit (Pompian, 2006). The loss aversion bias can make investors risk-averse when evaluating possible gains because avoiding losses is more important than making profits. When investments start to pay off, loss aversion individuals will quickly lock in profits and sell stocks because of fears that the market will reverse course and take profits. Loss aversion generally causes investors to hold losing and sell profitable stocks, so portfolio returns are not optimal (Ady, 2015); (Ady, Mulyaningtyas, et al., 2020);(Ady, Tyas, et al., 2020) .

Self-attribution bias is an individual's tendency to describe the success experienced due to internal factors while the failure experienced due to external factors. This bias will cause (Pompian, 2006): (1) Self-attribution bias after a long success will lead to excessive self-confidence, thus taking a greater risk of overconfidence, (2) Causing investors to trade too often (overtrading) high risk and, (3) Causing investors to only hear what they want to hear. (Ady, 2015) found that self-attribution bias appears in investors who are too confident that their success can come from their expertise, and the losses they experience come from external factors (Ady, Tyas, et al., 2020). These psychological biases make investors' returns decrease and even lose, which causes them to switch to trading robots.

Trading Algorithm

An algorithm is a set of instructions or steps written down systematically to solve logical and mathematical problems with a computer aid (Sismoro, 2005). Meanwhile, trading sells and buys products on the stock and foreign exchange markets. Thus, the trading algorithm is an algorithm that is made specifically for the process of buying and selling stocks and foreign exchange.

The role of the algorithm is essential to the computer. From the point of view of mathematics and statistics, the trading robot's ability is judged by its algorithm. Therefore, if external factors eliminate, they concluded that a trading robot could work effectively if the trading algorithm can work effectively. Trading algorithms make great use of statistics. Statistics itself is a branch of mathematics. Shah (2015) developed a predictive model to decide when to buy, sell or hold shares using data mining and machine learning techniques. Azhikodan et al. (2019) proposed automated swing trading using deep reinforcement learning. It experiments with swing trading to determine a buy, sell or hold the position. Pricope (2021) demonstrates that Deep Reinforcement Learning (DRL) in stock trading has enormous application potential that rivals professional traders under solid assumptions. Yang et al. (2020) A set of trading strategies that use three basic algorithms, namely: Proximal Policy Optimization (PPO), Advantage Actor Critic (A2C), and Deep Deterministic Policy Gradient (DDPG), shows that the implementation of a set of strategies used in this study successfully outperformed the average Dow Jones industrial rate and minimum variance portfolio allocation method, in terms of the Sharpe ratio by balancing risk and return under transaction costs.

Robot Trading vs. Conventional Trader

Trading automation research was conducted by Azhikodan et al. (2019). Using deep reinforcement learning, experiment with swing trading to determine a buy, sell or hold the position. This study answers the need to predict stock value trends that work along the reinforcement algorithm—also implementing a sentiment analysis model using a recurrent convolutional neural network to predict stock trends based on financial news. This paper aims to prove that the reinforcement learning method can teach stock trading tricks. Shah (2015) developed a predictive model to decide when to buy, sell or hold shares using data mining and machine learning techniques. Machine learning techniques such as Naive Bayes, k-Nearest Neighbor(k-NN), Support Vector Machine(SVM),

Artificial Neural Network(ANN), and Random Forest are used for predictive model development. Using data mining and machine learning techniques, the model provides buy-and-hold signals for the capital market to capital market users, such as the amount invested, time duration, minimum profit, and maximum loss. Using these buy and sell signals will reduce investors' psychological factors.

Pricope (2021) shows that Algorithmic stock trading has become a staple in today's financial markets. The majority of trading is fully automated. Deep Reinforcement Learning (DRL) agents are proving to be a force to be reckoned with in stock trading. They have demonstrated enormous potential for an application that rivals professional traders under solid assumptions, although this research is still in a very early stage of development. Ashfaq et al. (2021) show that to predict future prices, use machine learning to use past stock prices. However, Caporale et al. (2016) using trading robots shows that trading strategies exploiting daily patterns do not produce abnormal returns. There is no significant difference between the sub-periods of 2005 – 2006 (Normal), 2007-2009 (Crisis), and 2019-2011 (post-crisis). Lu, (2016) Simply looking at past stock prices is not enough to predict future returns using automated trading. A better way is to look at all the targeted sectors and use historical price information from all companies in that sector to predict the target return for the next day. Boehmer et al. (2021) Show that the average algorithmic trading improves liquidity and informational efficiency but increases short-term volatility. Ani Omuchesi & Bosire (2014) Showed that the introduction of ATS did not have a statistically significant effect on the Nairobi Securities Exchange market efficiency. Overall, the results show that automation has not yielded the expected benefits in increasing the efficiency of the Nairobi Stock Exchange.

Nunes (2021) conducted qualitative research analyzing the advantages and disadvantages of trading algorithms, showing: (1) BNP Paribas has developed many automated trading systems (ATS), but there is still much room for improvement and implementation of new systems. (2) The main benefits of the tool Automated trading software are disciplined and making no mistakes, compared to a trader who may find it challenging to stay focused on the plan. Nevertheless, a trader can take into account everything that happens and process it, while a robot can only make results based on a pre-programmed situation. (3) Automated trading systems are cheaper and increase business volume. Automated trading systems increase business profits and efficiency. However, limits must be set to maximum drawdown that can damage the robot triggered by the stop loss on each trade.

Based on the research findings above, there is a gap in the use of trading robots compared to conventional traders about whether trading robots can fully replace the human role in stock trading. Are trading robots capable of working so efficiently that we can fully trust them? Will robots control trading activities in the future?

RESEARCH METHOD

We Used Qualitative paradigm research with phenomenological methods to explore the effectiveness of robotic applications. Robot applications are used as capital market digitization through inductive thinking processes in the actual context of stock investors. The main characteristics of the qualitative approach in this study are more concerned with meaning, context, and emic perspectives. The purpose of the research in this paradigm was to understand and explore to then interpreted the meaning, not to explained and predicted a relationship as in quantitative research. In general, qualitative research aimed to understand the phenomenon of what was experienced, why he experienced it and how he experienced it.

This study uses a qualitative interpretive paradigm with Schutz's phenomenology and deontology methods. It aims to see the phenomenon's meaning and the moral aspects of investor behavior—determination of informants with purposive and snowball techniques. The research setting is individual investors. The search for informants was carried out using a purposive method, namely selecting informants by looking at predetermined qualifications. Informants are active investors who have invested in stocks for at least five years. In-depth interviews were conducted at a place agreed upon by the informants within four months. The data collection process is interactive, with a duration of 1 to 2 hours, depending on the conditions of the interview. To get key informants, researchers obtain information from securities companies, then search for informants using the snowball technique. In-depth interviews were conducted three to four times until they reached saturation depending on the researcher's subjectivity and the research problem to be investigated (Bogdan & Biklen, 2003); (Glaser & Strauss, 1967); (Guba & Lincoln, 2004).

