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This journal promotes and publishes conceptual papers/models, qualitative research, pedagogical research, practice notes, and case studies in business and applied sciences. Submissions are made through www.baasana.org

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**Business and Applied Sciences
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International Review of Business & Applied Sciences (IRBAS)

Scope and Coverage

The *International Review of Business & Applied Sciences (IRBAS)* is a double-blind peer reviewed journal of Business and Applied Sciences Academy of North America (BAASANA) publishes conceptual papers, Qualitative Research, Case Studies, Pedagogical Research, and Interviews involving global or country-specific Business, Social, Behavioral, and Applied sciences. The journal's primary focus is on innovative ideas leading to solutions to problems. Interdisciplinary and or discipline-specific descriptive, conceptual ideas, constructs, propositions, models, and theories, including moral and ethical, call for solutions to problems across the digital divide.

IRBAS publishes review articles, original ideas, and theoretical, conceptual narratives with less discipline-specific jargons. Statistical analysis, when used, should be explained in plain language for interdisciplinary global readers. Commentaries on articles and reports published in the Journal are welcome and encouraged. Authors will have the opportunity to respond to the commentary on their work and publish those responses. Special Issues devoted to critical global topics, including disruptive innovations and case studies on UN Sustainable Development Goals (SDG), will be routinely published.

The journal is an invaluable support to academics and researchers, environmental activists, SDG participants, teachers using innovative pedagogical styles, and all those charged with setting policies and strategies for business and social, global, and non-profit organizations.

Readership

Professionals, academics, researchers, managers, policymakers, environmental activists, and the promoters and implementers of UNSDG.

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- Corporate Social Responsibility and Sustainability
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- Information Technology and knowledge management
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- Global Health Issues
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 - Interdisciplinary Educational Issues and Models
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 - False citation: material should not be attributed to a source from which it has not been obtained.
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 - *Unacknowledged multiple submissions* of a paper for several purposes without prior approval from the parties involved.
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Manuscript Guidelines

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Journal Index

IRBAS is indexed by the Library of Congress, USA

EDITORIAL

Papers included in this issue are six. They are conceptual—clearly fitting into the scope of the journal. All of them relate to issues applied sciences and business.

The first paper entitled “No more burnt pancakes: The many benefits and meanings of mindfulness meditation practiced through the Plum Village App,” was co-authored by Weranuj Ariyasriwatana, Assistant Professor of Communication School of Communication and the Arts, Department of Communication, Marist College, Poughkeepsie, USA, and Amjol Bahadur Shrestha, Adjunct Professor from College of Humanities and Social Sciences, Department of Philosophy and Religion, Rowan University, Glassboro, New Jersey, USA. This study investigates the benefits and meanings of mindfulness meditation that college students perceive after using the Plum Village App for two weeks. The data were collected through the diary research method, then qualitatively content analyzed. Fifty-four students from Marist College were purposively sampled. They were instructed to download the Plum Village App and use it for 14 days. Most of the words selected illustrate positive experiences, e.g., peace, gratefulness, relaxation, introspection, therapeutic, flow, and eye-opening. Images that were frequently chosen to contain natural scenery with water. Authors claim that the investigation was the first qualitative study that explores the college students’ perception of the meanings and benefits of mindfulness meditation, as practiced through the Plum Village App. Therefore, the study provides a qualitative baseline of a subjective field of study.

The second paper was authored by John F. Decarlo of Hofstra University. The paper entitles “The Promiscuous Itch of Cancerous Phenotypic Selectivity: Post Translational Substrate Scopes of Amino Acids” where a question is posed: how deeply the promiscuous itch of phenotypic selectivity is ingrained in the substrate of amino acids, the backbone of proteins, of both normal and cancerous cells. To indicate this empirically a series of four case studies is presented in a cumulative order, such that there is an increase of metabolic complexity and in the consequential severity of selectivity. In this respect, it is first demonstrated that even an amino acid whose family structure and long history suggest otherwise, still exhibits the foundational potential to evolve a broad substrate scope embedded in its physical chemistry. Next, an enzymatic post-translational modification occurring in hundreds of protein substrates, which operate in two opposing phases is presented; yet their respective selectivity has been simultaneously co-opted by the niche construction of cancer cells.

The third paper was authored by Susmita Bose, Research Scholar, Department of Business Management, University of Calcutta West Bengal, India, and Dr. Kumkum Mukherjee Professor (Retired) Indian Institute of Social Welfare and Business Management, Kolkata. West Bengal, India. In the present paper, the focus has been to find out whether there is any difference between a leader’s perception regarding his own style of functioning and the followers’ perception of the same in various corporate sectors in and around Kolkata. The sample of the study were 33 Leaders including professional managers, team leaders, head of the departments and their respective 160 followers (n = 193). The leadership style of each of the leaders was measured by administering the 86-item Leadership Behaviour Description Questionnaire to each of the leaders and their respective followers.

The fourth paper was authored by Tony Bawo, Esimaje and Unekwu Onuche Faculty of Agriculture, University of Africa, Toru-Orua, Bayelsa, Nigeria. The title of the paper is “Comparative Analysis of Commercial and Self-Formulated Feed Usage among Broiler Chicken Enterprises in Edo State, Nigeria: A Carcass Weight and Profitability Perspective” The focus of the paper was on the profitability of Commercial Feed (CF) and Self-formulated Feed (SF) usage among broiler producers in Edo State were compared. The constraints faced by SF users were also assessed. Purposive and random sampling techniques were used to select 15 broiler farmers from each category for questionnaire administration. Budgetary analysis, t-test, and mean score analyses were employed.

The fifth paper entitled “Aggressively Passive Strategy of Utilizing Extreme Volatility (VIX) Readings as Intermediate and Long-Term Entry Points in a Dynamic Portfolio” was authored by Dr. Donald L. Crooks; Dr. Cathy Tully; Professor Edward Strafacci; Mr. Spencer Beyer; Mr. Vuk Bulajic; Ms. Ashley Starr; Mr. Christopher Ciccone of Wagner College. The paper explores the following research question: Does past data reveal consistent and appreciable positive market returns over 6,12 and 24 months of investing when VIX readings are in the low teens versus a portfolio that dictates investing only during periods of distress and exploding VIX readings more than 50. The authors provided scenarios of pragmatic and profitable investments based on the volatility indexes of the stock markets.

The sixth paper entitled “The Changing World Order” was authored by Dr. Frank Owarish, Ph.D., CEO, IISRT; a former senior UN executive International Institute for Strategic Research and Training, A New York State registered think tank dealing with academic research <https://internationalinstituteforstrategicresearch.info/>. This was a paper presented at CASA Singapore 2023. The paper is a compilation of literature and credible news reports pertaining to shaping **of the new world order**. The author uses a unique framework based on his eclectic strategic research on the essence global of global transformation. The paper highlights the major challenges currently facing the world. It also focuses on critical issues requiring urgent attention and offers solutions in broad brushstrokes, encouraging further research on them.

This is the 1st issue of volume 4 of the IRBAS. Papers included in this issue are interdisciplinary in nature and have dealt with issues of importance. The readers will find them informative and helpful toward professional growth. We will continue to publish qualitative papers, research models, conceptual papers, case studies, professional interviews, reports of disruptive innovation in education and other applied sciences. We welcome authors to spread the word and invite scholars and practitioners to read and then volunteer to write for future issues of IRBAS.

Sincerely,

M. Ruhul Amin, Ph.D. Editor-in-Chief

No more burnt pancakes: The many benefits and meanings of mindfulness meditation practiced through the Plum Village App by Weranuj Ariyasriwatana, Assistant Professor of Communication, Department of Communication, School of Communication and the Arts, Marist College, Poughkeepsie, USA & Amjol Bahadur Shrestha Adjunct Professor College of Humanities and Social Sciences, Department of Philosophy and Religion, Rowan University, Glassboro, New Jersey, USA

Structured Abstract:

Objectives: This study investigates the benefits and meanings of mindfulness meditation that college students perceive after using the Plum Village App for two weeks.

Methods: The data were collected through the diary research method, then qualitatively content analyzed. Fifty-four students from Marist College were purposively sampled. They were instructed to download the Plum Village App and use it for 14 days. Each day, they wrote a diary entry about one new meditation that they practiced. On the last day, they received a prompt to (a) find a word and an image that sums up their two-week experience of incorporating mindfulness meditation into their lives, and (b) list benefits of mindfulness meditation.

Results: The majority of words selected illustrate positive experiences, e.g., peace, gratitude, relaxation, introspection, therapeutic, flow, and eye-opening. Images that were frequently chosen to contain natural scenery with water. Numerous benefits of mindfulness meditation can be organized into three main categories: Mind, Body, and Body and Mind. Subcategories of Body are Sleeping, Breathing, and Other Physical Effects. Subcategories of Mind are Mental State, Addressing Mental Issue, Thankfulness, Self-Awareness, Peace, Mindfulness, Learning, and Other Benefits to Mind. Subcategories of Mind and Body are Relaxation, Self-Care, Wholeness, and Productivity.

Conclusions:

This investigation is the first qualitative study that explores meanings and benefits of mindfulness meditation, practiced through the Plum Village App, perceived by college students. It is an effective communication tool that is tremendously meaningful and beneficial to college students. It aids in training one to develop the “muscle” of mindfulness.

Keywords: Mindfulness Meditation, Mindfulness, Plum Village, Meditation App, Mindfulness Meditation App, Benefits

1. Introduction

Being a college student is not easy. It is a time of transition with responsibilities and activities. Mindfulness meditation, in the form of an app, might be useful for college students—especially during the COVID-19 pandemic. In order to explore this, a literature review of mindfulness meditation, benefits of mindfulness meditation, and the Plum Village app was conducted to provide a better understanding on the subject and frame our research questions.

Mindfulness and Mindfulness Meditation

Zen Master Thích Nhất Hạnh explained that there are three kinds of energy generated from the practice of Buddhist meditation: mindfulness, concentration, and insight (Nhất Hạnh, 2007). Mindfulness is the energy “that we generate when we bring our mind back to our body and get in touch with what is going on in the present moment, within us and around us. We become aware of our breathing and come home to our body, fully present for ourselves and whatever we are doing”—such as mindfulness of walking and mindfulness of drinking (Plum Village,

n.d.-a). Kabat-Zinn (2015) defined mindfulness as “moment-to-moment, non-judgmental awareness, cultivated by paying attention in a specific way, that is, in the present moment, and as non-reactively, as non-judgmentally, and as openheartedly as possible” (p. 1481). He categorized it into deliberate mindfulness and effortless mindfulness (Kabat-Zinn, 2015, p. 1481). To “practice mindfulness,” is to keep one’s attention focused on the work and “be alert and ready to handle ably and intelligently any situation which may arise” (Nhất Hạnh, 1999, p. 14).

Benefits of Mindfulness Meditation Practiced Traditionally and Through Meditation Apps

Mindfulness cultivates focus, or present-moment attention, and “an attitude of acceptance of (rather than reactivity toward) moment-by-moment experience¹” (Hassed & Chambers, 2015, p. 6). Goleman and Davidson (2017) stated that several benefits of mindfulness meditation emerge from the beginning of the practice and increase for longer-term meditators. A two-week practice results in less amygdala reactivity to stress and improvements in attention—better focus, improved working memory, less mind-wandering, and boosted exam scores (Goleman & Davidson, 2017). Mindfulness meditation also improves emotional regulation in university students (Delgado et al., 2010). Victorson et al.’s (2017) research revealed that mindfulness meditation decreases anxiety and uncertainty intolerance, while increases mindfulness, global mental health, and posttraumatic growth. The study of Márquez et al. (2019) indicated that mindfulness meditation reduces blood pressure. Those who meditate are less judgmental, more accepting, less depressed, less stress, less fatigue, and less confused (Márquez et al., 2019). Mindfulness meditation can lead to effective communication, i.e., mindful listening and mindful speech (Hassed & Chambers, 2015).

Behan (2020) stated that both meditation and mindfulness are useful skills that can help anyone understand that the frightening period of the COVID-19 pandemic shall pass, just like our thoughts. Since mindfulness meditation practices translate well to a wide range of populations (Behan, 2020), meditation apps can be recommended to college students. Huberty et al.’s (2019) study of the Calm app revealed that an app can be an effective modality that allows college students to practice mindfulness meditation—resulting in less stress, improved mindfulness, and more self-compassion. Lahtinen et al. (2021) found that mindfulness apps modestly improve mental health of users.

Plum Village and the Plum Village App

Thích Nhất Hạnh founded Plum Village—a global community of mindfulness practice centers offering teachings and retreats of engaged Buddhism and the art of mindful living—in 1982 (Plum Village, n.d.-b). Pháp Lưu stated that the Plum Village app is the realization of Nhất Hạnh’s vision for making good use of technology; people can practice mindfulness meditation wherever they are (Plum Village App, 2020). The Plum Village App was described as “a free app² with guided meditations, deep relaxations and other practices offered by Zen master Thích Nhất Hạnh and his monastic community” (Plum Village App, 2022a). This app, offered by The Centre for Applied Ethics, has more than 160,000 users (Plum Village App, 2022b). The bottom navigation bar consists of Resources, Talks, Meditations, Extras, and About the Plum Village app. “The Meditations” menu contains Start Here, Guided Meditations, Silent Meditations,

¹ “Nonreactivity doesn’t mean not responding; it just means that we don’t feel compelled to react without choice and discernment” (Hassed & Chambers, 2015, p. 6).

² For both Apple and Android smartphones

Deep Relaxation, Eating Meditation, Flowers in the Dark, Listening to the Rain Veranda, Stories for Children³, En Français, En Español, and In Italiano.

Research Questions

RQ 1: Based on a two-week experience of using the Plum Village app, what are benefits of mindfulness meditation perceived by college students?

RQ 2: Based on a two-week experience of using the Plum Village app, what does mindfulness meditation mean for college students?

2. Material and Methods

This study opted for a qualitative content analysis of diaries written by college students. The research participants, 54 Marist College students⁴, were purposively sampled. Students who took Research and Consumer Insights, from both sections, in the Fall 2020 semester were assigned to try the Plum Village app as part of In a Research Participant's Shoes assignment. The aims of this assignment are (a) to introduce students to a consumer diary research method, and (b) to provide them with a firsthand experience of being a research participant. Knowing how to observe oneself is the first step to acquiring an expertise in observing others (Fortini-Campbell, 2001). According to Siemieniako (2017), the diary method “focuses on collecting data in the present/proximate time, therefore overcoming recall problems which often exist in retrospective research methods” (p. 54).

The students were instructed to download and install the app through <https://plumvillage.org/mindfulness-practice/mindful-apps/> or <https://plumvillage.app/> on or before September 4, 2020—which is the first day. Since the mere presence of one's own smartphone reduces available cognitive capacity (Ward et al., 2017), students were suggested to download a lesson (or lessons) that they plan to practice on each day so that they can set their smartphone on Airplane Mode while meditating. At least, they would not be distracted by calls and notifications.

On the first day, they listen to all five lessons⁵ from “Start Here” on “Meditations” menu. The five lessons are (1) How to Dwell Happily in the Present Moment; (2) Mindfulness, Concentration and Insight; (3) Practicing with the Bell; (4) Walking Meditation; and (5) How to Use Guided Meditations. Then, they were required to fill in their journal with freestyle writing for at least five sentences, including the first impression about the app. If there were any likes or dislikes, they would state them in the provided space. For the second day to the fourteenth day, each student picked one new meditation (from “Meditations” menu) per day and meditated with it. Once this requirement was fulfilled, they could repeat meditation they previously did, try a new meditation from the “Meditations” menu, or explore the app if desire. For each day, research participants were required to state the title(s) of chosen meditations, do freestyle writing (at least five sentences), and identify any likes or dislikes (if they had any). Therefore, each research participant completed at least 14 different meditations in addition to the five lessons from “Start Here.”

³ Flowers in the Dark and Stories for Children were added to the app in May and July 2021, respectively. They were not available during the study.

⁴ Out of all 58 students, 54 of them completed the two-week trial of the Plum Village app and submitted their diary entries.

⁵ As of December 2021, there are seven lessons from “Start Here.” The two new lessons added are Introduction to Sitting Meditation and How to Practice and Apply Plum Village Guided Meditations.

On the 14th day, the students received a prompt via iLearn announcement⁶ and email. They had to (1) pick a word to describe the two-week experience, (2) find (or create) an image (or illustration) to describe the two-week experience, and (3) list benefits of mindfulness meditation based on their two-week experience. See Appendix A for instructions distributed to research participants.

In the spring of 2021, data was cleaned, and identifications were removed from each diary entry. Students' names were replaced with color names and plant names. Female students' names were replaced with color names—such as Jasmine Green, Magenta, and Coral. Male students' names were replaced with plant names—such as ZZ Plant, Baobab, and Bird of Paradise. The data was organized using NVivo, a qualitative data analysis software. After preparing the data, we defined the unit of analysis.

The unit of analysis is perceived benefit of mindfulness meditation. If one research participant mentioned relaxation several times, relaxation will be coded once for that research participant. However, all sentences written about relaxation from that participant formed a valuable source of insightful quotes that could be reported in findings.

In the summer of 2021, the coding frame and categories for benefits of mindfulness meditation was developed through a combination of inductive and deductive category development. See Appendix B for the codebook of this project. (The codebook was a result of iterative process.) There were two coders. Each coder coded diary entries from the same 14 students. The two sets of coding were compared. The interrater reliability is high: 96% for Mind, 99% for Body and 97% for Mind and Body. The two coders then discussed cases of discrepancy, and mutually made decisions on how to code them. The coding frame was modified. Later on, each of them coded the rest of the data (diary entries from the remaining 40 students. They occasionally consulted each other and modified the coding frame together when new kinds of benefits emerged. Finally, they compared their coding for all main and subcategories. They decided together on a few units of analysis that were coded differently. Since the two coders collaborated closely and agreed on all units of analysis at the end, the interrater reliability of this study is very close to 100%.

Findings of what mindfulness meditation means were reported in a straightforward manner chosen words and chosen images. The chosen words were divided into positive association, neutral association, and negative association. The two coders discussed and agreed on these categories.

3. Results: Benefits of mindfulness meditation

There are three main categories of benefits derived from practicing mindfulness meditation through the Plum Village app: Mind, Body, and Mind & Body.

3.1 Mind

This category covers benefits from mindfulness meditation that are related to thoughts, feelings, reflection, and awareness.

3.1.1 Mental State (from 35 research participants)

This subcategory refers to positive states of mind. Expressions from diary entries include calm (and its stemmed words like calming and calmer), clear mind, clarity, an ease of mind, happy

⁶ an educational software platform

(and its stemmed words like happiness), a sense of bliss, a rejuvenated mind, open-mindedness, a more open mind, distracting the mind, allowing the mind to go in a different direction, and groundedness. The term “calm” (or one of its stemmed words) is the most popular since 25 research participants used it in their diary entries. One student disclosed that she practiced mindfulness meditation to “*allow the mind to go in a different direction,*” “*expand the mind,*” and “*distract the mind,*” among many other benefits. Another student did a short meditation entitled Mindfulness of the Mind and shared his experience:

This meditation was extremely relaxing, and I felt very rejuvenated afterwards. Brother Phap Luu⁷ not only gives insight into the psychological phenomenon of mindfulness and the state of mind but soothes the listener with breathing techniques ... Mindfulness of the Mind isn't about sweeping clutter and thoughts under the rug, rather, it's about being aware of them but letting them pass through you. This release of tension and being present is extremely calming, both physically and mentally.

3.1.2 Addressing Mental Health Issue (from 30 research participants)

This subcategory refers to mental health issues that were alleviated from practicing mindfulness meditation. Addressing Mental Health Issue includes Reducing Stress, Lessening Anxiety, and Coping with Other Mental Health Issues.