Qualitative research does not aim to draw general conclusions but to explore the unique experience of each informant. Hence, the importance of qualitative research is not the sample size but the depth and uniqueness of the perceptions and experiences of each informant.Data collection methods used in-depth interviews, participant observation, and documentation. The criteria used for the validity and reliability of qualitative data are (Daymon & Holloway, 2007), (Shenton, 2004), credibility/trustworthiness using triangulation, member checking, and external audit. Authenticity/confirmability is done by bracketing and epoche. To complete the data and understand the problem under study, the researchers also took videos from YouTube using content analysis as part of the triangulation method.

Table 1. Demographic Data The Informant

No	Name	Age	Sex	Education	Marital Status
1	Fjr	45	Male	Bachelor	Maried
2	Iks	30	Male	Postgraduate	Maried
3	Hdr	32	Male	Bachelor	Maried
4	Brd	30	Male	High school	Unmaried
5	Rf	36	Male	Postgraduate	Maried

Source: Processed data

Data analysis used phenomenological data analysis (Moustakas, 1994). Data analysis was carried out through the following stages: (1) meaning units and grouping themes. This stage is the phenomenological reduction stage. (2) Individual textural-structural descriptions, concluding each theme to make in-depth textural and structural descriptions (full descriptions) of the informants' experience. (3) Cross-site analysis. At this stage, cross-analysis was carried out for the same unit of meaning among the participants and made a textural and structural description for all participants (Composite textural and structural description) to find the essence of substance. (4) Identification of the experience's essence results from a composite textural-structural description narrative or cross-site analysis. This stage integrates intuition, tacit dimensions, self-search, and reflection from textural and structural descriptions (Creswell, 2007).

RESULT AND DISCUSSION

Robot trading is a type of automated trading. The software executes trading deals entirely automatically and according to programmable algorithms. Humans alter only the program parameters while this software operates autonomously. Robots used in trading are not like those in science fiction. It takes the form of server-side software (high-performance computer). Therefore, traders of the future will be a group of trading servers. (Wira, 2021)

Trading robots or automated trading are often referred to as algorithmic trading. Generally, each trading robot has its strategy and algorithm, which its maker creates. These strategies and algorithms are called black boxes, referring to their secretive nature. Trading robots are often also called black box trading. Every major institution that plays in the financial market has its black box, for example, Chameleon (developed by BNP Paribas), Stealth (developed by Deutsche Bank), Sniper, and Guerilla (developed by Credit Suisse). Retail traders are now starting to use trading robots. For example, what is quite common is done by stock traders with their respective online trading software. Or trade Forex, commodities, and indices with an Expert Advisor (EA) in MetaTrader.

There are several advantages of using trading robots, including (1) Total elimination of the psychological elements involved in trading. Thus, it is expected that trading robots can eliminate human error; (2) large volume of transactions that can make continuously. The trading robot can carry out continuous transactions on all markets, applying the same algorithm repeatedly, without lag; (3) Speed; trading robots can execute transactions very quickly. It is analogous to the velocity of an electron. When first introduced trading robots, the speed factor became an advantage. But as more and more users of trading robots, the speed factor is no longer the main advantage.

Should Trading Robots be Used?

In March 2014, Virtu Financial, an HFT company, reported that it had made 1277 profitable trades over the past five years out of 1,278 days. Virtu only lost one day in 5 years. The claims given by Virtu indicate that trading robots can be profitable. But not all trading robots can be beneficial. For a trading robot to be good, it must have two conditions: 1. an excellent algorithm. 2. High-speed servers.

Retail traders do not have these two conditions. Fast servers are costly. Algorithms that are more powerful than institutions are also challenging to create. It takes intellectual abilities and very high research costs to make these algorithms.

Trading robots are all merely extensions of human emotions, even though they are getting more and more common. In the market, human psychology continues to be necessary. And because of that mentality, even the most advanced algorithms cannot predict the market. For traditional traders, mainly those still trading manually, there is always a chance to profit from the market.

The first reason why Forex employs trading robots more than the stock market is that the stock market is not as intense as the forex market. Thus retail traders don't need to use trading robots, claims Informant 1 (Fj) from Pintraco Securitas. Stocks and foreign exchange operate differently from one another fundamentally. Investors can sell foreign exchange in forex transactions even if they do not have foreign currency. Margin

trading is the phrase used in trading. However, margin trading is not permitted in the capital market. As purchasing shares entails purchasing a corporation, an investor who already has shares may sell them as follows:

> *"Well, if we buy shares, we buy a company. If we sell shares, we sell a company. However, if we already own a company, we can sell it because other things in shares are certain. For example, when we buy shares, we receive a certificate that our actual purchase will bind the company. If there is nothing comparable in Forex, you can discuss purchasing or selling first because it is simpler to move around if it is stock. You don't have to buy it first; then we can sell it. When the company makes a profit, we splash the dividend " (Fjr. .Als.1)*

Foreign exchange transactions are more accessible in transferring ownership from one investor to another because they are not related to the right to dividends as in stocks, so the recording is easier.

The absence of conditional orders is the second justification for not using a robot trading in stock trading. It indicates that in certain securities businesses, charges set in the trading system application are used to execute transactions involving the purchase or sale of shares. The state of the market largely influences every transaction made when you set up a purchase or sale order. It is contrary to the automatic purchase and selling transactions that take place in foreign exchange, as explained by Fjr:

> *"It's not like a robot in Forex that can be set up; if you buy the stock and then set it to sell, it will be set. The order condition is that when you want to sell, you must understand the conditional order on purchasing and selling. Yes, it has to do with selling it; therefore, we want to know how much to ask for it to share; at this point, I want to sell it for 1,500 or stop losing money." (Fjr.Al.2)*

The GTC (Got Till Cancel) menu, which is a feature to sell shares at the desired price with a time limit of one month or until the investor cancels the instruction, is present in stock trading programs, particularly in the Pintraco system. Investors who want to sell shares at a specific price without tracking the market and placing sell orders continuously are the target audience for this product. Therefore, if investors wish to sell their shares at a specific price, they can do it by using the GTC menu without having to keep an eye on price changes.

The term stop loss means selling at a loss. It is performed by investors if the stock price continues to decline. To limit his losses, he uses the stop loss menu. If the price has been reached, the system will automatically sell to avoid more severe losses. There is another term called trailing stop. This menu is used when investors want to monitor the market and make transactions according to market conditions.

Because stock transactions are lengthy and highly conditional, according to Fjr, trading robots are rarely used in them. Instead, investors must keep an eye on the market and alter their menu as necessary. Investors can set up transactions using the settings menu in the securities application system. For example, each security will create its own software, "profit" for Pintraco Securities, "Mouse" for Mandiri Sekuritas, and so forth. Each business has unique qualities that help it draw in and facilitate investors. Some are straightforward and require a laptop, while others, like Pintraco, may already be used on Android devices while still being more popular for foreign exchange transactions.

The stock market is more passive than the FX market, which is the third reason there is no need for trading robots in stocks. The capital market is less dynamic than the foreign exchange market, which changes rapidly every minute or even seconds. If the price is as desired, you simply monitor the market and sell it if necessary—possibly even on a different day for swing traders or position traders. In contrast to the foreign exchange market, which may be set up with a 1% selling down, it still requires manual market monitoring from humans every day, except for setting up robots, as previously mentioned.

> *"Yes, if the robot is set up, we don't need to watch it. For instance, buying for 1000 and then selling it at 1500, but I asked the computer to monitor it first up to 1,600, 1,700, precisely at the price of 1000, I input the trailing stop menu of 1,500." (Fjr.Al.4)*

Stocks are enduring, long-term investments. Pintraco Securities, on the other hand, offers possibilities for investors who desire quick trading. However, not all securities firms have access to this capability. However, each security has a unique application, and which one is created depends on the firm.

Because shares are stored rather than sold daily, mainly until they are sold at a loss, long-term investors who purchase shares to be maintained do not need to use stop loss, GTC, or trailing stop facilities. Because stock prices change, it is preferable to save. The cost of the stock that was bought this morning may have declined, but new investors who don't yet understand trading and yet have a high level of psychology may feel terrified and place a stop loss. In reality, the stock price spiked again a short while later, making investors regret their decision. According to the interview with Fjr, many investors still behave in the described manner simply because they were unaware of the differences between day trading and long-term investing.

> *"When someone has a need and does not have the opportunity to monitor it, he is represented by a stop loss. But if he is monitoring, then stop loss is not needed because stop loss takes time. If, for example, it goes down, it wants to go up and release the stop loss, so if we monitor the market, it's better. For example, it's time to sell - instead of seeing the price again, just sell it. A trader understands the time to sell, to use a stop loss, if it's still okay, you don't know the range of price movements selling little by little is what you want to trade."(Fjr.Plk.1)*

While each securities business produces its software, the features are often similar. However, the price movement in Forex is more active than in stocks, which can increase by 1% if you wait all day or even just for a half-hour. There can be just one that works with Android or solely on a laptop.

In line with the development of transactions on the stock exchange, transactions are generally carried out by manual trading. Manual trading is trading stocks manually. If there are exciting shares to buy, buy trading is carried out by investors manually by entering a buy order into the application system at a securities company by determining the desired price. And when it is felt that the profit obtained is quite large, then a sell order is manually entered into the application system at the desired price.

Automation is when a process is set up, so we don't have to watch it constantly. On the Indonesia Stock Exchange, automation has been there while in the application system used by securities firms, such as the "pending order" feature when planning to sell shares at a specific price. Since the application system at the broker handles transaction execution, numerous third parties provide apps outside of stock brokers that create concepts for analysis before returning to the broker. As Ryan Filbert states, facilities like trailing stops are utilized to perform share buying or selling operations. Still, the system is necessary to monitor the market as investors desire.(Filbert, 2021),:

The fact that the forex market is open 24 hours, five days a week, means that traders need more tools to monitor the market and even conduct regular trading, which brings us to the fourth reason why Forex needs trading robots more than stocks. On the other hand, the capital market is more laid back because it is only open from 9:00 to 15:00. Bear in mind that no trading robot can ensure that using a specific robot will always result in a profit and never a loss. It should mention that it is really a gimmick if something is offered. Every investment decision must have a risk associated, so no investment made utilizing any application will be risk-free. (Filbert, 2021):

On the other side, the use of robots was influenced by the state of the economy. The usage of trading robots is hazardous when the economy is unstable since investors find it challenging to set up trading robots owing to shifting circumstances, as stated by Brn below:

> *In today's economic situation, trading robots, in my opinion, can potentially be risky. Never utilize it since the trading robot is useless now that the economy is shaking. We can use robots if the economy is stable. Most of the time, we can set up a trading robot when we know the economy is in trouble and pinpoint the problem. If this type of robot trading is challenging, we set it ourselves, and the level of protection is up to us." (Wwc.Brn.ALS_1)*

Stages in Automation (Trading Robots)

Automation in stock trading goes through various stages. It happens following the times and the development of knowledge from investors. The stages in the development of trading automation are as follows:

1. Stage 1. Manual Trading

   At this stage, stock trading is performed manually by doing fundamental analysis, reading the issuer's financial reports, reading news in newspapers, and looking for information on the internet or anywhere. Self-performance includes doing technical analysis, making support-resistance, calculating indicators, and making charts to determine when buy and sell positions will be carried out; until then, carry out the execution (buy or sell) by yourself. Ryan Filbert defines it as "people who understand what they read." Here is the generation of trading manuals according to Rf (Filbert, 2020)

   > *"The generation of automation occurs in several stages. We have discussed trading robots; if I'm not mistaken, that's the title. You can look it up 2 or 3 years ago, and I will refresh it again to make something more current. That more updated; yes, the first is the manual generation. The manual generation is the person who trades in a manual style, they can read a newspaper, he knows that it is above, he can know he is below, it is support, this is resistant this is a reversal. This direction is continuous. He knows whether to be right or wrong. Everyone who reads the newspaper knows what is going on. They can read a newspaper, and they can get the point. He can see the point, oh the point is above, below, on the left, oversold, overbought, right, there is a name called Break Out, Break Down, there is ascending, triangle lalalala, lalalala the point, is that manual means that people who understand what the manual reads " (Rf .Otm.1)*

2. Applied Generation

   At this stage, investors look for available analytical tools to make it easier to understand the news in the newspaper. He searches for various available indicators and performs filtering; which ones he feels are suitable will be used, and those deemed unsuitable will be discarded. Get to know moving averages, RSI, and so on, which are indicators that are available to help him do technical analysis, such as the following expression from Rf (Filbert, 2020):

   > *"This generation has started adding applied moves. I have to find support- resistance- I'm not sure what tools can help me find out about support. And resistance aha its name is moving average- how to make a manual, it's applied instead of automatic. Why? Because the indicator has appeared, you just take it, and*

it appears; you have to read it. I don't fit this, I match this, I don't fit, I throw away what doesn't fit eh this one fits, but I'll modify it. It is an applied version that was taken and read to make it easier, so this is part of the technical analysis, but if I say modern technical analysis.” (Rf.Otm.2)