3.1.2.1 Reducing Stress (from 17 research participants)

Expressions include stress relief, relieve stress, stress reduction, less stress, less stressed, less stressful, destressing, destresser, “*not let stress drag me down,*” and “*building new skills to manage stress.*” The student who listened to Rain at Thay's Hut Veranda her the 12th day and Robins on a Rainy Day in Upper Hamlet on her 13th day found revealed: “*It took a while, until the end, but finally I found one type that I believe I will use in upcoming times when I am stressed.*”

3.1.2.2 Lessening Anxiety (from nine research participants)

Practicing mindfulness meditation helped students deal with anxiety through (a) the content from the guided meditation, such as Device Meditation; and (b) the breathing techniques. One student emphasized the importance of taking deep breaths:

For someone who has always struggled with bad anxiety I have really noticed that just adjusting your breath can change how you feel within seconds. My therapist used to tell me that she noticed in moments that I forget to breathe or that I do not take enough deep breaths, causing panic attacks. So taking at least 5 minutes of my day just to sit down and breathe has huge benefits on me.

Mentioning anxiety sometimes co-occurs with mentioning calmness, such as “*calm one's anxiety*” or stating that one is calm as a result of a lower anxiety level.

3.1.2.3 Addressing Other Mental Health Issues (from 10 research participants)

Meditating, according to students, was soothing and comforting. It also reduced negative emotions, clarified uncertain things, got rid of unwanted emotional baggage, released emotions bottling in one's head, and rescued one from a tough day. A student discussed a strategy to deal with overwhelming situations she learned from Dealing with Strong Emotions like Fear, Anger, or Worry: “*I can focus on my breath until I am able to gather my strength to assess the situation.*”

⁷ Thích Chân Pháp Lư

3.1.3 Thankfulness (from 15 research participants)

This category refers to appreciation derived from practicing mindfulness meditation. Expressions include appreciation (and its stemmed words such as appreciating, appreciative, appreciate) and gratitude (and its stemmed words such as grateful). A few research participants mentioned gratefulness or appreciation without identifying objects. Besides these general statements, objects that research participants were thankful for were divided into three groups: Self, Other People, and Other Things to Be Thankful for.

3.1.3.1 Self

Practicing mindfulness meditation was reported to make one more appreciative of one's body and being alive. One student, who meditated with 5 Minutes Body Scan and 15 Minutes Body Scan, wrote: "I often take the ableness of my body for granted but this meditation made me more aware and appreciative. I feel a better understanding and connection to my body. There was a lot of self-love." She concluded in her 14th diary entry that this experience made her more appreciative of her body.

3.1.3.2 Other People

Practicing mindfulness meditation was reported to make one feel grateful for other people. One student wrote: "*It also made me feel very grateful for my family, and friends because it made me take the time to think and reflect, more than I would if I weren't using this app.*" Besides, mindfulness can make one "*appreciate the time and work that others put in so that we may have luxuries and/or necessities in life*" and "*think more of the less fortunate.*"

3.1.3.3 Other Things to Be Thankful For

Practicing mindfulness meditation was reported to make one appreciate her/his surroundings, what one has, devices (such as a smart phone and a computer), life, mundane activities (like dish washing or drinking coffee), and little things. One student listed the following benefit in his 14th diary entries: "Newfound appreciation for what I have as a person (and think more of the less fortunate)." Another student praised the Plum Village app: "I say appreciation of the little things because something as simple as a meditation app can go a long way and it helped me rediscover how interesting and amazing meditation is and that I can do it anywhere and doesn't have to be in a fancy building or forest."

3.1.4 Self-Awareness (from 15 research participants)

This subcategory refers to an introspection and an awareness of one's awareness—the state of being focused on oneself. Expressions include the following: awareness (and other forms of this word), self-awareness, reflection, self-reflection, understanding of oneself, looking inward at oneself, introspection (and other forms of this word), and being aware of one's body posture. A student wrote: "*I found mindfulness meditation to be a reminder of focusing on what really matters. I liked looking inward at myself to see what I could do to be better to the world.*" Self-awareness might lead to self-love. One student wrote after doing the guided meditation Gratitude for the Four Elements: "*This was a great moment for me to reflect and appreciate myself and what I do. I am warm and I am kind.*" She then mentioned the benefit of practicing mindfulness meditation is "*self-love.*"

3.1.5 Peace (from 10 research participants)

Mindfulness meditation helps one achieve peace, inner peace, peace of mind, be at peace, or be peaceful. A student mentioned that practicing mindfulness meditation made him appreciate

peace and disclosed: “...it is up to you to train your mind to find peace and keep that peace with you wherever you go and however long you want.”

3.1.6 Mindfulness (from nine research participants)

Inspired by Plum Village’s definition of mindfulness, this category refers to energy that meditation practitioners generate when their mind and body are one and being aware of what is going on in the present moment. Expressions of mindfulness include the following: in the moment, present (or presence), and mindful (or mindfulness). Students mentioned being grounded in the moment, more mindful, and in the present (or to live in the present). One student wrote: “*I feel more mindful of my emotions.*”

3.1.7 Learning (from seven research participants)

Practicing mindfulness meditation, for beginners, can be a learning experience. Students mentioned that they learned to appreciate food and drink, breathe deeply, empty mind, identify the types of meditation that are enjoyable or effective, understand relationships between human and nature, adopt a healthy habit, try something new, communicate, rely less on devices, view the world from different cultural perspectives (or new perspectives) and values. One student mentioned: “*Learned how to put myself into the positions of my family members and give them benefit of the doubt.*”

3.1.8 Other Benefits to Mind

Other benefits to the mind include facilitating a brainstorming session with oneself, gaining a sense of control, and concentrating on a task at hand. One student mentioned that the app allowed her to “*become more in tune with the small things in life.*” She usually burned her pancakes prior to using the app; however, she did not burn them anymore.

3.2 Body

This category refers to positive changes in the body that can be perceived during and/or after a practice of mindfulness meditation. There are three subcategories: Sleeping, Breathing, and Other Physical Effect.

3.2.1 Sleeping (from 12 research participants)

This subcategory refers to improved quality of sleep resulting from practicing mindfulness meditation. One student wrote about his nap while the rest discussed sleep. They mentioned that mindfulness meditation has many benefits that aid sleeping: prepares one’s mind and body for bed, winds one down, makes one feel the body sink deeper into bed, helps one fall asleep, helps one fall asleep faster, helps one get to sleep at an earlier time, deepen one’s sleep, and even fixes sleepwalking.

A few students fell asleep during the meditation, for example, one student wrote: “*I fell asleep while doing the Calm Ease Meditation exercise. I slept very soundly, and I remember before falling asleep not having any thoughts.*”

Surprisingly, one student revealed that mindfulness meditation fixed sleepwalking: “*I noticed I was sleeping better. Usually, I sleepwalk during the night or am restless, however, I noticed that I wasn’t waking up in the middle of the night or moving things around.*”

3.2.2 Breathing (from five research participants)

This subcategory refers to positive changes in breathing. These include deeper breathing, fuller breathing, easy breathing, centering one’s breath, and catching one’s breath.

One student wrote that mindfulness meditation can “...*help you catch your breath with very helpful breathing exercises.*” He also wrote on Day #10 after practicing the guided meditation Mindfulness of the Mind: “*Towards the end he talks about being comfortable and having a breathing awareness. I think I’m starting to notice that I like the breathing exercises a lot more than the simple meditation.*”

3.2.3 Other Physical Effects (from 10 research participants)

This subcategory refers to other physical effects that mindfulness meditation brings about, in addition to sleeping and breathing. These include lowering heart rate, relieving headache, letting go of physical pressure, relaxing muscles, allowing the muscle and the brain to relax after a workout, stretching one’s body, being energized, being more awake, being energetic, and being in control of one’s body.

3.3 Mind and Body

This category refers to benefits of practicing mindfulness meditation that combine both mental and physical aspects. It contains Relaxation, Self-Care, and Wholeness.

3.3.1 Relaxation (from 23 research participants)

This benefit was expressed through the following terms: relax, relaxing, relaxed, relaxation, and unwind. One student concluded her two-week trial: “*The meditation all in all was a great experience. It allowed me to take that time out of my day to relax and calm down a little.*” A student athlete wrote: “*...I am constantly working out, doing school work, and practicing. Having a dedicated time to just relax was really refreshing.*”

3.3.2 Self-Care (from 15 research participants)

This subcategory refers to taking time to take care of oneself. Expressions include slowing down (or slow down), having time for oneself, making time for oneself, taking time out of one’s day, time to step away from the world, “*me time,*” self-care, taking a moment to breathe during the day, taking a break, and putting one’s phone and computer away. The term “time” was used in the majority of all expressions found under this subcategory. One student wrote that she “*was able to make a good use of time for self-care.*” Another student noticed: “*...I need to take time for myself. It reminded me that I don’t need to be constantly doing something...that I can sit for 5 minutes to think and breathe.*” Another term that signals self-care is slow (or slowing) down, found in diary entries of six research participants. One of them wrote: “*In my perspective, mindfulness meditation really helped me slow down and take life in by the minute it occurs.*”

3.3.3 Wholeness (from six research participants)

This category refers to an improvement in both body and mind. It includes statements like being physically and mentally healthy, stretching the mind and body, being connected to oneself, becoming one with the body, and reaching the state of wholeness. A student mentioned: “*I think taking time to pay attention to one’s breath and actually take deep and meaningful breaths is extremely important in maintaining a healthy body and mind.*”

3.3.4 Productivity (from three research participants)

Practicing mindfulness meditation was reported to increase one’s productivity. Mindfulness can lead to a better quality of work with less time. A student claimed that she was being more proactive about homework. Another student revealed: “*Not only have I been running more, but I have been making an effort to get up earlier. I have noticed that I am much more productive when I get up at an earlier time.*” Increase in productivity enhances academic performance, as

one student wrote: “*Helped me feel more comfortable with big assignments because I did deep breathing before them, during, and even after.*”

4. Results: Meanings of mindfulness meditation defined by college students

4.1 Words that are associated with mindfulness meditation.

Two research respondents did not follow the two additional instructions on the 14th day. Therefore, there are 52 words chosen. See all the words in Table 1.

Table 1. Words Chosen to Describe the Two-Week Experience of Practicing Mindfulness Meditation Through the Plum Village App.

Theme	Word (frequency)	
Positive association	Peace	Peace, Peaceful, Serenity, Serene, Calming
	Awareness	Aware (2), Awareness (2)
	Gratitude	Grateful (2), Gratitude, Thankful
	Relaxation	Relax, Relaxing, Relaxation, Unwind
	Mind, Thinking, and Emotion	Reflection, Reflective, Introspection, Contemplative, Concentration, An Interesting Range of Emotions
	Novelty	Eye-Opening (2), Opening, Different (2)
	Other positive associations	Change, Enjoyment, Experimental, Flow, Hope, Journey, Ikigai ⁸ , Immersive, Inspiring, Interesting (2), Learning, Patience, Pleasant (2), Relief, Respect, Simple, Therapeutic
Neutral association	Routine	
Negative associations	Hard, Short, Struggle, Unsatisfied	

Practicing mindfulness meditation was linked to peace, awareness, gratitude, relaxation, reflection, introspection, and many positive associations—e.g., enjoyment, concentration, flow, hope, inspiration, therapy, respect, and patience. One student recalled: “Each session allowed me to be aware of different things, such as, my body, thoughts, emotions, surroundings, and others. I feel an important step to meditation is being aware.” The student who summed it up with the word “serenity” revealed: “I struggle with anxiety and depression, and I found that throughout this two-week experience I have become calmer and centered in myself. I am more serene and light. I have found peace within my social life, electronics, and food.” The student who chose the word “peaceful” explained: “I choose this word because each time that I left a lesson, I felt at peace with my body and one with my body and mind.” The student who picked the term “relaxing” shared her experience: “...I mainly used the app to help me fall asleep and it really helped me relax my mind and do so. Even when I used it during the day, I just found it so relaxing to use.” The student who thought “therapeutic” was the “perfect” word to describe his two-week experience reported: “...It helped me to truly think and reflect each and every day. I also have noticed a lot of good changes in my everyday life because of these meditations. I started to see myself think more positively about things, be more appreciative of what I have, not let stress drag me down, and to live in the present...”

The experience was perceived as different, interesting, and eye-opening. One student wrote: *...this experience was very different from what I normally do. I never take the time to just sit and meditate and I always have a lot of stuff going on, so it was really nice to*

⁸ a Japanese word that means “reason for being”

destress and take time out of my day to calm down and meditate. I think it is a great thing to do and think everyone should try it at least once to see if it works for them as well.

Another student who claimed that the experience was eye-opening wrote:

As I listened to more and more of the meditations, I was able to understand how much time I spend worrying and stressing about meaningless things. I also didn't realize how much I needed to take a few minutes for myself to take a step back and enjoy the present moment. The meditation that I found really sank in was the one about washing the dishes. Such a meaningless task can be used as a time to reflect and really get a better understanding of what is going on around me.

One student chose the word "Change" in a positive way. He explained:

I think this word is fitting because my mentality on meditation has changed, especially with breathing. At first, I was annoyed with the constant reminder of breathing until I realized how important it is to the art of meditating. My mentality changed, and I accepted the fact that I need the reminders to become mindful and appreciate the purpose of the meditation.

There is one word that is neutral—more like a descriptive word. One student summed her experience with the term "Routine." Being required to meditate every day made her pick a specific time, at night after dinner when she was done with her other classes, to do it.

Practicing mindfulness meditation were negatively portrayed by four students with the following terms: Hard, Short, Struggle, and Unsatisfied. The student who chose the word "Short" explained: "I didn't spend too much time with the app or do long meditations because it wasn't super interesting to me." The student who picked the word "Struggle" declared that it was a struggle to "remember to do a meditation each day or even to find the time to do so." One he started to listen to the meditation, he "felt it was difficult to finish them."

4.2 Images that sum up mindfulness meditation.

Two research respondents did not follow the two additional instructions on the 14th day. Therefore, there are 52 images chosen⁹. See Appendix C for all images. When asked to select (or create) an image/graphic (or illustration) that represents the two-week experience of practicing mindfulness meditation, it turned out that images of natural scenery with water is very popular (13 images, without a human being). Also, there are 10 images of natural scenery with water and a human being. One student selected an image of a lake (see Figure 1):

I chose this image because the mindful meditation I did while using Plum Village helped me to reach a calmer state than I had been in prior to using the app, much like the calm waters of the lake below. It allowed me to take a step back from my busy life and take a moment to breathe, which in turn helped me to be more calm [sic] after it.

Figure 1: Lake



⁹ Images that research participants found from the Internet are copyright free (free stock photos). Any images created by students, e.g., photos and painting, were granted permissions during the oral consent.

One student explained why he picked a photo of a kid riding a bike (see Figure 2):

I chose a picture of a kid trying to learn how to ride a bike on training wheels, because that's how I felt trying to learn how to meditate. While I probably am not ready for the next level of meditating (like this boy isn't ready to ride a two wheeled bike) I still went out and gave it everything I could, and maybe one day I can get a hang of it. I could never quite clear my head all the way when meditating, and there were always other thoughts distracting me. Nevertheless though [sic], I had a good time participating and (started) to grasp a new skill. I like how relaxed it could sometimes get me, and I liked trying to be mindful of the present. Going forward I will probably continue to use this app, and I am glad I got the opportunity to experiment with it.

Figure 2: Bike



There are four images of animals: a cat, birds, a puppy, and a swan. The student who used the photo of her puppy gave a reason (see Figure 3):

...I am choosing this image to go along with my theme of relaxation and two weeks of a good night's rest. To me there is no more relaxed being than a puppy. Although they have a lot of energy, they are always falling asleep and just taking naps all day long. They need those naps to relax and be ready to play the rest of the day. This is how I felt using a mindfulness meditation app. I needed my good night's rest or my time to relax to take on the rest of the day.

Figure 3: Puppy



One student drew and painted her own illustration (see Figure 4). She wrote: *“These past two weeks have been the most stress I have felt in a while. So much was going on and depending on the lesson, it really cleared my mind ... Overall, I really enjoyed this experience.”*

Figure 4: Painting



There are a few negative depictions of the experience (see Figure 5). One student wrote:

I chose this image because I truly feel that it shows my experience exactly. There were many of the meditations that I truly enjoyed and would want to listen to again yet, there were also so many that I just did not want to finish. They made me frustrated and left me feeling unsettled. Some of them started off very strong and then just got so repetitive. One of the major issues for me was when there would be huge pauses that made me wonder if my phone had lost connection so I would open my eyes and see that the time was still going and that it was just an absurdly long section of silence.

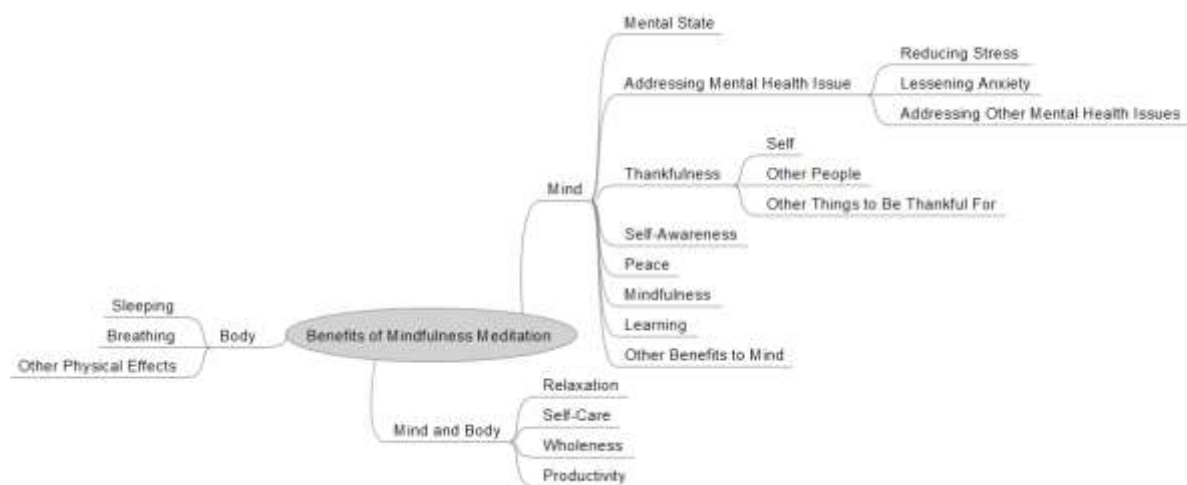
Figure 5: Frustration



5. Discussion

The majority of students think of their two-week experience of practicing mindfulness meditation positively. The negative comments are nevertheless useful insights to inspire (a) improvement for the existing meditations available on the Plum Village App, and (b) development of new meditations for any mindfulness meditation apps. The benefits of mindfulness meditation, categorized from diary entries of college students, were organized into three main categories: Mind, Body, and Mind and Body. (See Figure 6 for all categories uncovered in this study.) Even though the perceived benefits to Mind outnumbered the perceived benefits to Body and Mind and Body, all categories are important and worthy of investigation.

Figure 6: Categories of the benefits derived from practicing mindfulness meditation.



To meditate is to observe (Nhất Hạnh, 2012). Nhất Hạnh (2012) suggested observing the changes in one's mind under the light of awareness to transform darkness into light. Mindfulness meditation helps us pay attention to our emotional states. We should only observe emotions we feel without assessing or thinking more about them (Simpkins & Simpkins, 2014). Findings from the subcategory Addressing Mental Health Issue (under the main category Mind) suggest that mindfulness meditation can facilitate emotional development. Those who regularly practice mindfulness meditation can choose to bring awareness to what is going on in a stressful situation. Kabat-Zinn (2013) explained that by being aware, one is "actually changing the matrix of the entire situation even before you do anything overt, such as take action, or even open your mouth to speak" (p. 336). One no longer has to mindlessly react on "autopilot" impulse when buttons get pushed anymore. Moreover, a research participant mentioned that mindfulness meditation helped her learn "how to communicate" (see Learning, under the main category Mind).