3. Evolution Level One Generation
   The evolution level one generation is a generation that searches for various tools/indicators in deciding to buy/sell shares and modifies various indicators it encounters to produce an applied analysis model for itself, which is a combination of multiple analyses. So that it can better understand the news, make independent decisions (Filbert, 2020).
   "This generation is people who already know how to read newspapers. He understands the indicators, and he starts to know the weaknesses of this indicator, whether lagging, leading, false signals or the size is not quite right. So I will use this size - he already knows, so finally he says uhm if this and combined, it will produce something like this. It signifies a good application, so he made his version of the move, and so did I in the past because I have ideals. I also made my own applied version - so, for example, if you read in my book, the title is stock investing swing trader world'ways. This book is a classic technical analysis and merged with the modern - I already have automation. The important thing is to increase profit and reduce costs, which means I can make more profit, so there's already a rebound. The sponsor's message at the beginning before concluding can't be a layman. Indeed trading can't be more common than an investor, so being a part of active trading can generate a profit. You have to be careful. If you leave it too much to the robot, you haven't concluded yet. Still, I've opened it halfway, so this level one Evolution generation doesn't only use applied science but already has its own applied knowledge. He can combine it, so it's like the one on the right of your screen, actually is an applied indicator of my version of the swing trading strategy that has a reborn that can measure the depth that I use to like". ((Rf.Otm.3)
4. Second Level Evolution Generation
   The automation generation is the second evolution stage; at this level, investors adjust a variety of indicators to determine whether to buy or sell a position, issue buys and sell alarm signals and carry out direct buys and sells, sometimes with the assistance of experienced advisers. For them to transact automatically, as explained in the following Rf (Filbert, 2020) :
   "In this generation, a robot is made that automatically gives signals when it's time to buy or sell so you can press buy or sell when the signal appears but can automate buy and sell. So at level 2, after he knows there is a buy, he will immediately buy the order if you opened the manual earlier, read your laptop, read it first after reading you take action. If this is you, don't you, you don't see, you just watch like this, as soon as he appears, the sign is immediately ordered, meaning that this move is much more complex. After all, it has arrived at buying and selling because someone said, " wow, Ryan, if I was again cooking, " it turns out that the indicator on the back of my laptop sounds ting-tung-ting-tung, buying-buying, but my hands are dirty, how do I do it? Yes right. Some people think with his strategy. Is it wrong? Of course not; why? Because maybe the strategy is concise, time precision matters for him. We don't know. Still, the point is that in this level 2 generation, it's already like pokemon; yes, there is evolve, level 1, that's an indicator that has been tweaked at level 2 until the one who tampered with was able to transfer orders to buy and sell". (Rf.Otm.4)
5. Third Evolution Generation Level. The third level of evolution is the generation of increasingly intelligent trading robots. These smart robots can learn to adjust to changing market conditions, where investors take different indicators and modify them to determine to buy or sell positions and, at this level, increasingly sophisticated trading robots.
6. Copy Trade Generation
   These investors trade by imitating the trades of others. It is comparable to the cooperative management of investment funds. The parent account is replicated to the members, ensuring that other investors will also receive any purchases made by investors on the parent account. It is comparable to fund management for an investment manager or a fund manager. We don't know if the parent account employs a computer or a human, but what is certain is that investors do nothing but follow what the parent account does. Each investor will receive a return under the percentage of funds entered. According to Rf below, this is one sort of trading automation frequently used. (Filbert, 2020):
   "Trading automation is not only for robots. In more advanced times, there is also a name called copy trade, which means you copy someone else's account. Your account is someone else's account and will be mirrored like someone else's account. If he makes a purchase, you also make a purchase. If he sells, you also sell. We don't know if this person bought it because of a robot, so he installed it on the account. If your place is automatic, he is a robot, or he does a manual transaction. Why? Because you do nothing can also be called a percentage allocation management module. This fund manager is mostly Forex, so there is a pulling account. The money is placed as a percentage, and it will be transacted. Yes, it's still possible that the robot can be manual, in which automation of your trading goes up to the robot or up to the copy trade, where the copy trade is your account on the mirror. With someone's account or your

money is put in one place with a percentage allocation management module so that in percentage terms it's like share ownership, it's like a business, the trading business is both your money is 10%, my money is 90%, who else's money is that, so the point is 100 People manage this %, buy and sell using this account and it turns out that if this is a profit or loss, this account will be divided prorated according to the ownership".(Rf.Otm.5)

Trading robots are becoming more complex and intelligent thanks to the increasingly quick pace of technological advancements, including artificial intelligence (AI) technology. Smart robots can now learn to adjust to changing market conditions. However, is it accurate to say that there are error-free trading robots? Rf's experience in the capital market shows that there has never been an unbeatable trading robot. A trading robot always wins because no matter what technology is used, it will never be 100% accurate. There will always be errors, things will go wrong, the market will change drastically, and other factors will prevent the robot from functioning best. Because the market is dynamic and not static, it will constantly change in response to factors such as politics, the economy, and market emotion. Even if there is, Rf contends that it might not belong to the average retail investor. It is doubtful whether anyone who claims to have a trading robot that never loses is telling the truth because the conglomerate has much greater access to everything and can pay highly skilled individuals, including programmers and Nobel Prize winners. However, they are human and can make mistakes. Is Google Maps always correct, much like how it employs AI technology? We once discovered that Google Maps itself occasionally had glitches or errors.

Robots are used to assist humans in their work or as instruments for decision-making, but they cannot immediately take the position of humans since humans are the ones that set up robots, which needs to be done. Therefore, if people do not adapt to the times, grow in knowledge in line with the times, and better comprehend technology in line with the times, they will not be able to exist, and over time, they will be replaced by people who do. According to Rf, if stupid people use smart robots, so they will become stupid tools. To apply and understand these tools, he must have learned and understood trading, not people who are just becoming familiar with the capital market. These tools are less useful and high risk, as described in the following Rf. (Filbert, 2020):

In line with Rf, Brn also has the same opinion about trading robots, where the use of trading robots depends on the wearer. If the user can't analyze the market, then the use of robots will not be useful because robots function to help humans, but humans do the settings for the robots, as he stated:

"Because, once again, it's in our tendency to put anything up if the settings don't grasp how the robot performs effectively, the trading robot might have a positive or negative outcome depending on who uses it. We absolutely don't utilize robots when we understand and can assess the market. They will undoubtedly do their own calculations. Everyone has a different indicator, and how it is used will determine whether the robot survives." (Wwc.Brn.Rsk_1)

So investors are required to be careful with advertisements that claim trading robots are invincible. Robots cannot make trades that are one hundred percent correct, because in the end it will lead to risks that may never be imagined.

Stock Trading Robot Investor Behavior Model

In terms of timezone or timeframe, there are two types of investors in investing: long-term investors and short-term investors. Long-term investors invest in a period of one year or more; they buy stocks to be kept in the long term. The second type of investor is a short-term investor, who invests in stocks in the short term (less than one year) and then resells them.