More than 40% of research participants mentioned **relaxation** as one of the benefits of practicing mindfulness meditation. A relaxed state of mind, derived from meditation, forms the conditions for **creativity** to flourish (Headspace, 2022). In one sense, to be *mindless* is to be in a distracted state—to be caught in a stream of thoughts. With the practice of mindfulness, one acts as a witness to one's thoughts, and begins to notice new things. Indeed, what becomes old, becomes new again. "Becomes new again" could act as a source for creativity. One has more "materials" to combine into new things. Also, one is not condemned to automatic response; one can evaluate and think clearly about ideas and choices.

With numerous responsibilities and options to spend time, **self-care** should be part of college students' daily activities. According to Hassed and Chambers (2015), "a little time invested in self-care can save a huge amount of time in dealing with illness, inefficiency, and misery that come with not caring adequately for ourselves" (p. 161). Almost 30% of research participants noticed that practicing mindfulness meditation allows them time for self-care—the practice of taking an active role in protecting their "own well-being, pursuing happiness, and having the ability, tools, and resources to respond to periods of stress..." (Mindful Staff, 2022). Finding time for self-care is imperative as the majority of research participants mentioned this term (or its synonym) when discussing this benefit.

College students are heavy users of laptops and mobile phones. According to Verizon (2022), they use their smartphones in all contexts: first thing after waking up (77%), during idle time (92%), school-related tasks (82%), in the bathroom (47%), while commuting (93%), while exercising (39%), and elsewhere (waiting in line 85% and multitasking—walking 83%, and shopping 75%). The excessive use of cell phones might be detrimental to health. A person with high number of text messages, when compared to a person with a low number of text messages, exhibits inferior performance on measures of right frontal lobe functioning—possibly leading an inability to control anger and aggression, which might affect an ability to control negative emotions (Carter, 2017). Angster et al. (2010) study revealed that a high frequency of texting and having more social network "friends" indicate less satisfaction in intimate relationships.

Mindfulness meditation has potential to neutralize these deleterious effects. In *Device Meditation*¹⁰, Pháp Lru stated:

When you spend two hours with your computer, you may forget entirely that you have a body. Your mind becomes totally caught up in what is happening on the screen and your body becomes tense. But you can only truly be alive when body and mind are together. The practice is to breathe in and bring your mind home to your body. We only need two or three seconds in order to do that. When mind and body are together, you are well established in the present moment where life, joy, happiness, and peace are available. The past is already gone, and the future is not yet there. That is why the present moment is the only moment when you can be truly alive...

One research participant who tried this meditation on the seventh day referred to it as her "*best meditation yet*": "...I didn't look at my phone or laptop as much, only when I had to. I felt much more grounded in myself and in my day. This was great to do in the morning." Another research participant pointed out that this meditation made her appreciate devices, "*such as computer and smartphones.*"

In *Looking Deeply into the Phone*, app users make their phone the object of their mindfulness, learn about themselves, and express gratitude for all the elements that have come together to make the phone available to us. One student listed appreciating devices, such as computers and smartphones, as a benefit of mindful meditation. Another student commented: "...*even with such miniscule, everyday items like my phone, I felt immensely grateful for them.*"

Lastly, asking each research participant to pick (a) an image and (b) a word that sums up the experience of practicing mindfulness meditation turned out to be appropriate projective techniques that uncover various meanings of mindfulness meditation among beginners.

¹⁰ Access this on the Plum Village app > Meditations > Guided Meditation > Short Meditation > Device Meditation.

Mindfulness meditation was associated with its benefits, the process of practice, and engaging with something new—e.g., learning a new skill and embarking on a journey.

6. Conclusion

This study adopted a unique way to reveal multiple meanings of mindfulness meditation and perceived benefits of mindfulness meditation from writing 14 diary entries during the two-week period of using the Plum Village app. It is the first qualitative study that explores the benefits of mindfulness meditation, practiced through the Plum Village app, perceived by college students. We found that the Plum Village app is an effective communication tool that is tremendously meaningful and beneficial to college students. It aids in training one to develop the “muscle” of mindfulness. Although the perceived benefits of mindfulness meditation are abundant, we grouped them into three main categories: Mind, Body, and Mind and Body. Moreover, asking each research participant to pick (a) an image and (b) a word that sums up the experience of practicing mindfulness meditation turned out to be appropriate projective techniques that uncovers various meanings of mindfulness meditation among beginners.

Categories, subcategories, and quotes from the corpus of diary entries—contributed by research participants—become a treasure trove of rich insights. App developers—including the Plum Village App team¹¹—may utilize the findings by improving existing apps; creating new apps, categories, or meditations (new product development); and crafting marketing communication campaigns. Policymakers can include mindfulness meditation as one of the tools to improve the wellbeing of the population and promote it with benefits that are relevant and meaningful to the target audience. Educational institution staff (including coaches and counselors) may consider incorporating mindfulness meditation practice (without religious association) into extracurricular activities or services available to students.

7. Limitations and Future Research

This study is qualitative; therefore, the findings are not generalizable. However, categories and subcategories of the benefits of practicing mindfulness meditation are helpful as a theoretical framework for subsequent quantitative studies by researchers interested in the benefits of mindfulness meditation—especially from using a meditation app.

8. Acknowledgement

We would like to express our deep gratitude for Catalin Zorzini (and his colleagues from the Plum Village App team), Thích Chân Pháp Lư, and Dr. Orlaith O’Sullivan for creating the Plum Village app, explaining its story and the process of creation to us, answering all questions we had about the app; brainstorming with us in order to come up with the best way college students can benefit from practicing mindfulness meditation. Most importantly, we would like to thank the late Thích Nhất Hạnh for his invaluable teaching and selfless dedication to mindfulness. We are forever grateful for your teaching and inspiration.

¹¹ The Oak Forest Team consisted of Raj, Justin, Jasmine, Cata, Karim, Sister True Dedication, Maarten, Ocean, Gabriela, Anca, and Borja.

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Appendix A: Instruction for research participants

Day #1

Instruction: From “Meditations,” click “Start Here” and listen to all five lessons. Do the free writing for at least five sentences. Then, identify your Likes (if any) and Dislikes (if any).

Free Writing (at least five sentences, this should include first impressions for the app):

.....

Likes ¹² (0 – as many as you have)	Dislikes ¹³ (0 – as many as you have)
<ul style="list-style-type: none"> • Xxx • Xxx 	<ul style="list-style-type: none"> • Xxx • xxx

Day #2

Instruction: Pick a new meditation lesson from the “Meditations” menu tab (middle one at the bottom of the screen, looks like a circle/ring).

Once you are done with this requirement, you can explore other options from the menu tab (even the ones not from “Meditations”). This is not mandatory.

Name of the new meditation lesson I did	
Other lesson(s) I did (if any)	

Free writing (at least five sentences):

.....

Likes (0 – as many as you have)	Dislikes (0 – as many as you have)
<ul style="list-style-type: none"> • Xxx • Xxx 	<ul style="list-style-type: none"> • Xxx • xxx

...

(Continue until Day #14.)

In the morning of Day #14, research participants received a prompt in a form of an iLearn announcement—which was also forwarded to their emails.

Additional Tasks for Day #14

Task #1

1.1 If you have to sum up your two-week experience of incorporating mindfulness meditation to your life, what **word** would best describe it? Briefly explain the reason for choosing the word.

¹² “Likes” can be about anything.

¹³ “Dislikes” can be about anything.

1.2 Pick one **image** that best represents your experience during this two-week period of using this mindfulness meditation app. The image can be anything (an illustration, a photo from any stock images, manually drawn (by you or anyone), or created with a software (by you or anyone). Examples include, but not limited to, facial expression, animal, animation, scenery, and abstract. Then, write a brief paragraph below the image to explain the reason for choosing your image.

Task #2

List **all*** benefits of mindfulness meditation. Read all your diaries entry. Take some time to reflect on the benefits that you can feel (or notice) during the two-week period.

*You might write about it in other entries, however, include mentioned benefits again in the entry of Day #14 along with any benefits that you just notice. Make this your personal comprehensive list without doing any secondary research; do not search for the benefits of mindfulness meditation on the internet. Just write from your perception. If you feel there is no benefit, just write that there is no benefit. There is no need to change anything in your previous diary entries of Day #1 – Day #13

Appendix B: Codebook

(resulting from an iterative process)

Body

- Sleeping
- Breathing
- Other Physical Effects

Mind

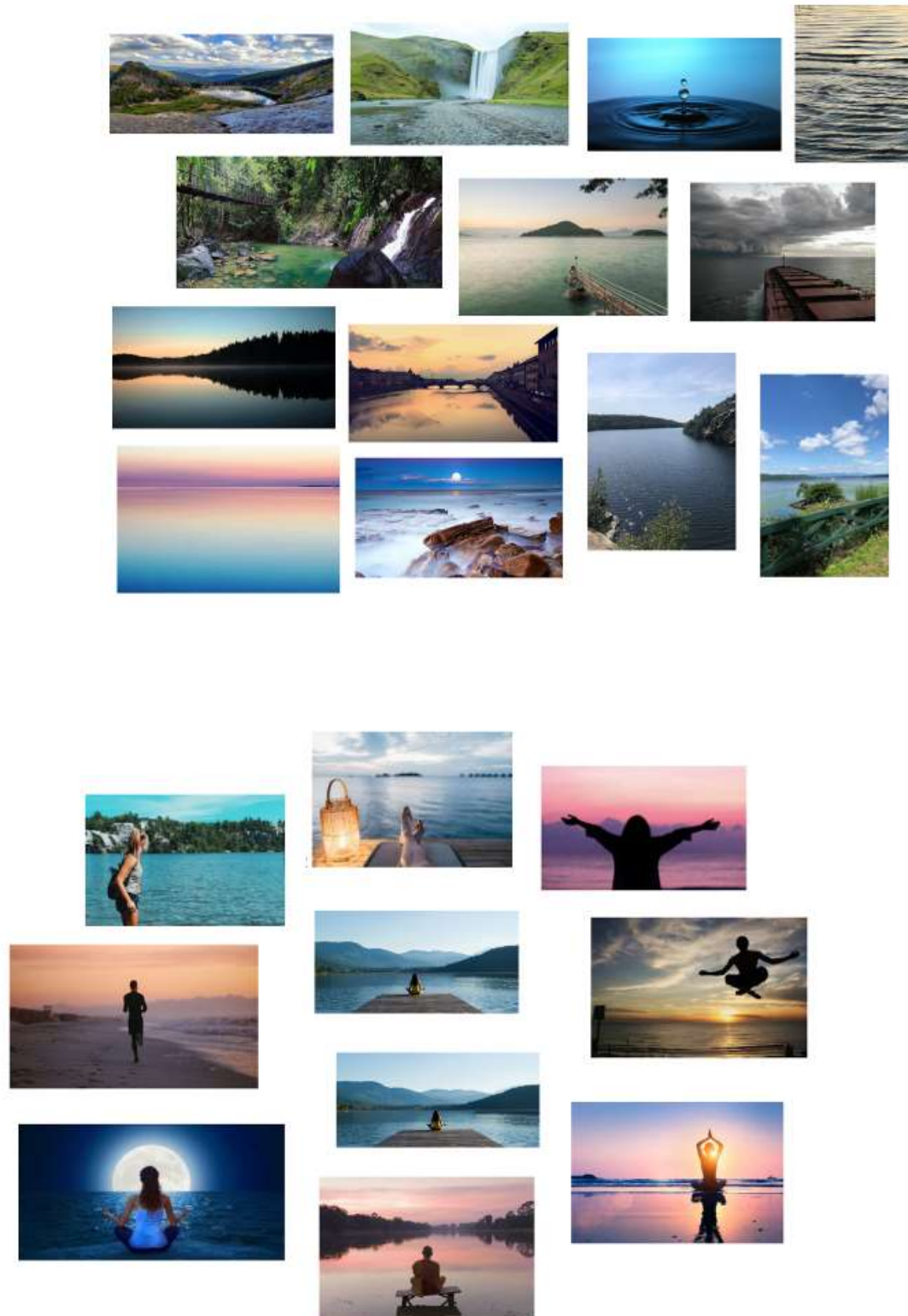
- Mental State
- Addressing Mental Health Issue
 - Reducing Stress
 - Lessening Anxiety
 - Addressing Other Mental Health Issues
- Thankfulness
 - Self
 - Other People
 - Other Things to Be Thankful For
- Self-Awareness
- Peace
- Mindfulness
- Learning
- Other Benefits to Mind

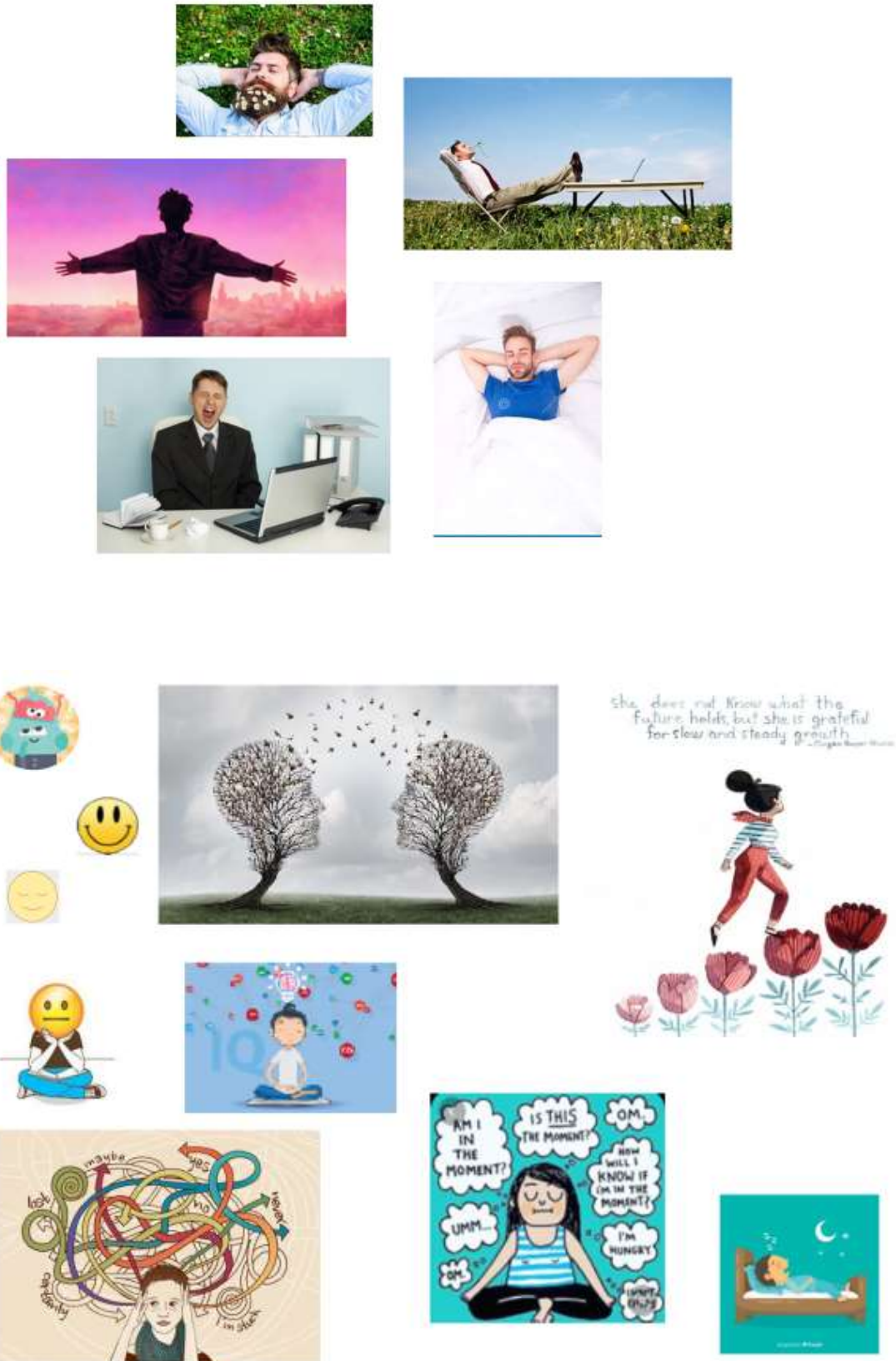
Mind and Body

- Relaxation
- Self-Care
- Wholeness
- Productivity

Appendix C: Images chosen from research participant

“Pick one image that best represents your experience during this two-week period of using this mindfulness meditation app.” (Images were organized on PowerPoint slides.)







The Promiscuous Itch of Cancerous Phenotypic Selectivity: Post Translational Substrate Scopes of Amino Acids by John F. Decarlo Hofstra University

Abstract

A question is posed: how deeply the promiscuous itch of phenotypic selectivity is ingrained in the substrate of amino acids, the backbone of proteins, of both normal and cancerous cells. To indicate this empirically a series of four case studies is presented in a cumulative order, such that there is an increase of metabolic complexity and in the consequential severity of selectivity. In this respect, it is first demonstrated that even an amino acid whose family structure and long history suggest otherwise, still exhibits the foundational potential to evolve a broad substrate scope embedded in its physical chemistry. Next, an enzymatic post-translational modification occurring in hundreds of protein substrates, which operate in two opposing phases is presented; yet their respective selectivity has been simultaneously co-opted by the niche construction of cancer cells. It is also noted that the prior selective metabolic reprogramming also depends upon the up regulation of a mitochondrial enzyme which is a key precursor for biosynthetic and bioenergetic processes. Lastly, it is examined how the substrate scope of selectivity of amino acids can not only be broadened, but how radical phenotypes found in secondary brain tumors derived in post translational dynamics rely on such potential selectivity.

Introduction

It might seem glib to state that the process by which cancers originate and thrive is based on the selectivity of natural selection – in extra high gear – in that, their cells replicate faster and larger, and that their varied cellular development is also un-regulated, opening them up to endless possibilities. But that is essentially true. But a question remains: how deeply ingrained in the substrate of amino acids of both normal and cancerous cells is that selectivity?

In order to explore and indicate the depth of the ‘promiscuous itch of phenotypic selectivity’, a series of four case studies will be presented in sequential order, such that they will increase in terms of their metabolic complexity, and in terms of the consequential severity of their selectivity.

In Case One, we examine a foundational potential for an amino acid, the backbone of proteins, to evolve a broader substrate scope as embedded in its physical chemistry, even with an amino acid whose family structure and long history, suggest otherwise. In Case Two, we examine O-GlcNAcylation which is an enzymatic post-translational modification occurring in hundreds of protein substrates, which operates in two opposing phases; and yet, their respective selectivity has been co-opted by the niche construction of cancer cells to operate simultaneously to the advantage of the cancer cells. In Case Three, it is noted that the prior selective metabolic reprogramming also often depends upon the up-regulation of mitochondrial enzyme glutaminase (GLS) activity, which converts glutamine to glutamate (glutamine = essential amino acid; glutamate = non-essential/involved in nervous systems), which is a key precursor for biosynthetic and bioenergetic processes.¹⁴ In Case Four, in a purposeful sense, we return to

¹⁴ Most phenomena of life can be best understood in terms of chemical reactions that are catalyzed by enzymes. Nurse, Paul. *What is Life?* Pg. 64.

Case One, in terms of examining how the substrate scope of selectivity of amino acids can be broadened, but we increase the consequential ante in terms of exploring the radical phenotypes found in secondary brain tumors derived post translational dynamics.

Theoretical Considerations:

In the four cases noted above, while classical adaptive evolution typically proceeds through selection of mutations with small effects, strikingly novel phenotypes can occur either through mutations of a major regulatory control gene expressed in a tissue specific manner, or through facilitated variation. In fact, in secondary tumor sites we see how there is a developmental bias to openness, that was probably not a completely random variation, but rather the result of a type of selection.¹⁵

Moreover, Extended Evolutionary Synthesis theorists and oncologists are keen on original biosignatures, especially with chemical idiosyncrasies. For the former, they are the hallmark for novel phenotypic variants which distinguish their theory from classical Darwinism; for the latter, they are essential for detecting, accessing and treating invasive cancers. Also, whereas novel phenotypes, induced by genetic mutations, are usually randomly found in isolated cells, and lacking advantageous directional functionality, novel cancerous phenotypic variations are frequently directional and functional, as induced by and for the microtumor environment.

Lastly, in lieu of their range of genotypic and phenotypic adaptations, brain cancers might represent the perfect case study for investigating the inter-relationship of gene first and plasticity first development, and the evolutionary selectivity value of the latter. While such instances of niche construction and developmental plasticity have been documented by single-cell techniques, large population dynamics have offered methodological challenges in terms of epigenetic profiling of modification of individual cells over time and across cell tissue. Hence, spatial multi-omics profiling technologies allowing for transcriptome, protein, and epigenome mapping – have been implemented, offering valuable insight into cell organization and tissue development for Extended Evolutionary Synthesis theory. But above all, it is the selectivity of enzymes, with their foundational structure of amino acids, which afford insight into the promiscuous itch of phenotypic selectivity.

Historical Background: Amino Acids and Enzymes

The encoded information directing a protein enzyme to "select" only one of several similar compounds as the substrate of a chemical reaction is encoded in the precise three-dimensional shape of the enzyme; that precise shape is itself encoded by the linear sequence of amino acids constituting the protein; and that particular sequence of amino acids is encoded by the sequence of nucleotides in the gene for that enzyme.

Historically, in keeping with the view that enzymes are highly specific to their substrates, in 1884 Schwann extracted pepsin from gastric juices, and pepsin, which carefully controls the flow of chemicals across membranes, was observed to break down egg proteins much faster than stomach acid alone. It was also the highly pure crystallized enzyme pepsin that passed the test of protein purity in 1929.¹⁶

In this respect, enzymes, which are a type of protein, make a biochemical reaction more likely to proceed by lowering the activation energy of the reaction, thereby making these reactions proceed thousands or even millions of times faster than they would without a catalyst. The issue

¹⁵ Lewens, Tim, *Darwinism: A Health Check at Forty*, Cambridge University, 2015.

¹⁶ Lorch, Mark. *Biochemistry. A Very Short Introduction*, Oxford University Press, 2021

of activation energy also coincides with the 19th century debate between experiments of Pasteur and the theories of Liebig, which was eventually settled by the Buchner brothers who demonstrated that while fermentation did require the chemicals extracted from biological cells, it could take place without a viable living agent or organism. Hence, the vitalistic belief that living organisms are fundamentally different from non-living matter was dramatically overturned.¹⁷ Nonetheless, as will be explored the ability of enzymes to broaden their scope of substrates and their corresponding selectivity will be presented as a means of better understanding the creative emergence of both normal cells and phenotypic cancer cells, from the protoplasm of living cells.¹⁸

More specifically, the historical investigation led to the discovery that proteins are easily degraded by acid, leaving various molecules in the residues of these reactions, which all possessed an acidic amino, or the 20 amino acids that are encoded in the human body. Thus, the question is: can an amino creatively develop new side chains, thus broadening its substrate scope, or is its scope genetically predetermined?

Case One: L-Alanine

L-Alanine or Alanine, abbreviated Ala or A, is a non-essential amino acid made in the body from either the conversion of the carbohydrate pyruvate or the breakdown of DNA and the dipeptides carnosine and anserine.¹⁹ Normal alanine metabolism, like that of other amino acids, is highly dependent upon enzymes that contain vitamin B6. Alanine is an important participant as well as a regulator of glucose metabolism.

The L-Alanine dehydrogenase has a natural history that suggests it would – not - be a promising candidate for expansion of substrate specificity by protein engineering as it is the only amino acid in its fold family, and it has a strong preference for L-alanine over all other substrates, and it is the only sequence or structural similarity to any known amino acid dehydrogenase. To test whether the natural history of the enzyme is a predictor of its innate evolvability, directed evolution was carried out on AlaDH, introducing random changes – mutations – into the gene that encodes the peptide-cleaving enzyme.²⁰

First, a single mutation, F94S, identified through molecular modeling, which comprises a group of techniques that employ computer-generated images of chemical structures that show the relative positioning of all the atoms in the molecule being studied, was introduced into the AlaDH and completely altered the substrate specificity pattern. Additionally, saturation mutagenesis libraries in this mutant background which generate random or targeted mutations and screen the library of proteins for the functional alterations, identified a double mutant (F94S/Y117L) demonstrating increased activity toward hydrophobic amino acids, which neither interact with water nor are dissolved by it.

Thus, the catalytic efficiencies achieved in AlaDH proved to be comparable to those that resulted from similar efforts in the Amino Acid Dehydrogenase superfamily and demonstrates the evolvability of Mycobacterium Tuberculosis (MtAlaDH) specificity toward other amino acid

¹⁷All known enzymes are catalysts, but not all catalysts are enzymes. The difference between catalysts and enzymes is that enzymes are largely organic in nature and are bio-catalysts, while non-enzymatic catalysts can be inorganic compounds

¹⁸ Lorch, Mark. *Biochemistry. A Very Short Introduction*, Oxford University Press, 2021

¹⁹ A dipeptide is a peptide composed of two amino-acid residues.

²⁰ Directed Evolution continues with different versions of a mutated gene being inserted into bacteria that starts churning out many, slightly different enzymes; and the bacteria whose enzymes work best in organic solvents is chosen and subjected to further rounds of test-tube evolution.

substrates. From this basic example of the substrate selectivity discerned in physical chemistry, we now proceed to more complex biochemical metabolic processes.²¹

Case Two: The OGA and OGT Dynamic

Post translational modifications refer to any alteration in the amino acid sequence of the protein after its synthesis by a ribosome.²² It may involve the modification of the amino acid side chain, terminal amino or carboxyl group by means of covalent or enzymatic means following protein biosynthesis. Generally, these modifications influence the structure, stability, activity, cellular localization or substrate specificity of the protein.

In particular, O-GlcNAcylation is a dynamic post-translational modification which affects myriad proteins, cellular functions, and disease states. Its presence or absence modulates protein function via differential protein and site-specific mechanisms, necessitating innovative techniques to probe the modification in highly selective manners. Its modifications also occur through the addition of the monosaccharide N-acetylglucosamine to serine and threonine residues on intracellular proteins in the cytosol, nucleus, and mitochondria. As a highly dynamic form of modification, changes in O-GlcNAc levels coincide with alterations in metabolic state, the presence of stressors, and cellular health.

But specifically, and significantly, O-GlcNAc modification is the reversible addition of N-acetylglucosamine to serine/threonine residues of intracellular proteins. It is added by the enzyme O-GlcNAc transferase (OGT) and removed by O-GlcNAcase (OGA). While there are only 2 enzymes that regulate the cycling of O-GlcNAc, chemists can perform substrate targeted OGT/OGA: (a) OGT catalytic domain can be targeted to proteins through a nanobody/tag pair, resulting in increased O-GlcNAc of the tagged, target protein. (b) Similarly, OGA can be nanobody targeted to remove O-GlcNAc.²³

Accordingly, scientists thought that OGA and OGT enzymes only directly work against each other, but these two opposing enzymes work together in a nutrient-rich environment to drive cancer cells to grow and reproduce. Such a type of ‘acquired metabolism’ has been defined as “parts of (one’s) metabolism which aren’t encoded in your own genome. (One) gain(s) access to them in some way by associating with another species”.²⁴ In fact, the process called O-GlcNAc protein modification whereby cancer metabolism alters the function of proteins by

²¹ *Alteration of substrate specificity of alanine dehydrogenase*, by Puja Fernandes , Hannah Aldeborgh, Lauren Carlucci , Lauren Walsh , Jordan Wasserman, Edward Zhou , Scott T. Lefurgy , Emily C Mundorff - Published by Oxford University Press, 2014

²² Many proteins are modified shortly after translation is completed to mediate proper protein folding or stability or to direct the nascent protein to distinct cellular compartments (e.g., nucleus, membrane).

²³ Balana, Aaron T., Moon, Stuart P., Pratt, Matthew R. *Current Opinion in Structural Biology*, May 2020

²⁴ Moeller, Holly. *She Finds Keys to Ecology in Cells That Steal From Others*, Quanta, 2022

attaching certain kinds of sugar molecules is thought to generally act as a nutrient sensor for many types of cancer acting horizontally and synergistically in the microenvironment.²⁵

More specifically, OGA alters the acetylation²⁶ of a protein known as PKM2 (a key player in cell metabolism), and this activity increases along with levels of glucose available to the cell. OGT then inhibits PKM2 activity via O-GlcNAc modification, which drives metabolic reprogramming and promotes tumor growth. In this respect, in addition to working in synch with each other, both OGT and OGA are expressed at higher levels in many cancers than in normal tissues. This also coincides with the fact that novel phenotypic selections are frequently directional and functional, as induced by and for the microtumor environment.

Case Three: Cancerous Mitochondrial Enzyme Glutaminase (GLS) Activity

To support sustained biomass accumulation, tumor cells undergo metabolic reprogramming. Nutrient transporters and metabolic enzymes are regulated by the same oncogenic signals that drive cell-cycle progression. However, tumor growth depends upon cancer cells acquiring nutrients from their environment and using these molecules to fuel proliferation, but the metabolic microenvironment of tumors is characterized by fluctuating and limited nutrient availability. To survive these conditions, cancer cell-intrinsic mechanisms sense and signal nutritional status and scientists have uncovered the workings of a metabolic pathway or “gauge” that lets cancer cells detect when they have enough nutrients around them to grow. They note for solid tumors, nutrients and oxygen are often limited, so the cell has to make a decision to grow or survive but have shown how the cell adapts to its microenvironment, detecting nutrients availability to make this decision.²⁷

More specifically, a key to the nature and regulation of metabolic adaptation is nutrient-responsive transcription factors²⁸ (e.g., HIF, SREBP, ATF4) and signaling pathways (e.g., mTORC1, AMPK) which allow tumor cells to tune their metabolic output and strategies to fluctuations in nutrient availability, thus balancing tumor cell proliferation and survival with a combination of anabolic and adaptive responses (On/Off-Weak/Strong-low/High).

At the same time, lysosomes are the major cellular site for clearance of defective organelles and digestion of internalized material. Demand on lysosomal capacity can vary greatly, and lysosomal function must be adjusted to maintain cellular homeostasis. Here, the team identified an interaction between the lysosome-localized mechanistic target of rapamycin complex 1 (mTORC1) and the transcription factor TFEB (transcription factor EB), which promotes lysosome biogenesis. Cells also activate AMPK when they are running low on energy, and AMPK is activated in tissues throughout the body following exercise or during calorie restriction. In response, AMPK alters the activity of many other genes and proteins, helping keep cells alive and functioning even when they're running low on fuel.

²⁵ The process of horizontal gene transfer is one of the reasons the genes that make certain bacteria resistant to antibiotics can spread rapidly through whole populations of bacteria, and even from one unrelated species to another. Nurse, Paul. *What is Life?* Pg. 47.

²⁶ Acetylation is an epigenetic process which increases gene stability and the transcription of genes related to molecular functions.

²⁷ Jay Prakash Singh is lead author on the paper. Other Yale contributors include Kevin Qian, Jeong-Sang Lee, Bichen Zhg, Qunxiang Ong, Weiming Ni, Hai-Bin Ruan, Min-Dian Li, Kaisi Zhang, Jing Wu, Raimund Herzog, Susan Kaech and Robert Shewin. This work was supported by grants from the NIH (R01 DK089098, P01 DK057751), Yale Cancer Center, and the American Cancer Society

²⁸ In molecular biology, a transcription factor is a protein that controls the rate of transcription of genetic information from DNA to messenger RNA, by binding to a specific DNA sequence.

Moreover, there is a major type of selectivity involved to support sustained biomass accumulation, and for tumor cells to undergo metabolic reprogramming. While nutrient transporters and metabolic enzymes are regulated by the same oncogenic signals that drive cell-cycle progression, many cancer cells exhibit an altered metabolic phenotype, in which glutamine consumption is upregulated relative to healthy cells. Significantly, this metabolic reprogramming often depends upon the up-regulation of mitochondrial enzyme glutaminase (GLS) activity, which converts glutamine to glutamate (glutamine=essential amino acid; glutamate=non-essential/involved in nervous systems) which is a key precursor for biosynthetic and bioenergetic processes.

Significantly, GLS catalyzes the hydrolysis of glutamine to glutamate, which then supplies diverse metabolic pathways with carbon and/or nitrogen.²⁹ As will be discussed in the last Case Study, the influx of new and numerous metabolic pathways is key to the selectivity offered to cancer cells by the underlying scope of selectivity of amino acids.

Case Four: Spatial Multi Omics & Post Translational Cancerous Phenotypes

In a sense, we now return to the findings of Case One, in terms of examining how the substrate scope of selectivity of amino acids can be broadened, but we increase the consequential ante in terms of the radical phenotypes found in secondary tumors.

Some basic background: post-translational modification can occur at any step in the "life cycle" of a protein. Many proteins are modified shortly after translation is completed to mediate proper protein folding or stability or to direct the nascent protein to distinct cellular compartments (e.g., nucleus, membrane).

Post translational modifications refer to any alteration in the amino acid sequence of the protein after its synthesis. It may involve the modification of the amino acid side chain, terminal amino or carboxyl group by means of covalent or enzymatic means following protein biosynthesis. Generally, these modifications influence the structure, stability, activity, cellular localization or substrate specificity of the protein.

Treating glioblastoma has proven to be more challenging than originally thought. After profiling more than 24,000 cells and sequencing the DNA for each cell, the research team discovered that each one can change to any one of the four types of stem cells, including the mature cell which can regress back to its immature state, and start a new cycle. In fact, cancer cells often gain growth and survival advantages by reawakening long-dormant genes, and some help them act more like stem cells, which can replicate themselves indefinitely without gaining specialized

²⁹ Lukey, Michael. *SIRT5 stabilizes mitochondrial glutaminase and supports breast cancer tumorigenesis*. Kai Su Greene, Xueying Wang, +10 , and Richard A. Cerione
<https://orcid.org/0000-0003-4512-5897> rac1@cornell.edu Authors Info & Affiliations

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functions.³⁰ Moreover, regression of the neoplastic phenotype and metastasis remains unsatisfactorily explained by the cell-centered perspective.³¹

Based on the hypothesis that transcriptional subgroups are spatially segregated and engage in 5 distinct brain areas, spatial multi omics³² determined that there existed segregation in 90% of surveyed tumors, consisting of: 1 glial related gene; 2 Inflammation associated genes; 3 radical glia; 4 reactive immune; and 5 neural developments. In other words, clonal architecture has a limited impact on 5 spatially distinct transcriptional programs. Instead, a bidirectional program is set up in which the secondary host environment plays an important role in reshaping the genetic and transcriptional heterogeneity such that genotypes have primary lead in phenotypes in secondary tumors, and the latter, in turn, effect genotypes.³³

It was also qualified that proteins with higher numbers of positive protein-protein correlations were more essential for cancer cell survival, as their increased transcript and protein expression levels, and the number of pathways in which they are involved are supportive of metabolic and related growth needs. In this respect, knowing what we now know about the broad spectrum of amino acid substrate selection, in contrast to the hardware of digital computers, a ‘wet chemistry’ is needed to approximate the ‘wiring’ of cells and organisms which is fluid and dynamic in keeping with biochemicals that can diffuse through water in cells, move between different cellular compartments and also between cells.³⁴

Conclusion: The Extensive Underpinning of Selective Substrates

In sum, in exploring the depth of the ‘promiscuous itch of cancerous phenotypic selectivity’, we first examined a foundational example of the potential for an amino acid, the backbone of proteins, to evolve a broader substrate scope as embedded in its physical chemistry, even with an amino acid whose family structure and long history, suggest otherwise. Surprisingly, such an evolution turned out to be the case.

Secondly, we examined O-GlcNAcylation which is an enzymatic post-translational modification occurring in hundreds of protein substrates, which operates in two opposing phases; in fact, chemists purposely perform substrate targeted OGT/OGA: (a) OGT catalytic domain can be targeted to proteins through a nanobody/tag pair, resulting in increased O-GlcNAc of the tagged, target protein. (b) Similarly, OGA can be nanobody targeted to remove

³⁰ H. Lee Moffitt Cancer Center and Research Institute, Jan/21/2021.

³¹ It is reasonably supposed that past natural selections explain why there are specific factors of developmental bias, and that this overall process of molecular disguise ties back to the embryonic process of self-assembly, in that, the early embryo must surmount many challenges to survive and develop into a human being, not the least of which is the mother’s immune system, which is the cause of most still born fetuses.

³² Development and deployment of single-cell and spatial multi-omics profiling technologies by Dr. Rong Fan (Yale) allow for spatial transcriptome mapping, spatial high-plex protein mapping, and spatial epigenome mapping offering invaluable insight into cell organization, tissue development.

³³ Ravi, Vidhya M. *Spatially resolved multi-omics deciphers bidirectional tumor-host interdependence in glioblastoma*. *Cancer Cell*, Volume 40, Issue 6, 13 June 2022, pages: 639-655.e13

³⁴ Nurse, Paul. *What Is life?* Pg. 95.

O-GlcNAc.³⁵ And as well as components which can be reconnected, repositioned, and repurposed in a cell, effectively ‘rewiring’ the entire system yet, significantly, these seemingly opposing catalytic domains have been selectively co-opted by cancer cells to operate simultaneously to the advantage of the cancers. In this respect, we see how components can be reconnected, repositioned, and repurposed in a cell, effectively ‘rewiring’ the entire system.³⁶

Thirdly, such cancerous and selective metabolic reprogramming often depends upon the up regulation of mitochondrial enzyme glutaminase (GLS) activity, which converts glutamine to glutamate (glutamine: essential amino acid; glutamate: non-essential/involved in nervous systems), which is a key precursor for biosynthetic and bioenergetic processes. Hence, while nutrient transporters and metabolic enzymes are regulated by the same oncogenic signals that drive cell-cycle progression, many cancer cells exhibit an altered metabolic phenotype, in which glutamine consumption is selectively upregulated relative to healthy cells to support sustained biomass accumulation.

Lastly, in a sense, we returned to Case One, in terms of examining how the substrate scope of selectivity of amino acids can be broadened, but we up the ante in terms of the radical phenotypes found in secondary tumors. Here, it was qualified that proteins with higher numbers of positive protein-protein correlations were more essential for cancer cell survival, as their increased transcript and protein expression levels, and the number of pathways in which they are involved are supportive of the metabolic and related growth needs. Moreover, the type of post translational modifications taking place in a secondary tumor refers to any alteration in the amino of the amino acid side chain, terminal amino or carboxyl group by means of covalent or enzymatic means following protein biosynthesis. Generally, these modifications influence the structure, stability, activity, cellular localization or substrate specificity of the protein, which is clearly the case in the aggressive and varied growth in glioblastoma.