Ady et al. (2013); Ady (2015); Ady (2018a) shows that short-term investors can be distinguished according to how long they hold shares for later resale (Trading). These short-term investors can also be further divided into day traders, swing traders and position traders, where day traders are traders who make daily transactions, swing traders are traders for a period of weeks to months, and position traders are traders who trade stocks in the long term (monthly to 6 months). Short-term investors often experience psychological pressure which causes their behavior in stock trading to experience biases such as overconfidence, representativeness, loss aversion, and self-attribution bias (Ady et al., 2013); (Ady, 2015); (Ady, 2018a). These various psychological biases make investors' returns decrease and even lose, which causes them to switch to trading robots.

In the age of globalization, automation or trading employing robot applications is becoming more prevalent. Digitization is used by many different life lines, including those in the financial market, to expedite and streamline work. The more sophisticated application systems used by securities firms, which have features or menus that investors can customize when they are unable to monitor the market, are examples of how the capital market is becoming more digital. These systems allow for successful and efficient trading. At the moment of trading, investors might still complete other tasks. For short-term investors, features like stoploss, trailing stops, got till cancel, and others improve the effectiveness and efficiency of trading.

The usage of automation and trading through robot applications is growing in the age of globalization. Digitization is used by a variety of industries, including the capital market, to expedite and streamline tasks. The

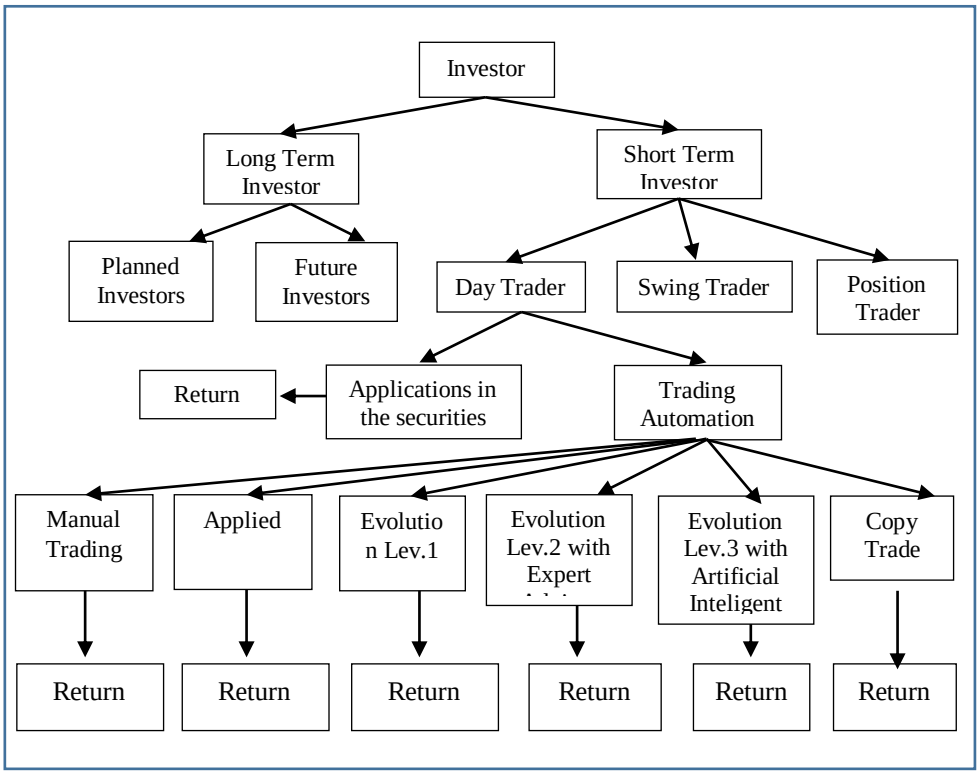
increasingly sophisticated application systems used by securities firms, which have features or menus that investors can customize when they are unable to monitor the market, are examples of how the capital market is becoming more digitalized. These systems allow for effective and efficient trading. During trading hours, investors can still complete other tasks. The effectiveness and efficiency of trading for short-term investors is increased by features like stoploss, trailing stop, got till cancel, and others.

Automation has been carried out in stages in applications in securities companies. The existence of various menus such as pending orders, trailing stops, got till cancel (GTC) and so on is intended to provide facilities and conveniences for investors who cannot monitor the market fully due to other jobs, so that they can continue their work without having to monitor the market all day. However, all these facilities are actually only suitable for investors who do day trading, and less suitable for long-term investors. For long-term investors, when he uses fundamental analysis as a basis for stock selection, starting from looking at macro conditions both abroad and at home, looking at the good industrial sector at that time, and the company's financial condition, it will make it easier to choose stocks. Purchasing undervalued, highly liquid, and market-capable stores will lower the danger of losing investment capital (Capital lost). Nunes (2021) found that the main benefit of automated trading software is discipline and not making mistakes, compared to a trader who may find it challenging to stay focused on the plan. But a trader can take into account everything that happens and process it, while a robot can only make results based on pre-programmed situations. Lu (2016) demonstrates that only examining historical stock prices is insufficient to forecast future returns. (Boehmer et al., 2021) The beneficial effects of algorithmic trading are greater in large stocks than in small stocks.

In contrast to long-term investors, who purchase shares intending to hold them for the long term, they do not need to employ the aforementioned features because they believe they will not need to sell any time soon, negating the need to keep track of the market. In particular, position trading investors and long-term investors will sell the shares when the stock price is overvalued (Ady, 2018a); (Ady, Mulyaningtyas, et al., 2020).

Short-term investors/day traders use trading robots to help make analysis and decision-making easier. They do the settings on the robot according to the market conditions they face. It is done by investors, especially if they do not have time to monitor the market continuously. There are two ways to automate trading. The first is to use an application at a securities company. Various menus are increasingly growing according to the needs of investors. Currently, many securities companies provide trading automation facilities such as Got till cancel, trailing stop, and pending orders, which makes it more accessible as a form of automation trading. And secondly, to automate trading by the stages described in the previous subtitle for increased returns, level one evolution generation, level two evolution generation, level three evolution generation, and Copy Trade Generation. The stock trading robot investor behavior model can be seen in Figure 1.

Trading robots will be employed by short-term investors more and more in the future, yet ultimately their success will depend on their knowledge of and aptitude for market analysis. Robots do not replace people; yet, even the most advanced robots will be useless in the hands of fools who are ignorant of the financial market.



Source: Processed data, 2022

Figure 1. Stock Trading Robot Investor Behavior Model

The key advantage of automated trading software, unlike a trader who finds it challenging to maintain concentration on the plan, is discipline and not making mistakes. However, a trader can process everything that occurs, unlike a robot, which can only produce outcomes based on predetermined circumstances.