Future Studies:

Whole-genome and exome sequencing studies reveal many genetic variants between individuals, some of which are linked to disease. Many of these variants lead to single amino acid variants (SAVs), and accurate prediction of their phenotypic impact is important. But this is not easily attained, as gene expression involves a cascade of chromosomal, transcriptional and post-transcriptional events. Genomic variants also produce differences between individuals in terms of transcriptional and post-transcriptional events at equal frequency. Nonetheless, beyond cancer studies, clinical studies have demonstrated links between amino acid variants and such disorders as cardiac dysfunction troponin C, epilepsies, and HIV -1Tat, among others. There also theories regarding selective recruitment of protein isoforms as a cause of strain-specific patterns of posttranslational modifications, giving rise to unique disease phenotypes. But these theories need further definition and qualification.

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³⁶ Nurse, Paul. *What Is life?* Pg. 95.

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Singh, Jay Prakash. Lead author on the paper. Other Yale contributors include Kevin Qian, Jeong-Sang Lee, Bichen Zhang, Qunxiang Ong, Weiming Ni, Hai-Bin Ruan, Min-Dian Li, Kaisi Zhang, Jing Wu, Raimund Herzog, Susan Kaech and Robert Shewin. This work was supported by grants from the NIH (R01 DK089098, P01 DK057751), Yale Cancer Center, and the American Cancer Society, *Oncogene*, 10/19/2021

Difference between Perception of Leader and the Follower about the Leading Style of the Leader in Manufacturing Industry: Reducing the Difference by Susmita Bose Research Scholar, Department of Business Management, University of Calcutta West Bengal, India & Dr. Kumkum Mukherjee Professor (Retired) Indian Institute of Social Welfare and Business Management, Kolkata. West Bengal, India

Abstract

In any organisation, Leadership style of a leader is one of the most crucial factors. Effective leadership is commonly believed to be an essential element to organizational success. Leadership in organizations is important in shaping workers' attitude, perceptions, responses to organizational change and acceptance of innovations. In any organisation the Leaders' function is not limited to leading the followers only. His/her actual responsibility is to understand and motivate his/her followers so that together they can achieve the organizations' goal.

In the present paper, the focus has been to find out whether there is any difference between a leader's perception regarding his/her own style of functioning and the followers' perception of the same in various corporate sectors in and around Kolkata. The sample of the study were 33 Leaders including professional managers, team leaders, head of the departments and their respective 160 followers (n = 193). The leadership style of each of the leaders was measured by administering the 86-item Leadership Behaviour Description Questionnaire to each of the leader and their respective followers.

The findings of the study seem to indicate that, in most cases the perceptions of the leader about his/her style of leading and the perceptions of the followers about the same do not match.

Key Words: Leader, Follower, Leadership Styles, Leader's perception, Followers' perception

Introduction

"The concept of leadership implies that leaders are individuals who, through their actions, facilitate the movement of subordinates or group towards common or shared goals." (Monga, Coetzee and Cilliers, 2012).

"Leadership style is one of the most important factors of an organisation. Leadership is one of the key determinants associated with the success and failure of any organization" (Khajeh, 2018). Leadership style is an approach in which people are directed and influenced by a leader to achieve organizational goals. "As businesses persistently progress and grow, the responsibility of a leader becomes more challenging and imperative" (Gautam and Malla, 2013) Leadership has always been a topic of interest for researchers. "Researchers have different views about the leader's role and their effectiveness in success or failure of any industry, project or organization, but at the same time mostly researchers agree that a leader and style of leadership play a critical role in organizational success." (Naeem and Khanzada, 2018)

"The relationships between the leader and employee, as well as the quality of employees' performance, are significantly influenced by the leadership style adopted by the leader" (Monga, Coetzee and Cilliers, 2012). The leading style of a leader is the summation of his/her demographic gender, age, education, experience, culture of the organisation he/she is associated with, his/her perspective towards life, and his/her attitude towards his/her responsibilities. So,

a leader has its own assessment or perception of his/her style of leading, but at the same time followers built up their own interpretation about the style of leading of their leader which ultimately influences their performance and attitude towards the organisation. “Participants may make the wrong perception or perceive the same stimulus or situation in entirely different ways” (Luthans, 2005). “Having the right perception is a significant skill for any effective leadership” (Otara, 2011).

Literature Survey

“In recent past one of the mostly researched topics is leader and their style of leadership.” (Naeem and Khanzada, 2018). From the existing research evidence, it has been found that there is little research on how Leader and the respective followers perceive Leadership style of the leader.

To examine the analyzes the impact of Leadership style on team performance and Leaders’ perception about the same, in a public sector, Dias, Borges (2017) has shown that the leader assume that team performance is directly influenced by transformational leadership while the followers think that their performance is directly affected by the transactional characteristics of the leaders and not transformational characteristics.

In order to understand the difference of super’s perception of Leadership style of leader and followers’ perception of the same in public and private banks Sharma and Nair (2020) in their study has shown significant difference in the perception for transformational and transactional style in private banks in comparison to public banks.

In order to investigate leadership style from employees’ perspective of leadership communication and leaders’ method of leading in various organisations through leadership communication, Bornman (2015) in his/her research work has shown that leaders or managers don’t understand the concept of ‘communicating Leader’ properly and also they don’t understand how to nurture leader-follower relationship for betterment of the organisation.

Thus it is evident from the above mentioned studies that there exist significant difference in leader and Followers’ perception. Follower’s performance in organisation gets affected by his/her perception about the leading style of the leader he/she is working under. The achievement of organization goal gets affected to a significant extent by his/her perception of leadership style of the leader he/she is working under.

Objective of the present study

The primary objective of the study is to check whether the perception of the Leader about his/her leading style and the perception of the follower about the same match or doesn’t match in Manufacturing Industry.

More specifically, attempts were made to -

Determine the leadership style of a particular leader as perceived by his/her followers (people directly reporting to the identified leader) in Manufacturing Industry

Determine the leadership style of a particular leader as perceived by the leader himself/herself in Manufacturing Industry.

Analyse the possible difference between the perception of the leader and the perception of the follower about the leadership style of the leader in manufacturing industry.

Operational Definitions

Leader:

In the present study, Leader is a person, who can take independent decision, has the power to give orders or instructions to a group of followers and had the ability to influence them towards the achievement of organization's goal. For example, Business Executive, Senior Manager, Project Leader, Team Leader and the like.

Leadership style:

In the present study, leadership style is referred to an individual's propensity to behave in a particular manner within the organization, which could be accessed through the response of his/her follower to GLOBE Study Questionnaire.

Follower:

In the present study, follower of an individual is the person who reports directly to the individual and takes instructions from him/her.

Manufacturing Industry

In the present study manufacturing industry is defined as any industry that makes products from raw materials by the use of manual labour or machinery. This includes all foods, chemicals, textiles, machines, electrical equipment etc.

Methodology

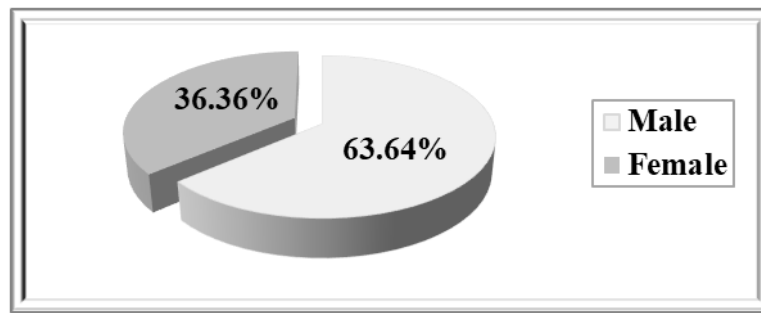
Sample:

Thirty-Three identified leaders from manufacturing industry along with One Hundred and Sixty followers were taken as the sample of the present study, thus making the sample size One Hundred and Ninety Three.

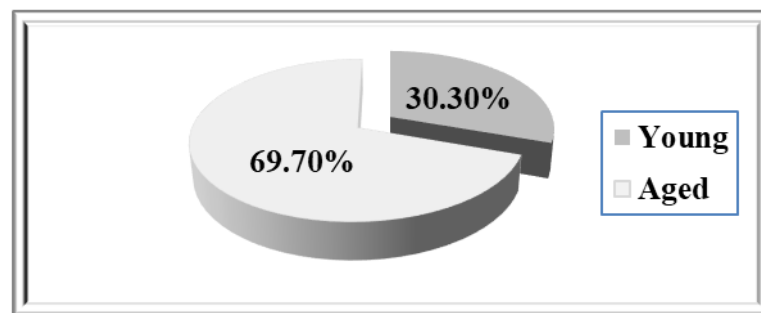
Description of Sample

Exhibit 1: Gender of Leaders in Manufacturing Industry

Male (%)	Female (%)
63.64	36.36

Figure 1: Gender of Leaders in Manufacturing Industry**Exhibit 2: Age of Leaders in Manufacturing Industry**

Young (%) =< 40 Years old	Young:	Aged (%) Years old;	Aged:>40
30.30		69.70	

Figure 2: Age of Leaders in Manufacturing Industry**Exhibit 3: Years of Job Experience of Leaders**

Types of Industry	Junior (%)	Senior (%)
Manufacturing	27.27	72.73

Note: Junior =<15 Years of Job Experience; Senior > 15 Years of Job Experience

Figure 3: Years of Experience of Leaders in Manufacturing Industry

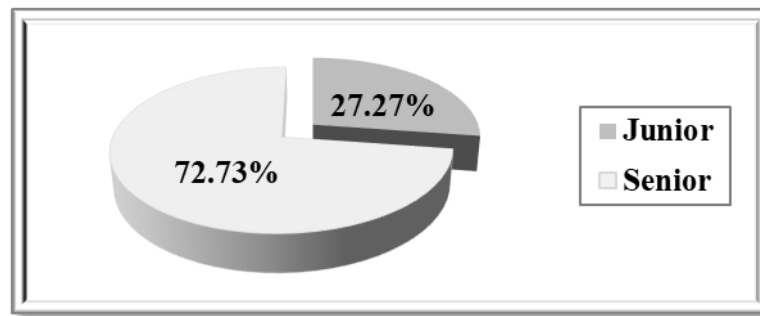


Exhibit 4: Mean and S.D. of Age and Experience of Leaders.

Types of Industry	Leaders' Age		Leaders' Experience	
	Mean	S.D.	Mean	S.D.
Manufacturing	46.61	6.25	21.70	6.20

Tools:

The Leaders' and the followers' perception about the leadership style of each of the leaders was measured by administering the 86-item Leadership Behaviour Description Questionnaire individually to each leader and the followers of the respective leader.

Method of data collection

The Global Leadership Behaviour Description questionnaire was administered individually to each of the respondents to identify the leadership style of each of the leaders as perceived by the leader and his/her followers.

Data Analysis

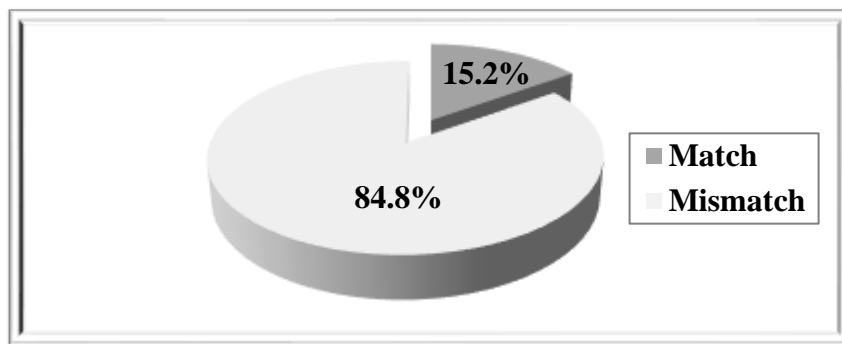
Leadership score obtained from followers' response to the GLOBE study questionnaire. The leadership trait, which obtains the maximum score, is the leadership style of the leader.

Findings

Table 1: Perception Difference between Leader and the respective Followers regarding Leadership style in Manufacturing Industry

Leader and Followers' Perception Match (%)	Leader and Followers' Perception Mismatch (%)
15.2	84.8

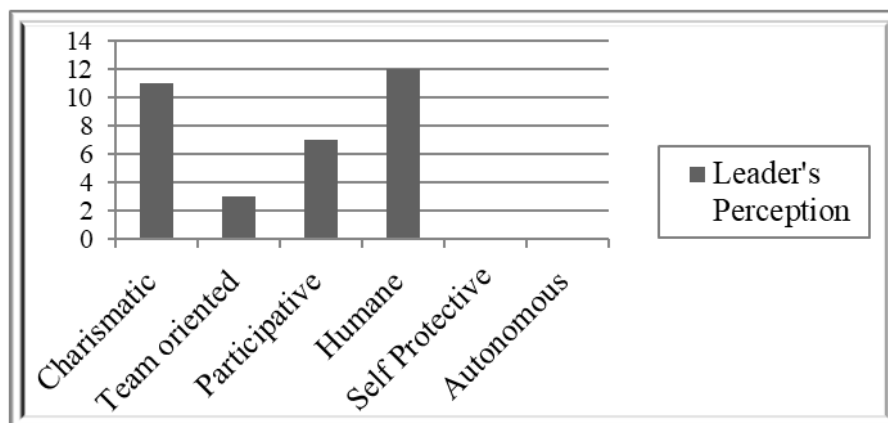
Figure 4: perception Difference between Leader and the respective Followers regarding the Leadership Style in Manufacturing Industry only



Referring to **Table 1** and **Figure 4**, it is noted that in most cases, the perception of the followers about the leadership style of the leader differs from the self perception of the leader about his/her leading style.

In Manufacturing Industry, only 15.2% cases the leadership style as perceived by the leader and the followers are same. 84.8 % of the time the perceptions are different.

Figure 5: Leaders' Perception vis-a-vis Followers' Perception of Leader's Leadership Style in Manufacturing Industries



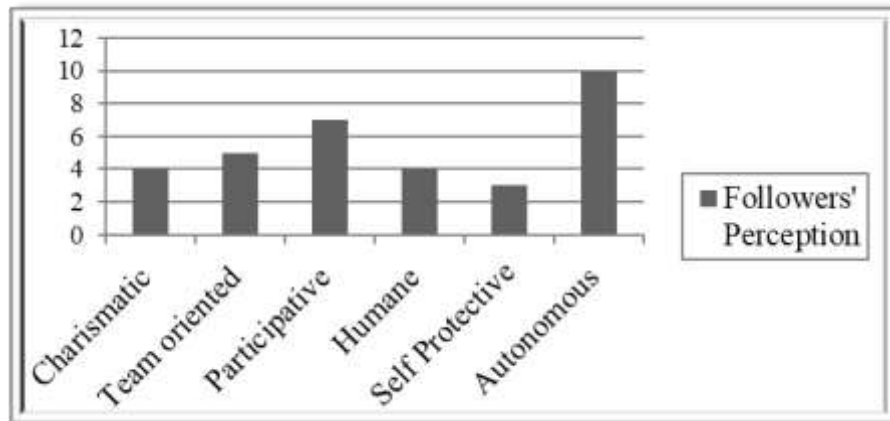


Figure 5 illustrates the perception difference between Leader and respective Followers in detail.

Discussion and Conclusion

Leading Style influences the followers' achievement in the organisation. "A positive relationship between the management and the employees is very crucial for any organization to get better turnover and recognition" (Nidadhavolu, 2018). Leaders' self-identity and proper self-assessment is an important factor in the development of organisation

In this research work it has been found that there is a huge difference in perception between the leader and the follower. This finding of the study also follows previous findings by Sharma and Nair (2020)

In the research study an interesting finding to observe that, leaders whose leading style seems self-protective or autocratic to their followers are either not ready to accept or unaware of this fact. This is the area where the problem between leader and follower generates.

When the perception matches everything seems all right. But the problem begins when perception mismatch because that causes expectation mismatch. Expectation mismatches cause accumulation of stress and tension between them. Leader-Follower relationship gets affected very badly. The disturbed relation between Leader and follower ultimately impacts the organisational goal badly. Therefore, no organisation can afford to let that happen.

"Understanding self is an important component to understanding leadership" (Payne, 2015). To come out of this problem the Leader and the follower need to have open discussion about their expectations from each other. "Cooperation and mutual trust are important determinants of performance in groups where member roles are highly interdependent" (Yukl, 2013).

True leadership implies an interactive process between a leader and his/her followers. "Communication enables them to share what they have and what they expect from others".(Luthra and Dahiya, 2015). There should be a forum in every organisation where the employees can interact with each other and can share their views openly. This will help the leader and the followers to understand each other not only as an employee but also as a person. "In Organizations, leader's styles have a particular consequence on their individual follower's work conduct, styles of leadership are not only determining factors for every organization's success, but it could promote the failure also if not suited" (Sharma and Nair, 2020, p.51).

“In many respects, the LMX theory (Graen, 1976) is in line with Vroom’s (1964) expectancy theory and Blau’s (1964) exchange theory that call for a stronger balance between managers and employees. According to these theories, better performance can be achieved only when there is a reasonable level of expectation-fit and when the social exchange between managers and employees is fair and equal (Gadot, 2007).

Therefore, for leaders, pursuing the organisation’s goal is not enough. He needs to work consistently on the relationship and mutual understanding with his/her followers.

“COVID-19 has come as a shock to society, health systems, economies, and governments worldwide. During extraordinary challenges, uncertainty and countless personal tragedies, leaders are under pressure to make decisions on managing the immediate impact of the pandemic and its consequences, decisions that will shape the state of the world for years to come.” (World Economic Forum, 2020). The global pandemic has drastically affected everyone worldwide. To face the resultant challenging situation, understanding between Leader and the follower has become much more relevant. In this period of uncertainty, no organisation can afford to have internal stress among employees. “The need to drive change has become more important than ever, and this is especially evident with businesses whose operations have been most affected by COVID-19 as they’re working hard to transform their organization and stay ahead of their competitors.” (Robert Hosking, 2021).

This is a testing time for true leadership. A Comprehensive partnership between the Leader and his/her followers, based on mutual respect and trust, will help the organisation to achieve their goals successfully.

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Comparative Analysis of Commercial and Self-Formulated Feed Usage among Broiler Chicken Enterprises in Edo State, Nigeria: A Carcass Weight and Profitability Perspective

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Abstract

The profitability of Commercial Feed (CF) and Self-formulated Feed (SF) usage among broiler producers in Edo State were compared. The constraints faced by SF users were also assessed. Purposive and random sampling techniques were used to select 15 broiler farmers from each category for questionnaire administration. Budgetary analysis, t-test, and mean score analysis was employed. The SF users incurred lower cost of feed but recorded higher costs on other inputs. The ATVC for CF (₦524.61) was however higher than that of the SF (₦481.54). The GM was ₦375.39 for CF users and ₦418.64 for SF users. Similarly, the respective net returns were ₦354.69 and ₦395.56. The respective RoIs were 1.65 and 1.78. The t-test revealed significantly lower cost of feed for SF users ($t=1.74$, $\alpha=0.046$) but there was no difference in profit margins (difference=₦43.2, $t=1.06$, $\alpha=0.149$). Inadequate finance and the high cost of feed ingredients were the most serious constraints faced by SF users. Good practices that will lead to the reduction in medication cost, and expansion to take advantage of economies of scale are canvassed to complement the SF strategy. More research on non-conventional feed materials is also recommended to reduce the menace of high costs of feed ingredients.

Key Word: broiler chicken; commercial feed; self-formulated feed; profitability

1. INTRODUCTION

Nigeria's population is growing at a faster rate than the increase in animal products in the country and the population is expected to reach 400 million people by the year 2050 (United Nation Database, 2015). Thus, with time, animal production will be significantly overwhelmed by the population, possibly leading to malnourishment in a large percentage of the populace. While there are alternative and sometimes cheaper sources of animal protein (Onuche, 2020), Nigerians continue to have their preferences. Thus, in spite of the availability of cheaper animal protein sources like fish, the demand for animal protein sources in Nigeria has continued to overwhelm supply. The volume of broiler chicken produced for instance continues to enjoy robust patronage on and off-season. Aside from meeting the nutritional needs of Nigerians, thus assisting in meeting SDG 2, poultry production also serves as a tool for socio-economic empowerment.

The Nigerian agricultural sector is responsible for the provision of food and livestock with poultry production being responsible for 80% of the production (Netherlands Enterprise Agency, 2020). Poultry enterprise constitutes one of the fastest ways for animal protein production and has become a popular industry for smallholders, contributing significantly to Nigeria's Gross Domestic Product and employment opportunities (Oladokun and Johnson, 2012). However, the output level remains low compared to the input committed and the poultry

products are grossly inadequate in meeting demand (Olasunkanmi and Bamiro, 2008). There is therefore the need for an increased production of poultry and poultry products.

With the rising population, it has become pertinent for poultry production to be more aggressive in mitigating the challenges of food insecurity posed by the increasing population in the country, as well as creating employment opportunities. To achieve these double goals, the poultry ventures have to be profitable. A key component in profitable poultry enterprises is adequate consumption of qualitative feeds at rational prices. Mallick et al., (2020) stated that feed costs represent between 70 – 80 % of the total cost of producing various poultry products. Specifically for broiler chicken, feed accounts for 70% of the recurrent cost. The resulting price implications are enormous since poultry feeds are made of grains and other feed ingredients normally utilized by man (Mallick et al., 2020). The ensuing competition leads to higher prices of feed materials and its attendant consequences on the market and profit (Onuche, 2021).

Decreased market and profit are capable of slowing the growth of farms and even leading to the collapse of some. Afolayan and Afolayan (2008) reported that many commercial farms had collapsed while a good number of them have witnessed slow growth due to sudden increases in the cost of poultry feeds. Thus, to retain a rational profit margin, in the face of rising costs of feed and labour, there must be a strategy to reduce the cost of production while retaining a high level of performance in the birds. Failing which significant increases in the prices of poultry products will ensue (Afolayan and Afolayan, 2008). The fall out of increased prices will lead to the migratory demand scenario as reported by Onuche (2021). Such a scenario of change in demand can lead to the collapse of the poultry sector, leading to decreased animal protein supply, income poverty, unemployment and reduction in the contribution of the sector to national income.

One of the strategies to mitigate this challenge is the reduction of feed cost while maintaining high performance is the formulation of sufficient ration at the least possible cost. The majority of farmers, however, rely on ready-made commercial feed. Okoli *et al.*, (2005) reported that 55.6% of poultry farmers use commercial poultry feeds in feeding their flocks, probably due to the lack of knowledge about feed formulation or the fact that the actual size of most of these farms may be too small for the practitioners to go into feed formulation.

Self-formulation of feed is a necessary strategy given the high cost of commercial feed. The cost of commercial feed borne by the farmer comes with the margins obtainable at the different levels of production and the marketing chain. That is, the cost of feed includes the cost of the materials, the margin of the producer, as well as those of the marketers. Self-formulated feeds are void of direct costs other than those of the materials and transportation, making them cheaper than commercial ones. In self-formulating feed, the poultry farmer takes a lot of factors into consideration. These factors include available ingredients, increasing rate of restriction on available ingredients, the price mixes, and most importantly, the nutrient requirements of each species of bird.

Over time, farmers who formulate their feed can tinker with different formulas, and with experience arrive at a formula that can help them achieve their objectives. It is a process that involves some risks. Some of which may include failure and diseases. Information on the advantages of using the self-formulated feed in broiler production as regards profit margin is scanty. This study, therefore, examined the profitability of commercial and self-formulated feed usage among broiler chicken farmers in Edo State, Nigeria. The specific objectives were to:

1. determine the gross margin, net return, and the return on investment of broiler poultry enterprises that used commercial and self-formulated feed,
2. compare the feed costs and the profitability levels of the two categories of broiler chicken farmers, and
3. identify the constraints faced by the broiler producer.

The hypotheses to be tested are:

H₀₁: there is no difference in the costs of feed.

H₀₂: there is no difference in the margins for the two categories.

2. MATERIALS AND METHODS

The study was carried out in Edo State, Nigeria. The State has a population of approximately 3.2 million people (NPC, 2009). It lies approximately between latitude 5° 44' North and 7°34' North of the Equator and longitude 5° 4' East and 6°45' East of the Greenwich Meridian (Edo State Statistical Yearbook, 2013). The State has eighteen local government areas with three agro-ecological zones according to delineation by Edo State Agricultural Development Program (EADP). These ecological zones include Edo North, South and Central. The State is mainly agrarian producing crops such as yam, maize, cassava, oil palm, and rubber. Also, a significant percentage of the population is engaged in livestock, fishing, carving and carpentry activities (Edo State Statistical Yearbook, 2013). The climatic condition of the State favours poultry production and broiler chicken production thrives very well in the state. The target populations for this study were the broiler farmers who use commercially formulated feed and those who self-formulated their feed. The study focused on the cost of variable inputs, types of feed ingredients, cost of the ingredients, and quantity and value of the output.

Primary data were used for the study. The Primary data were collected from the broiler farmers through the use of a structured questionnaire and interview schedules. The sampling frame for the study was obtained from the Edo State Poultry Farmers Association. The sampling procedure comprised of purposive and random techniques. The small-scale homestead poultry farmers were first purposively identified, following which a sample of 30 small-scale homestead broiler farmers was drawn across the three ecological zones of the state. The sampled small-scale farmers comprised of 15 broiler farmers involved in the use of commercial feed and, 15 that use self-formulated feed. As much as possible, the selected farmers were similar in terms of production level and other factors. The size of these enterprises ranged from 40-50 birds during the September-December production cycle of 2015.

The cost and revenue for production and sales respectively of the average market weight per Kg of broiler were examined. The Gross Margin (GM) and Net Return (NR) of both categories of broiler chicken farms were calculated using budgetary analysis. All calculations were undertaken using Naira and were based on a kilogram of broiler chicken. Following Onuche et al., (2020), the GM approach to profit estimation is expressed as follows:

$$GM = ATR - ATVC \quad (1)$$

$$NR = GM - ATFC \quad (2)$$

Where:

GM = Gross Margin (₦)

ATR = Average Total Revenue (₦)

ATVC = Average Total Variable Cost (₦)

ATFC = Average Total Fixed Cost (₦)

NR = Net Return (₦)

$$ROI = \frac{\text{Average Total Revenue}}{\text{Average Total Cost}} \quad (3)$$

Where ROI = Return on Investment

The fixed costs of the broiler produced were depreciated using the straight-line depreciation method as given by Olukosi and Erhabor (2005). It is stated as:

$$\text{Depreciation} = \frac{\text{Cost of Procuring the asset} - \text{Salvage Value}}{\text{Life Span of the Asset}} \quad (4)$$

The t-test was used to compare the costs of feed for the two categories of broiler enterprises as well as their gross margins. We compared gross margin instead of NR since our goal was to investigate profitability differentials based on the cost of feed, a variable input.

The z-test is expressed as:

$$Z = \frac{\hat{X}_1 - \hat{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad (5)$$

Where: Z = Calculate Z

\hat{X}_1 = Mean revenue of commercial feed users

\hat{X}_2 = Mean revenue of self-formulated feed users

n_1 = Sample size of commercial feed users

n_2 = Sample size of self-formulated feed users

S_1^2 = variance of commercial feed users

S_2^2 = variance of self-formulated feed users

The hypotheses were tested using the t-test technique at 5% error level. To rank the pre-enumerated constraints faced by broiler chicken farmers a five-point ordinal level Likert scale method was used. Specifically, constraints faced by farmers who use self-formulated feed in the study area were identified and measured. The responses to the various constraints were scored in a way that the response indicating the most serious constraint was given the highest score of 5, then, 4, 3, 2, and 1 for the less serious response as defined below:

Very Serious (VS) = 5, Serious (S) = 4, Fairly Serious (MS) = 3, Not Serious (NS) = 2

Not a Problem (NP) = 1

The mean scores (ms) were computed using:

$$ms = \frac{\sum fxi}{n} \quad (6)$$

Where f is the frequency of a response, x is the response, i is the i^{th} response to a constraint by a respondent and n is the total number of broiler enterprises. The benchmark was 3 by dividing the sum of the weight by 5, i.e., $\frac{5+4+3+2+1}{5} = \frac{15}{5} = 3$. Thus, a constraint was then considered serious if the mean was above 3. All studied enterprises were similar in all aspects of management, except for the type of feed used. That is, the feeding regimes, vaccination schedule, and medication, strains produced, other managements systems were similar. The enterprises were also assumed to operate in a perfectly competitive market where prices are fairly the same.

3. RESULTS AND DISCUSSION

3.1 Cost and Profitability Analysis of CF and SF Based Broiler Farms

Table 1 shows the budgetary analysis of broiler production for the two categories of feed users in the Edo State. First, we note that the mortality rate was higher for the SF broiler producers who lost 7.6% of the 750 birds stocked, while the C.F broiler producers lost 3.17% of the 725 broilers they stocked. For the CF users, the average weight of their broiler meat was 2.8kg as against the 2.76kg recorded for the SF users.

The results further indicate that apart from the cost of feed, the average costs of inputs per kg of broiler were higher for the SF users. The cost of feed for the CF constituted 56.7% of the total cost, while in the case of SF, it constituted 51.60%. The figure for the CF users is similar to those established in the literature. So, (2003) and Olorunfemi, (2006) reported that feed in the poultry industry accounts for about 60-80% of the total cost in poultry business. The estimate for the SF is however substantially lower, indicating that self-formulation of feed may hold some promise in the poultry business in Nigeria.

Table 1: Budgetary Analysis for CF and SF based Broiler farms in Edo state

Items	CF based broiler producers	SF based broiler producers
Stocked day-old chicks	725	750
Birds that survived	702 (3.17% mortality)	693(7.6% mortality)
Average size per bird	2.8kg	2.76
Total quantity sold	1,965.60	1,912.68
Price (₦/Kg)	900.00	900.00
Variable Cost/kg (₦)		
Av. Cost of day-Old Chicks	86.0	89.00
Av. Cost of Feed	309.0	258.00
Av. Cost of Labour	41.21	42.34
Av Cost of Medications	56.90	58.80
Other Cost	31.50	33.40
Av. Total Variable Cost	524.61	481.54
Av. Fixed Cost		
Depreciation of assets	20.70	22.90
Av. Total Fixed Cost	20.70	22.90
Av. Total Cost	545.31	504.44
Gross Margin	375.39 (41.7% AR)	418.64 (46.1% of AR)
Margin to cost ratio	0.69	0.83
Net Return/	354.69	395.56
Return on Investment	1.65	1.78

Source: Field Survey 2015

The results further indicate that apart from the cost of feed, the cost average cost of inputs per kg of broiler meat was higher for the SF users. The cost of feed for the CF constitutes 56.7% of the total cost, while in the case of SF, it constituted 51.60%. The figure for the CF users is like those established in the literature. So, (2003) and Olorunfemi, (2006) reported that feed in the poultry industry accounts for about 60-80% of the total cost in a poultry business. The estimate for the SF was, however, substantially lower, indicating that self-formulation of feed may hold some promise in the poultry business in Nigeria.

The gross margin per kg of broiler in the case of the CF was estimated to be 375.39, representing 41.7% of the average revenue, while that of the SF was 418.64, representing 46.1% of the average revenue. Thus, the two categories of enterprises were profitable. The comparison of the two margins however indicated that the SF was more profitable, owing to the lower cost incurred on the feed. Further, the lower cost of feed for the SF also aided to offset the slight difference in the fixed cost, which was lower for the CF users, leading to higher Net Returns for the SF. consequently, the Return on Investment was also higher for the SF category. The result shows that the poultry business was profitable in the study area. This agrees with the findings of So (2003), Oladeebo and Ambe-Lamidi (2007) and Echehbiri *et al.*, (2006), Olorunwa (2018). The apparent substantial differences in the costs of feed and margins for the two categories of broiler producers were tested using the t-test technique.

The result for the comparison of the cost of feed for the two categories of broiler chicken producers in Table 2 indicates a difference of 51.0 Naira. The t-value (1.74, $\alpha=0.0456$) indicates that there is enough statistical evidence in support of the rejection of the null hypothesis of zero difference between the costs of the two feed types. Thus, self-formulated feed is cheaper than commercial feed. The result of the comparison of the mean margin per kilogram of broiler chicken in Table 3 however does not support the notion that self-composition of feed will necessarily lead to higher profits.

Table 2: Test of Difference in Feed costs between CF and SF based Broiler Enterprises on Edo State

	Feed cost per kg of broiler
CF	309.0
SF	258.0
Difference	51.00
Standard error	15.09
t-Stat	1.74(0.0456)

Source: Field Survey, 2015.

The test result indicates a margin difference of 43.2 Naira in favour of the enterprises engaged in self-formulation of feed. The t-statistic of 1.06 was, however, not statistically significant at a 5% level of error. Hence, at a 5% level of significance, we do not find enough statistical evidence to reject the null hypothesis of equal margins. This implies that there is no significant difference in the margins of the two categories of broiler farmers. Thus, it makes no difference what type of feed the broiler chicken producer uses. The explanation for the non-significance in margin difference can be found in Table 1 where all the other variable costs are higher for the category of broiler producers that adopted the self-feed composition strategy. These higher variable costs led to the reduction of whatever margin that may have been gained by the lower cost of self-composed feed.

Table 3: Test of Difference between Margins of CF and SF Based Broiler Enterprises in Edo State

	GM per kg of broiler
CF based	375.39
SF based	418.60
Difference	-43.2
Standard error	20.48
t-stat	1.06(0.15)

Source: Field Survey, 2015.

Thus, while there is a significant saving from the cost of feed, the advantage it may have conferred by way of increased margin was eliminated by the incidence of a higher cost (per kilogram of broiler chicken) of other factors like those found for labour, medication, cost of day-old chicks, for the average farmer who is engaged in feed formulation. These broiler chicken producers must therefore work to reduce these variable costs alongside the strategy of feed formulation in order to take full of advantage of the self-feed composition strategy.

3.2 Constraints Faced by Broiler Farmers

Table 4 shows the constraints faced by the commercial feed broiler farmers in the study area. The table showed that inadequate finance and high cost of feed ingredients were ranked 1st as the highest level of seriousness (very serious) with the mean and standard deviations of 4.5, 4.5, and 1.3, 1.2, respectively. This was followed by the unavailability of feed ingredients, high cost of labour, high cost of transportation, ready market for the product and high cost of medication sharing the same ranking of 4th. The low price on product ranked from 5th with a mean and standard deviation 2.9 and 0.6 respectively. Lastly, high mortality and distance to the market were the least ranked constraints the farmers faced in the study area.

Table 4: Constraints Faced by Self-Formulated Feed Broiler producers in Edo state

Constraints	Mean Score	SD	Rank
Inadequate Finance	4.5	1.3	1st
High cost of Feed Ingredients	4.5	1.2	1st
Unavailability of Feed Ingredients	4.4	1.2	2rd
High Cost of Labour	4.3	1.2	3rd
High Cost of Transportation	4.2	1.1	4th
Ready market for Product	4.2	1.1	4th
High Cost of Medication	4.2	1.3	4th
Low price on Product	2.9	0.6	5th
High Mortality rate	2.1	0.6	6th
Distance to Market	1.6	0.4	7th

Source: Field Survey, 2015.

4. CONCLUSIONS

The study reveals that both users of commercial and self-formulated feed made some profit from their broiler chicken enterprises and that feed cost is lower for producers who adopted the self-composition strategy. The study however did not find statistically compelling evidence to support the notion that self-formulated feed is a preferred method of feed acquisition as per profit margins. This is because other components of variable cost were sufficient enough to significantly reduce the financial advantage elicited by the use of the self-feed formulation strategy. Thus, while implies that farmers constrained by financial considerations may tinker with self-formulation of feed, they need to map out strategies that will lead to the reduction in the identified variable costs. For instance, these producers may need to maintain high hygiene in the production environment to reduce the cost of medication. Similarly, the adoption of strategies that will lead to economies of scale can lead to the reduction of the per-kilogram costs of labour and that of day-old chicks. These strategies will lead to the reduction of the burden of financial constraints, by lowering the costs of production. The resulting profitability will lead to improvement in the supply of broiler meat, stabilize the businesses and contribute to societal advance through reduced unemployment.

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Aggressively Passive Strategy of Utilizing Extreme Volatility (VIX) Readings as Intermediate and Long-Term Entry Points in a Dynamic Portfolio by Dr. Donald L. Crooks; Dr. Cathy Tully; Professor Edward Strafacci; Mr. Spencer Beyer. Mr. Vuk Bulajic; Ms. Ashley Starr; & Mr. Christopher Ciccone Wagner College

Abstract

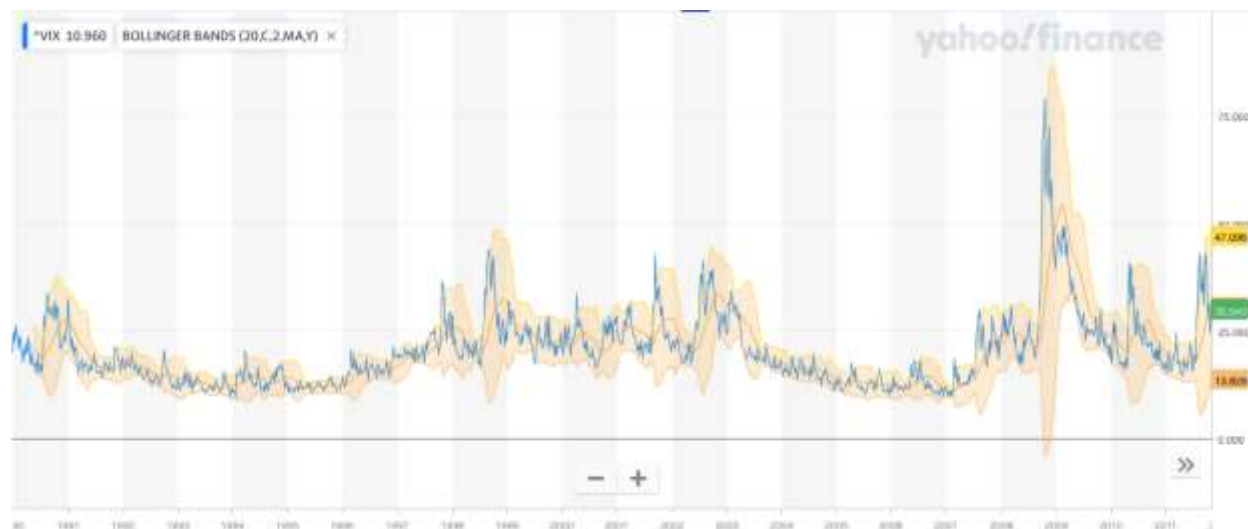
Does past data reveal consistent and appreciable positive market returns over 6,12 and 24 months of investing when VIX readings are in the low teens versus a portfolio dictate of investing only during periods of distress and exploding VIX readings more than 50.

Over the years market participants have endeavored to find the ‘Holy Grail’ as far as market timing is concerned, which could result in a superior, profitable ongoing strategy. A course of ‘Buy and Hold’ has proven to be superior, over the long term, to the practice of market timing. Challenging this tradition, the authors will investigate the feasibility of a passive cash strategy based on the historical background of the VIX (Volatility Index) as a formidable, predictive instrument of entry and exit points. At the extremes, the market is commonly ruled and roiled by extensive and pervasive climates of fear and greed bracketed by long stretches of complacency.