CONCLUSIONS AND RECOMMENDATIONS

Investors in the short term who trade frequently need trading robots. The establishment of psychological bias and cognitive bias behavior is often a consequence of trading with high frequency and limited time horizon. Trade automation will be particularly effective in minimizing the fear and greed that frequently overshadow trading, making investors' decisions worse and lowering returns. This biased behavior will be significantly reduced.

Various degrees of trading automation demonstrate the system's level of sophistication. Securities firms continuously offer inventive and unique menus to aid investors in automated trading. Stock trading does not require a trading robot because of several factors that set it apart from FX trading: (1) Since the stock market is less volatile than the forex market, retail traders are not required to use trading robots. (2) Order-conditional justifications. This indicates that in certain securities businesses, orders set in the trading system application are used to execute transactions involving the purchase or sale of shares. (3) Because of how more passive the stock market is compared to the currency market, (4) Since the forex market is open five days a week, twenty-four hours a day, forex traders require more instruments that can track the market and even engage in regular trading. On the other side, the Indonesian capital market is more laid back because it is only open from 9:00 to 15:00.

Trading robots and automation will be employed more and more in the future, but it is important to keep in mind that no matter how clever a trading robot is, it cannot take the position of humans because it must be programmed by humans. However, those who refuse to change with the times and adopt new technology will be displaced by those who can keep up with it because, in the future, automation will be so advanced that it will permeate all industries, including finance and the capital markets.

IMPLICATIONS, LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Implications

Investors must keep up to date with technology and learn to automate trading. Still, even more important is to understand how stock prices are formed—trying to be more rational using fundamental and technical analysis as well as a discipline with a trading plan to reduce trading psychology factors. It is because trading robots can only be practical if they are set up by people who understand the science of investment and stock price movements**.**

Limitations

The limitation of this research is the absence of female informants who can complement the behavior of investors from a different gender perspective. The limited number of investors willing to participate in being interviewed and the condition of the COVID-19 pandemic that has not entirely subsided are limitations too for researchers in collecting data.

Direction for Future Research

For future research, it is essential to test and compare returns using robots trading and manual trading to see if there are significant differences between the two trading methods to complement the results of this research.

Acknowledgement

This research was funded by the Directorate of Research, Technology and Community Service, Directorate General of Higher Education, Research and Technology, Ministry of Education, Culture, Research and Technology for the fiscal year 2022, Number SP DIPA-023.17.1.690523/2022 2nd revision, April 22nd, 2022.

REFERENSIS

Ady, S U, Mohamad, S., Pantamee, A. A., M, K. O. C. H. V, & Chong, K. W. (2022). Effects of Ceo Incentives and Corporate Social Responsibilities on Financial Performance. *Polish Journal of Management Studies*, *25*(2), 9–20. https://doi.org/10.17512/pjms.2022.25.2.01

Ady, Sri Utami. (2015). *Manajemen Psikologi dalam Investasi Saham, Kajian Fenomenologi dalam Sentuhan Behavioral Finance* (Monika Bendatu (ed.); 1st ed.). CV. Andi Offset. https://doi.org/http://repository.unitomo.ac.id/id/eprint/231

Ady, Sri Utami. (2018a). The Cognitive and Psychological Bias in Investment Decision-Making Behavior: (Evidence From Indonesian Investor's Behavior). *Journal of Economics and Behavioral Studies*, *10*(1), 86–100. https://doi.org/10.22610/jebs.v10i1.2092

Ady, Sri Utami. (2014). Nilai-nilai dibalik Kestabilan Psikologis, Kunci Sukses Berinvestasi (Studi pada Perilaku Investor di Bursa Efek Indonesia. *Simposium Riset Ekonomi VI-2014*, 323–334.

Ady, Sri Utami. (2018b). The Moral Values of Psychological Stability , Successful Key of Investment. *1st International Conference on Intellectuals' Global Responsibility (ICIGR 2017)*, *125*(Icigr 2017), 33–37.

Ady, Sri Utami, & Hidayat, A. (2019). Do Young Surabaya's Investors Make Rational Investment Decisions ? *International Journal of Scientific & Technology Research*, *8*(07), 319–322. https://doi.org/https://www.ijstr.org/research-paper-publishing.php?month=july2019

Ady, Sri Utami, & Mulyaningtyas, A. (2017). Eksplorasi Tingkat Efisiensi Pasar Modal Indonesia, Studi Kasus di Bursa Efek Indonesia. *Ekspektra: Jurnal Bisnis Dan Manajemen*, *1*(2), 103–123. https://doi.org/DOI: http://dx.doi.org/10.25139/ekt.v0i0.184

Ady, Sri Utami, Mulyaningtyas, A., & Farida, I. (2020). Overconfidence : Technical Analysis in Trading , Investment or Gambling ? *Conference on Islamic and Technology*. https://doi.org/10.4108/eai.21-9-2019.2293942

Ady, Sri Utami, Sudarma, M., Salim, U., & Aisyah, S. (2013). Psychology's Factors of Stock Buying and Selling Behavior in Indonesia Stock Exchange (Phenomenology Study of Investor Behavior in Surabaya). *IOSR Journal of Business and Management*, *7*(3), 11–22. https://doi.org/10.9790/487X-0731122

Ady, Sri Utami, Tyas, A. M., Farida, I., & Gunawan, A. W. (2020). Immediate and Expected Emotions toward Stock Returns through Overconfidence and Cognitive Dissonance: The Study of Indonesian Investor Behavior. *PalArch's Journal of Archaelogy of Egypt/Egyptology*, *17*(3), 1140–1165. https://doi.org/https://archives.palarch.nl/index.php/jae/article/view/238/241

Ani Omuchesi, J. A., & Bosire, M. (2014). The Effect of Automation on Stock Market Price Volatility: A Case of Nairobi Securities Exchange. *IOSR Journal of Economics and Finance*, *5*(3), 71–79. https://doi.org/10.9790/5933-0537179

Ashfaq, N., Nawaz, Z., & Ilyas, M. (2021). *A comparative study of Different Machine Learning Regressors For Stock Market Prediction* (Issue April). http://arxiv.org/abs/2104.07469

Azhikodan, A. R., Bhat, A. G. K., & Jadhav, M. V. (2019). Stock Trading Bot Using Deep. In I. Guru Nanak Institutions, Ibrahimpatnam, Telangana (Ed.), *Innovations in Computer Science and Engineering* (Issue May, pp. 41–49). © Springer Nature Singapore Pte Ltd. 2019. https://doi.org/10.1007/978-981-10-8201-6

Boehmer, E., Fong, K., & Wu, J. (Julie). (2021). Algorithmic Trading And Market Quality: International Evidence. *Journal of Financial and Quantitative Analysis*, *56*(8), 2659–2688. https://doi.org/https://doi.org/10.1017/S0022109020000782

Bogdan, R., & Biklen, S. K. (2003). *Qualitative Reseach for Education: an Introduction to theory and Method* (4th ed.). Pearson.

Caporale, G. M., Gil-Alana, L. A., & Plastun, A. (2016). The weekend effect: an exploitable anomaly in the Ukrainian stock market? *Journal of Economic Studies*, *43*(6), 954–965. https://doi.org/10.1108/JES-09-2015-0167

Creswell, J. W. (2007). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. In *Book: Vol. 2nd ed*. https://doi.org/10.1016/j.aenj.2008.02.005

Daymon, C., & Holloway, I. (2007). *). Metode-metode Riset Kualitatif dalam Public Relation dan Marketing Communiccation* (S. I. Astuti (ed.); 1st ed.). PT. Bentang Pustaka.

Filbert, R. (2020). *Robot Trading 1%/Hari, Yuk dibeli*. 27 November 2020. https://youtu.be/B8bVDbz8DlE

Filbert, R. (2021). *Robot Trading juga Ada di Saham*. 23 Oktober 2021. https://youtu.be/czEeKthG9mM

Glaser, B. G., & Strauss, A. L. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. In *Observations* (Vol. 1, Issue 4). https://doi.org/10.2307/2575405

Guba, E. G., & Lincoln, Y. S. (2004). Competing paradigms in qualitative research. In *Approaches to qualitative research: A reader on theory and practice* (pp. 17–38). https://doi.org/http://www.uncg.edu/hdf/facultystaff/Tudge/Guba%20&%20Lincoln%201994.pdf

Jannah, W., & Ady, S. U. (2017). Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya. *Ekspektra: Jurnal Bisnis Dan Manajemen*, *1*(2), 138–155. https://doi.org/10.1007/BF00139728.5

Kahneman, D., & Ripe, M. W. (1998). Aspects of Investor Psychology. *The Journal of Portfolio Management*, *24*(4), 52–65. https://doi.org/DOI: https://doi.org/10.3905/jpm.1998.409643

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian Investment, Extrapolation, and Risk. *The Journal of Finance*, *49*(5), 1541–1578. https://doi.org/10.1111/j.1540-6261.1994.tb04772.x

Lu, N. (2016). *A Machine Learning Approach to Automated Trading*. Boston College Computer Science.

Moustakas, C. (1994). *Phenomenological Research Methods* (1st ed.). Sage Publication. http://methods.sagepub.com/book/phenomenological-research-methods

Nunes, M. D. A. (2021). *Automated Trading Systems VS Manual Trading in Forex Exchange Market*. NOVA Information Management School.

Nuroniyah, R., Ady, S. U., & Sugiyanto. (2018). Market Anomalies of LQ 45 Companies Stock Return Listed On the Indonesia Stock Exchange. *Ekspektra: Jurnal Bisnis Dan Manajemen*, *2*(2), 103–120. http://ejournal.unitomo.ac.id/index.php/manajemen/article/view/414/556

Olsen, R. A. (1998). Behavioral finance and implications volatility for stock-price volatility. *Financial Analysts Journal*, *54*(2), 10–18.

Pompian, M. M. (2006). *Behavioral Finance and Wealth Management How to Build Optimal Portfolios That Account for Investor Biases* (1st ed.). John Wiley & Sons.

Pricope, T.-V. (2021). *Deep Reinforcement Learning in Quantitative Algorithmic Trading: A Review*. http://arxiv.org/abs/2106.00123

Sadiq, M., Pantamee, A. A., Mohamad, S., Aldeehani, T. M., & Ady, S. U. (2020). Corporate governance and earnings management: Evidence from listed non-financial firms. *Polish Journal of Management Studies*, *22*(2), 456–469. https://doi.org/10.17512/pjms.2020.22.2.30

Shah, P. (2015). *Automated Stock Market Trading System* (Issue c). https://doi.org/10.13140/RG.2.1.1998.3520

Shefrin, H. (2005). *A Behavioral Approach to Asset Pricing*. Academic Press. https://www.elsevier.com/books/a-behavioral-approach-to-asset-pricing/shefrin/978-0-08-047603-2

Shefrin, H. (2007). *Behavioral Corporate Finance: Decision That Create Value* (McGraw-Hil).

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*. https://doi.org/10.3233/EFI-2004-22201

Shiller, R. J. (1998). Human Behavior and the Efficiency of the Financial System. In *NBER Working Paper Series* (MA 02138; 6375). https://www.nber.org/system/files/working_papers/w6375/w6375.pdf

Sismoro, H. (2005). *Pengantar Logika Informatika. Algoritma dan Pemrograman Komputer* (Dwi Prabantini (ed.); 1st ed.). Andi Offset.

Wira, D. (2021). *Robot Trading di Masa Depan*. 18 Juni 2021. https://juruscuan.com/belajar/trading/523-robot-trading-di-masa-depan

Yang, H., Liu, X. Y., Zhong, S., & Walid, A. (2020). Deep reinforcement learning for automated stock trading: An ensemble strategy. *ICAIF 2020 - 1st ACM International Conference on AI in Finance*, 1–9. https://doi.org/10.1145/3383455.3422540

Yang, L. (2019). Loss Aversion in Financial Markets. *Journal of Mechanism and Institution Design*, *4*(1), 119–137. https://doi.org/10.22574/jmid.2019.11.005

Yiwen, H. (2022). Impact of Investors' Loss Aversion and Overconfidence on Market Performance Evidence from China Stock Markets. *Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021)*, *203*(Icemci 2021), 2022–2025. https://doi.org/10.2991/assehr.k.211209.330

REPUBLIK INDONESIA
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA

SURAT PENCATATAN

CIPTAAN

Dalam rangka pelindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan	:	EC00202277442, 20 Oktober 2022
Pencipta		
Nama	:	**Dr. Sri Utami Ady, SE., MM,Ilya Farida, SE., MM dkk**
Alamat	:	Taman Pondok Jati CI/17, RT 29, RW 10, Kedungturi, Taman, Sidoarjo, JAWA TIMUR, -
Kewarganegaraan	:	Indonesia
Pemegang Hak Cipta		
Nama	:	**Universitas Dr. Soetomo**
Alamat	:	Jl. Semolowaru No.84, Menur Pumpungan, Sukolilo, Surabaya, JAWA TIMUR, 60118
Kewarganegaraan	:	Indonesia
Jenis Ciptaan	:	**Karya Ilmiah**
Judul Ciptaan	:	**THE ROLE OF INVESTORS' BEHAVIOR AND PSYCHOLOGICAL UNBIASEDNESS ON THE DIGITIZATION OF THE CAPITAL MARKET IN INDONESIA: MEDIATING ROLE OF TECHNOLOGY ADVANCEMENT**
Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia	:	15 September 2022, di Surabaya
Jangka waktu pelindungan	:	Berlaku selama 50 (lima puluh) tahun sejak Ciptaan tersebut pertama kali dilakukan Pengumuman.
Nomor pencatatan	:	000393183

adalah benar berdasarkan keterangan yang diberikan oleh Pemohon.
Surat Pencatatan Hak Cipta atau produk Hak terkait ini sesuai dengan Pasal 72 Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta.

a.n Menteri Hukum dan Hak Asasi Manusia
Direktur Jenderal Kekayaan Intelektual
u.b.
Direktur Hak Cipta dan Desain Industri

Anggoro Dasananto
NIP.196412081991031002

Disclaimer:
Dalam hal pemohon memberikan keterangan tidak sesuai dengan surat pernyataan, Menteri berwenang untuk mencabut surat pencatatan permohonan.