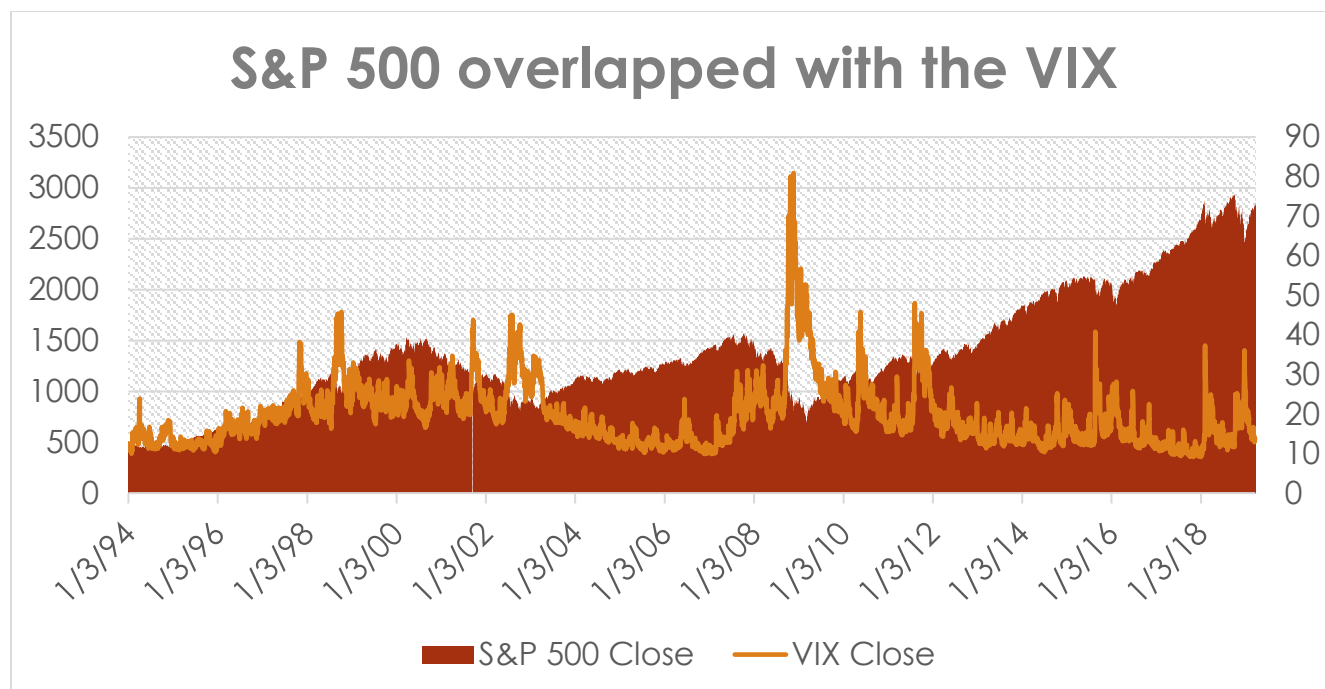
This research study, going forward, will look to back test the price movements of major individual stocks and underlying indices following extended periods of calm interspersed with pointed and severe corrections leading to weeks or months of financial dislocation and rapidly expanding VIX readings.

Essentially, we will incorporate a Bollinger Band methodology. A VIX estimate of over two standard deviations will be used to measure the trigger event of U.S. Securities over specified periods. Those returns will then be mean tested against unadjusted returns in order to determine whether there is a statistically significant ($\alpha = .10$)

Please see the following graph as explanatory:



Exploding VIX readings add to exponential increases in put premiums making protection against eroding profits a very expensive insurance policy. Research will delve into whether these extreme readings can/may be an enduring platform for investment entry at more reasonable levels, aided by the fear factor which drive stock prices lower. It is expected that these entry points will only occur occasionally and require disciplined patience waiting the appropriate entry points. Below is an overlay of the VIX and the S and P index from 1994 until the middle of 2019. We intentionally left out the recent pandemic period to assess what had transpired during the Dot.com bubble and the events leading up to and including the Great Recession. We can see in retrospect the tremendous buying opportunity afforded us by one of the great ‘systemic’ breakdowns in global history, a perfect storm of excess leverage fueled by destructive derivative activity.



Introduction

What is volatility, simply stated, the range of movement of an asset/stock over a twelve-month period. Some examples of this are as follows. Some stocks do not have much movement during the period of a year, an example would be utilities which tend to have little extraordinary stock movement over twelve months. The volatility of this class might be 10, this being said that if the hypothetical stock price is 100 then one would expect/anticipate roughly a 10-point range around the base price, 90-110. Other more innovative or controversial stocks such as hi-tech or biotech could have a volatility in excess of 50 again with a stock price of 100 this would equate to a one-year range of 50-150. When you have such monumental moves the underlying options will also experience dramatic moves. Options traders and writers (those who sell the options , either covered or naked), naked writers sell options without having a position in the underlying security thereby requiring greater option premiums at a time of heightened stress and stock movement , especially during periods of extreme stock/index movement which a certain times over the past 30 years have exceeded 50 and even 83 during the 2007-8 “great recession”, the record of 150 resides with the “Crash of 1987”, and the more recent Covid 19 experience have reached as high or higher again 80 on the VIX measure. At these times of uncertainty fear exerts its presence on equity option prices. With a look back at price actions during these periods and for 6,12 and 24 months it has been seen that these exponential moves have provided the foundations for steady and sometimes even explosive portfolio, as seen in 2020, returns. The study will look at these occurrences attempting to ascertain if past performance can be a formidable and reliable passive investment strategy and where does it rank with the traditional ‘buy and hold’ or dollar cost averaging.

The CBOE Global Markets Incorporated, responding to demand from options traders and institutional investors created the CBOE Volatility Index in 1993 to measure the market's forecasting of 30-day implied volatility implied by the at-the-money S&P 100 Index also known as the OEX, option pricing. The VIX was embraced very quickly by investment professionals as the premier template for U.S. stock market volatility, routinely referred to as the "the investor fear gauge".

At the turn of the century the CBOE in conjunction with Goldman Sachs refined the VIX to reflect new ways to measure expected future volatility, now almost twenty years later the VIX is a mainstay in formulating strategy from directional studies, momentum and overall strength and weakness of the entire stock market. This new iteration of the VIX is based upon the S&P 500, instead of the OEX 100 for a broader net, so to speak, to estimate future price swings. An aggregation of the weighted prices of SPX puts and calls over a wide range of strike prices is utilized.

In 2014 the CBOE updated the VIX to include weekly SPX expirations thereby providing a better alignment with the new components of the options universe including a plethora of ETF's, ETN's, and other indexes providing a vibrant risk management tool. Inclusion of these SPX Weekly's allows the VIX index to be calculated with the S&P 500 Index option series that most precisely match the 30-day target timeframe for expected volatility that the VIX is intended to represent.

March of 2004 the first exchange traded VIX futures contract began trading on the CFE (CBOE Futures Exchange) on a new electronic platform as opposed to the open outcry of the old CBOE floor/pit. This welcome change allowed for greater speed as well as improved transparency. Two years later options on the VIX were launched by the CBOE and quickly became the most successful new product in the exchange history. Documentation, over the years has strongly supported the negative correlation of volatility to stock market returns and overwhelmingly points to the benefits of including volatility assumptions and resultant data/results within an active portfolio.

The CBOE /CFE provides continuous liquid and transparent markets for all VIX products that are available to both retail and institutional money managers and especially hyperactive and leveraged hedge funds.

With this background we tasked ourselves to analyze VIX data from 1987 through the conclusion of 2020, each focused on separate aspects of the data. We focused on the returns generated upon entry into the three major indexes (NASDAQ, DJIA, S&P 500), and the varying time between VIX readings in excess of 40 and below 15. The intent is to compare the VIX with market trends, while examining volume data between the DJIA and S&P to compare how investors reacted in each index. In any strong market movement trends are established and perpetuated by expanding volume. Volume will control price much like the moon controls the tides of the ocean with its gravitational pull. When volume dissipates it begins to signal a more benign and normal stock

market and resultant lower volatility. Strong volume signals a continuation of a trend, the more volume the stronger the underlying movement of stocks and indices.

Looking back to 1987 we will attempt to look at more macro trends that created extreme VIX readings and then as our research expands and hones in on less extreme but multiple standard deviation expansion we will ascertain certain ‘snap back’ scenarios before moving to those readings in excess of 40 but less than the 80 which has been penetrated less often but with more dramatic results and returns. There are four distinct time periods along with particular catalysts that are very diverse but did unleash extraordinary angst and fear in the form of large increases in ‘put’ premiums. These four, in chronological order will be the crash of 1987, the bursting of the dot.com bubble in 2001, the Great recession of 2007-09, and the more recent pandemic rout of 2020 and the explosive rebound. Each of these occurrences were accompanied by external excesses and abnormal prices in certain asset classes in the case of 1987, 2001 and 2007-09 while 2020 was truly a “Black Swan” in which a health crisis resulted in a tremendous global slow down and in many cases a complete economic shutdown. In all four cases the economy and the stock market recovered and went on to greater stock prices and recovery although they all required different remedies over a range of time of recovery while eclipsing the stock market highs previously registered.

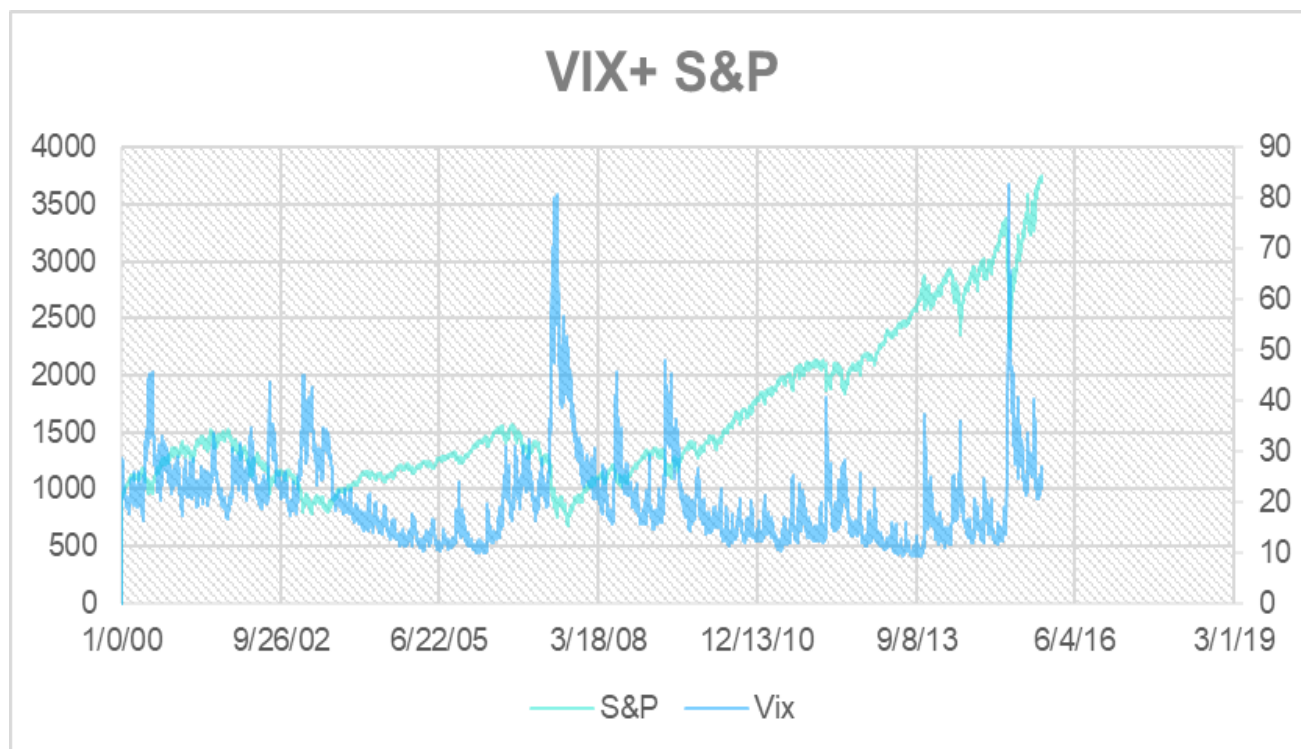
Proposition 1 – Excess returns follow the volatility caused by the market crash of 1987.
Proposition 2 – Excess returns follow the volatility caused by the dot.com selloff of 2001.
Proposition 3 – Excess returns follow the volatility caused by the 2008 recession.
Proposition 4 – Excess returns follow the volatility caused by the 2020 pandemic retreat.

While this investigative study is concerned more with the extreme VIX readings and subsequent ‘snap back’ of the indices, it is important to look at some of the causes of the four occurrences of extreme readings we will simply touch on some of the overriding factors that contributed to the chaos and calamity.

The highest VIX readings of all time came during the week of the October 1987 crash with the only readings above 100 in history, with the worst day being Black Monday with an unbelievable reading in excess of 150. This would equal a reading for the DOW JONES index to go below zero over the next 12 months. This number quickly retreated to below 100 by the end of the week. There are several factors that affected the overall meltdown of that year and those include rising interest rates, the bursting of the LBO (leveraged Buyout bubble) and overleveraging by high net individuals and aggressive hedge funds. Factor in the prevalence and over selling of portfolio insurance by investment banks which led to an incredible crush of everyone trying to exit at once, equivalent to yelling ‘fire’ in a crowded movie theater. Portfolio insurance led to a false sense of security and actually worsened the crisis in that the lower the indices went the more stock that had

to be sold to maintain some semblance of downside protection. The full-scale advent of computerized program trades sent over DOT and Super DOT machines (Designated order turnaround) delivered preprogrammed large orders to the New York Stock Exchange and overwhelmed the face-to-face broker/specialist interaction as orders were cascading to the floor of the New York Stock in seconds forcing prices ever lower and creating a voluminous backlog of selling orders. To exacerbate matters was an unusual bet made by George Soros to use the SPX index as a surrogate in an effort to collapse the U.S. dollar in which he had a large short position. On the Thursday of that fateful week Soros placed very large bets in both the cash and futures markets. Soros funds sold \$1,000,000,000 of Dow Jones stocks on the opening that day while concurrently disposing of \$1,000,000,000 of S and P futures at the same time. This created a calamity of selling that led to a catharsis and put in a major market bottom that the S and P and the DJIA rebounded from, a low that was put in place and never meaningfully penetrated to this day. In fact, since 1987 the DJIA has risen from 1500 to over 35,000 in 2021. We will look to see how long it took to recover to the pre-Crash level in connection with the VIX retreating to under 15.

It took two years for the DJIA to return to its pre-crash levels, however the calming of nerves happened much faster as the VIX retreated to under 20 in a few months and remained so for an extended period of time. The Crash of 1987 proved to be one of the most, if not the most incredible buying opportunities in history as it set a low in the indices that has not been meaningfully breached since. Below we move forward to the turn of the century to see the extreme VIX readings that happened in the early part of the 21st century and how the S and P fared during crises and afterward.

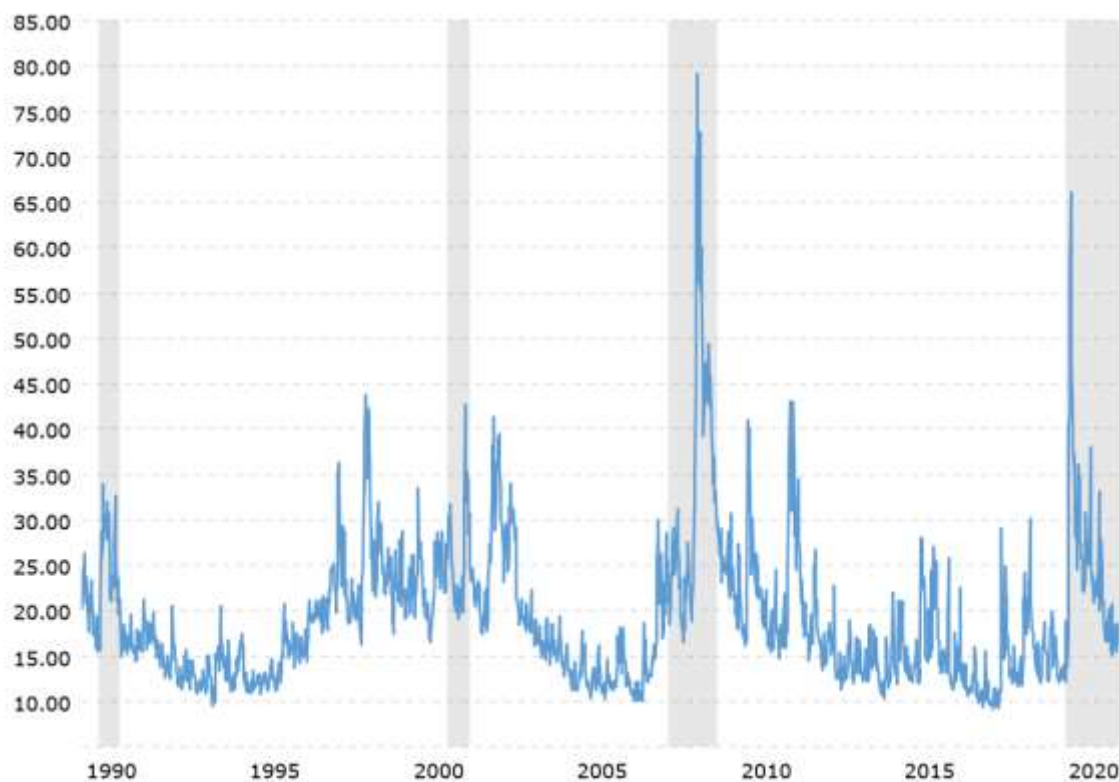


The time in between VIX readings is quite interesting. On average, it takes between 125 and 126 days in between a VIX reading of 30. The average time it takes the VIX to retreat to 12 after reaching 30 is 905 or 906 days. On the other hand, the average time for the VIX to increase from 12 to 30 is only 628 days. This data is skewed slightly by several things. When the VIX is on the edge of 30, it can vary in the high 20 range and cross the threshold of 30, leading to numerous data points that indicate a short time between VIX readings. There were many times that the VIX dipped below 30 for only 4-7 days and then increased again. There were also times of extended low VIX levels, such as the period leading up to the 2008 financial crisis when there were 1,605 uninterrupted days of less than 30 VIX. However, when moving toward, or away, from volatile times in the market, this average seems to hold true. The averages for both when the VIX retreats from 30 to 12 and when it advances back both seem to be more accurate as they typically are stretched over longer periods of time.

Something that was initially surprising, it takes much less time for the VIX to go from 12 to 30, denoting increased volatility, than it does to retreat from 30 to 12. The difference is just shy of 300 days, nearly a year's difference. However, like in human nature, we tend to react to negative news stronger and more swiftly, than we react to positive news. Humans reacting poorly to bad news increases volatility more than our reaction to good news as the economy calms down. Thus, it is quicker for the VIX to increase to 30 than retreat back to 12. This is confirmed when looking at the data, the VIX remained above 30 until the end of 2011 following the 2008 crisis. This is despite the fact that recovery began in mid- to late-2009. Furthermore, while the VIX did drop below 30 in late 2011, it did not reach 12 until the spring of 2013 where it hovered for much of the

next few years. This further proves that it is harder for volatility in the markets to decrease rather than increase, especially after a major economic crisis, such as the COVID crisis we are currently experiencing. Despite the dramatic gains of 2020, the VIX index remains quite high. This can, in part, be attributed to a greater sense of insecurity as far as periods of extended calm are concerned with the continued spread of Covid 19. It also adds the specter that resultant VIX readings are relative to the amount of the standard deviation expansion. This can be seen that while a VIX reading in excess of 30 can show instability in stock prices with a strong propensity for weakness it actually can signal this ‘relative calm’ after retreating from atmospheric readings in the 50-80 VIX range.