LAMPIRAN PENCIPTA

No	Nama	Alamat
1	Dr. Sri Utami Ady, SE., MM	Taman Pondok Jati CI/17, RT 29, RW 10, Kedungturi, Taman
2	Ilya Farida, SE., MM	Raya Ketengan, RT 02, RW 02, Tunjung, Burneh, Kabupaten Bangkalan
3	Mustika Winedar, SE	Medayu Utara I/52, RT 06, RW 03, Medokan Ayu, Rungkut
4	Alvy Mulyaningtyas, SE., MM	Manukan Dadi II Blok 1 SC/6 RT 05, RW 07, Manukan Kulon, Tandes
5	Dicken Okta Sandra Susena	Dandangan Gang 1/10 RT 02, RW 09, Dandangan
6	Adiel Herdi Pratama	Taman Pondok Jati CI/17, RT 29, RW 10, Kedungturi

REPUBLIK INDONESIA
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA

SURAT PENCATATAN
CIPTAAN

Dalam rangka pelindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan	:	EC00202281120, 31 Oktober 2022
Pencipta		
Nama	:	**Dr. Sri Utami Ady, SE., MM,Ilya Farida, SE., MM dkk**
Alamat	:	Taman Pondok Jati CI/17, RT 29, RW 10, Kedungturi, Taman, Kabupaten Sidoarjo , -, JAWA TIMUR, -
Kewarganegaraan	:	Indonesia
Pemegang Hak Cipta		
Nama	:	**Universitas Dr. Soetomo**
Alamat	:	Jl. Semolowaru No.84, Menur Pumpungan, Sukolilo, Surabaya, JAWA TIMUR, 60118
Kewarganegaraan	:	Indonesia
Jenis Ciptaan	:	**Karya Tulis**
Judul Ciptaan	:	**Model Perilaku Investor Robot Trading Saham**
Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia	:	26 Oktober 2022, di Surabaya
Jangka waktu pelindungan	:	Berlaku selama 50 (lima puluh) tahun sejak Ciptaan tersebut pertama kali dilakukan Pengumuman.
Nomor pencatatan	:	000396864

adalah benar berdasarkan keterangan yang diberikan oleh Pemohon.
Surat Pencatatan Hak Cipta atau produk Hak terkait ini sesuai dengan Pasal 72 Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta.

a.n Menteri Hukum dan Hak Asasi Manusia
Direktur Jenderal Kekayaan Intelektual
u.b.
Direktur Hak Cipta dan Desain Industri

Anggoro Dasananto
NIP.196412081991031002

Disclaimer:
Dalam hal pemohon memberikan keterangan tidak sesuai dengan surat pernyataan, Menteri berwenang untuk mencabut surat pencatatan permohonan.

LAMPIRAN PENCIPTA

No	Nama	Alamat
1	Dr. Sri Utami Ady, SE., MM	Taman Pondok Jati CI/17, RT 29, RW 10, Kedungturi, Taman, Kabupaten Sidoarjo
2	Ilya Farida, SE., MM	Raya Ketengan, RT 02, RW 02, Tunjung, Burneh, Kabupaten Bangkalan
3	Mustika Winedar, SE., MM	Medayu Utara I/52, RT 06, RW 03, Medokan Ayu, Rungkut

Sri Utami Ady <sri.utami@unitomo.ac.id>

Abstract Sri Utami Ady

ICOBIMA ICOBIMA <icobima@pelitaindonesia.ac.id> 16 Oktober 2022 12.50
Kepada: Sri Utami Ady <sri.utami@unitomo.ac.id>

Dear Author,

We are pleased to inform you that your abstract has been accepted in ICOBIMA 2022.

Please submit your full paper to our OJS (https://www.ejournal.pelitaindonesia.ac.id/ojs32/index.php/ICOBIMA/about/submissions) and make payment before November, 7th 2022. Payment details are as follows:

Account Name: Stefani Chandra

Account Number: 00413 66571 30

Bank: Permata Bank

Swift Code: BBBAIDJA

Amount: Rp. 500,000

We would like to thank you for your participation in ICOBIMA 2022, see you there.

Regards,

ICOBIMA 2022 Committee

Pada tanggal Sen, 10 Okt 2022 pukul 15.16 Sri Utami Ady <sri.utami@unitomo.ac.id> menulis:

CERTIFICATE

No. 733/SER-SEM/IBTPI/XI/2022

THIS IS TO CERTIFY THAT

Sri Utami Ady

has participated as: Presenter

in the 1st INTERNATIONAL CONFERENCE ON BUSINESS MANAGEMENT AND ACCOUNTING

"Adaptability of Business in the New Economic Era"

Organized by **Institut Bisnis dan Teknologi Pelita Indonesia**

On November 11, 2022

General Chair

Prof. Dr. Teddy Chandra, S.E., M.M.

Cancelor of IBT Pelita Indonesia

Prof. Dr. Amries Rusli Tanjung, S.E., M.M., Ak.

CERTIFICATE OF BEST PAPER

No. 557/SER-SEM/IBTPI/XI/2022

PRESENTED TO

Sri Utami Ady

as

Best Paper 1 (Finance and Information System)

For the manuscript entitled

THE PHENOMENON OF TRADING ROBOTS AS THE DIGITIZATION OF THE CAPITAL MARKET, WILL CONVENTIONAL TRADERS VANISH?

in the 1st INTERNATIONAL CONFERENCE ON BUSINESS MANAGEMENT AND ACCOUNTING

"Adaptability of Business in the New Economic Era"

Organized by **Institut Bisnis dan Teknologi Pelita Indonesia**

On November 11, 2022

General Chair

Prof. Dr. Teddy Chandra, S.E., M.M.

Cancelor of IBT Pelita Indonesia

Prof. Dr. Amries Rusli Tanjung, S.E., M.M., Ak.