The chart below is highlighting, the shaded areas, where the economy was mired in a recessionary environment. Of especial note is the “new” normal post the Great Recession of 2007-09 where the VIX stayed elevated, on an historical basis, while the economy healed and options traders remained skeptical and nervous about a tenuous recovery. This is reflected in higher than normal options premiums.



We decided to look at the longer-term extreme readings as entry point to avoid churning and establishing too many short-term tax events while the trend to zero commissions has negated that point as profit erosion. We also wanted to look at how fast the VIX could revert to more normalized levels, this became a by product of the speed and severity of the downturn that was the genesis for the explosive VIX readings. For example, the highest recorded VIX readings occurred during the week of Black Monday in October of 1987, when the VIX reached a totally unsustainable level of 150. Unsustainable simply because that level of fear, massive selling would have taken the major indices to zero in only a few months. The collateral effect of this exponential move of 22 standard deviations, moved down to under 50, still a very high number in less than 30 days. Movement from there was slower as the market makers needed to be rewarded with higher 'put premiums' to assume the risk of this historic uncertainty. VIX reading stayed above 30 for well over a year and became the new normal. One of the overriding reasons that the market rebounded as solidly as it did was the simple fact that this was lightning in a bottle and the result of over leveraging of many positions in takeover names and the inflated values of similar non takeover names as more and more money chased even the slightest hint of an LBO. The broader economy was not effective, and no recession followed this leading indicator. The market regained its footing and enjoyed a fairly stable decade of the 1990's and formidable market moves with little chaos and trauma.

There was an event in the late 1990's where the VIX did make a fast move up to the mid-40 range but we will not cover this in-depth and that is the LTC (Long Term Capital) meltdown which really was its own Black Swan exacerbated by a swollen balance sheet of leverage of over 100 times assets. In this extraordinary event the Treasury and Federal Reserve stepped in and with the use of moral suasion implored/forced Wall Street to bail itself out by purchasing LTC's positions. All but one Investment bank complied, Bear Stearns, who ironically was LTC's clearing agent, this sin of omission came back to haunt Bear Stearns as the government failed to bail them out and Bear saw its stock price plummet from roughly \$170/ share to a takeover price of \$10 a share by JPMorgan/ Chase along with government guarantees. This began the calamity of the Great Recession which will be discussed later in this dissertation.

We decided to look into the dot.com bubble VIX readings because it involved a once in several generations' upheaval in technology and how it fostered incredibly unsubstantiated valuations.

The ushering in of the internet age in the mid 1990's led to a revolution that will be looked upon as important as the discovery of fire or the wheel. The internet allowed for global connectivity and prices of delivering content has continued to move lower since inception. Throughout turmoil, chaos, economic or otherwise the internet has grown every single month without one decrease since its beginnings. Cable and satellite delivery have added to this exponential growth in the delivery of information, data and other content. The internet led to some incredible companies led

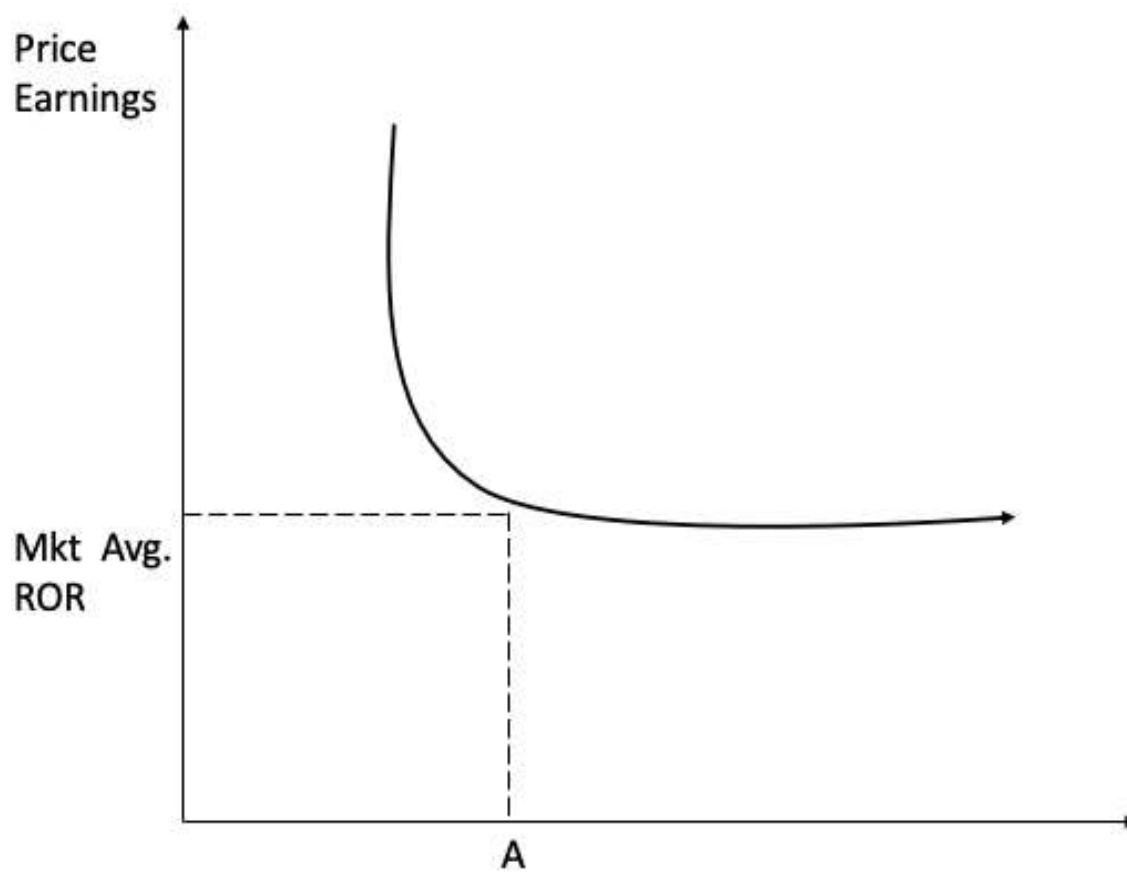
by Amazon and Google which didn't exist until the end of the last century and have changed the way business is transacted and information exchanged around the world. With the advent of broadband delivery speed of data transmission has increased tens of thousands of times.

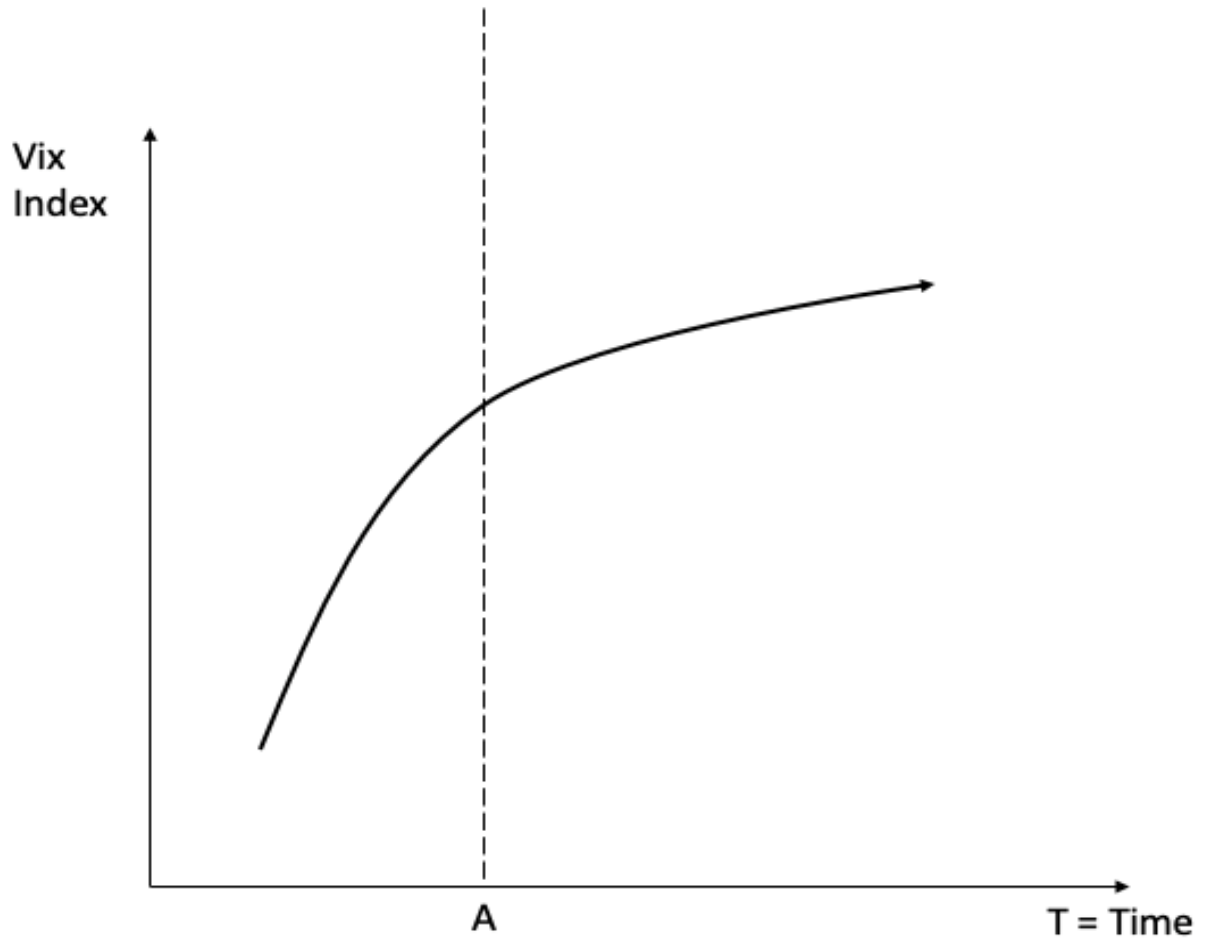
While the VIX reached over 40 during the Dot.com bubble the real carnage was felt in the technology heavy Nasdaq index which declined almost 90 % during that time to under 2,000 which has now risen to over 14,000 and set in place an incredibly strong and durable buy point.

Theoretically, markets have exhibited mean reversion. Using a mean reverting model when price earnings reach statistically significant abnormal returns.

($\partial = 2, a = .10$).

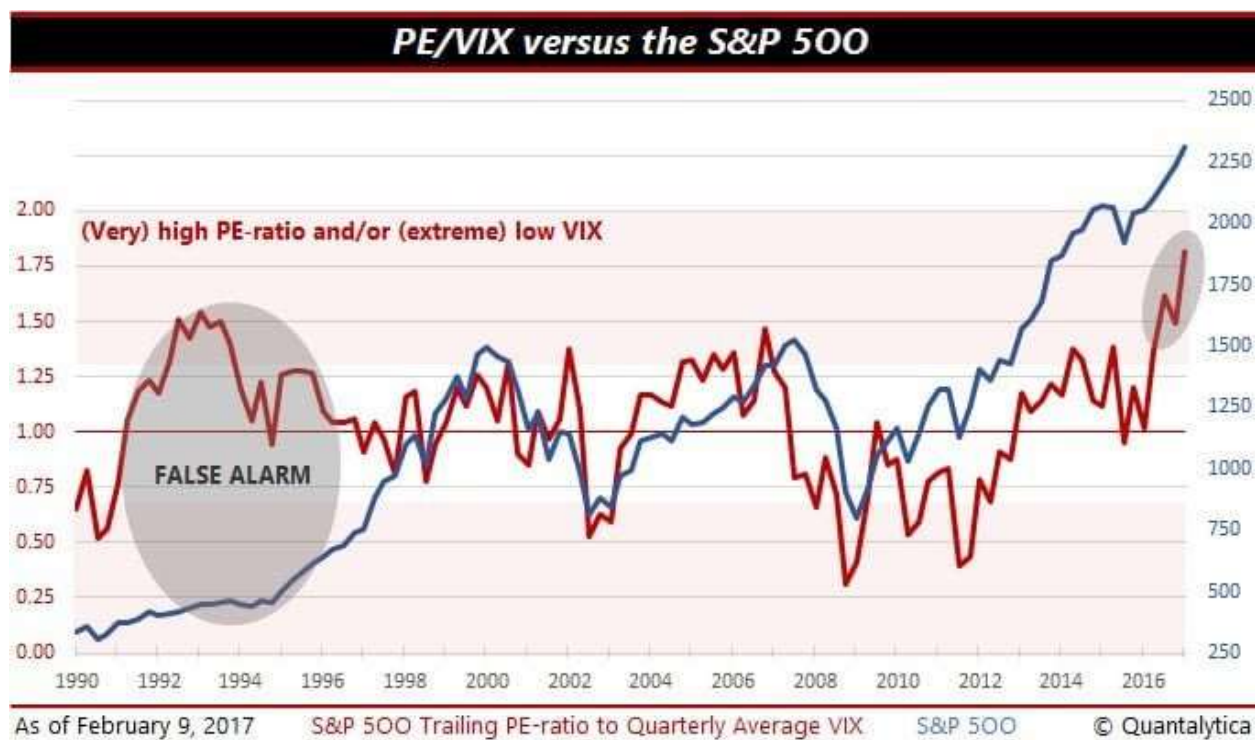
As price earnings ratios are at increased levels historically, the market can be assumed to be in a low volatility state. Point A is a point of inflection where equity valuations have reduced significantly (significance level = .1, 2 standard deviations from the mean, $\alpha=.1, \partial = 2$). At this point, we would expect volatility indicators to rise exponentially thus creating an entry point. We may viewpoint A as the bottom in the economic cycle.





THE ECONOMIC CYCLE





Great Recession

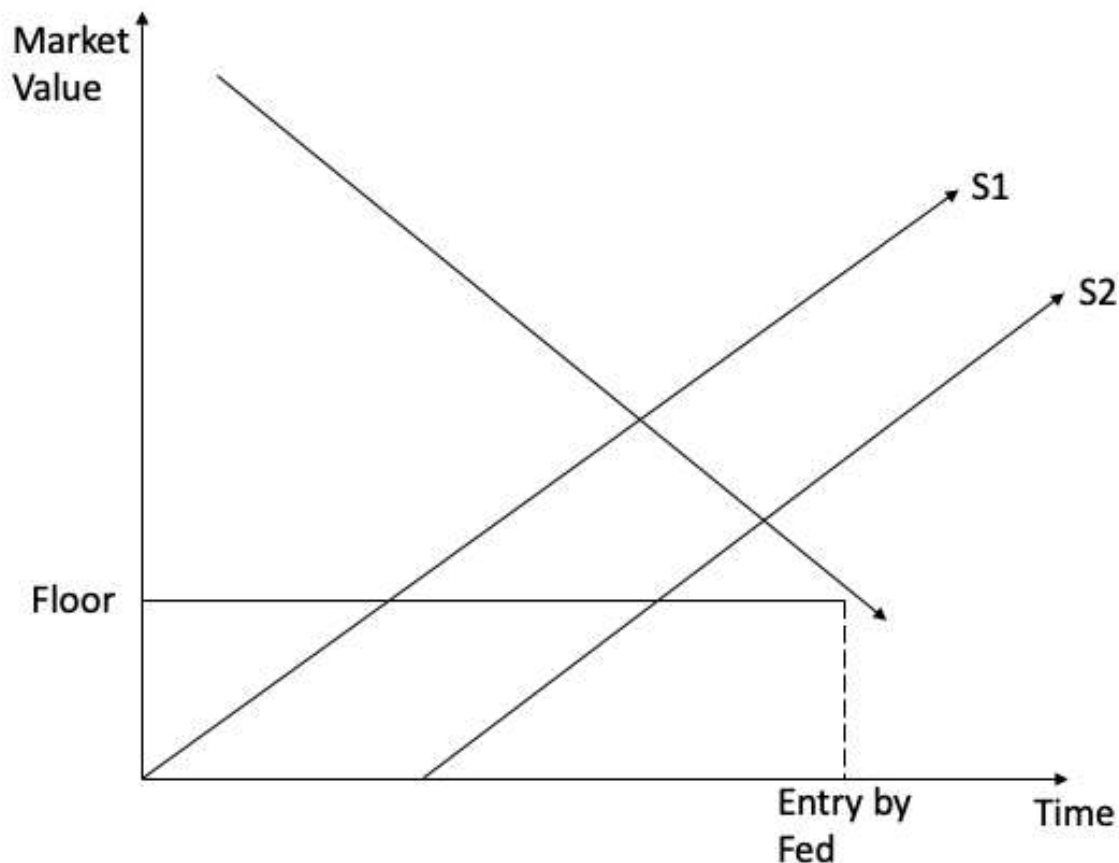
The Great Recession of 2007-2009 was indeed the closest thing to a perfect storm systemic meltdown that novels could be written about. The genesis of the crisis revolves around rising real estate values, over leveraging and the advent of new derivative instruments that sent the global economy reeling, especially the United States and Europe, in some places like Ireland creating an even greater bubble. The sunshine states of California, Florida and Nevada had seen extensive price appreciation of homes which led to increased speculative building. Teaser mortgage rates, predatory lending practices and explosive gambling in CDS instruments (Credit Default Swaps) allowed speculators to bet against institutions in which they had no vested interest, akin to taking out an insurance policy on your neighbor's home. Collateralized Debt Obligations were a bundling of thousands of mortgages which then could be securitized and sold to the general public through such entities as Federal National Home Association also known as Fannie Mae. Through the CDS model investors/speculators could bet against the viability of these mortgages. The house of cards started to erode and implode with the bankruptcy of Bear Stearns and continued unabated until the U.S. Congress bailed out the major banks with TARP (Troubled Asset Relief Program) All of the above coupled with inflated credit ratings by Fitch, Moody's and Standard and Poor led to bringing the Global Economy to a near total collapse. It is not by any accident that this backdrop led to a huge spike in the VIX for an extended period of time that peaked at over 80. The Dow Jones retreated to a low below 7,000 that acted as the beginnings of a preented 10-year surging bull market when the VIX retreated to below 18 for an extended period of time.

For over 100 years investors have been trying to follow and measure markets and the flow of funds. Monitoring the VIX, along with indexes such as the DJIA, NASDAQ, and S&P help us come to understanding markets and correlations.

By looking at the DJIA and S&P Volume chart, we can see that from 1998 to 2005 the DJIA and S&P Volume numbers moved in sync. Starting in 2006, we observed great percentage changes in the volume of the S&P relative to the DJIA. This was a turning point leading up to the financial crisis of 2008.

There is a huge spike of the volume of the S&P on 12/21/2007. The DJIA volume increases at nearly 111% higher than the previous day. However, the next day on the 22nd both the S&P and DJIA face a drop of 72% and 80% in volume respectively. The S&P reaches one of its all-time highs on 10/10/2008, with the S&P and DJIA volume increasing 68% and 55% making S&P's closing volume 11,456,230,000. This is because on October 10th, 2008, stock markets crashed across Europe and Asia. Other stock markets such as London, Paris, and Germany dropped by 10% within their first hour of trading and further when Wall Street's markets opened. The following day, on October 11th, the United States Government had to intervene and announced a rescue effort to buy assets to stabilize banks and the economy. This series of events were the first of many in the 2008 Financial Crisis.

We may assume that the Keynesian monetary influence of the Federal Reserve created an effective floor on the asset markets as lower interest rates propped valuations (to become known as the FED PUT. This phenomenon helps to explain the underpinnings of our theory. During periods of financial panic, Central Bank liquidity measures serve as a substantial determinate of demand. (See below):



Liquidity supply increases as the market sells down. As the Federal Reserve increases liquidity (S1 to S2) an effective floor is created.

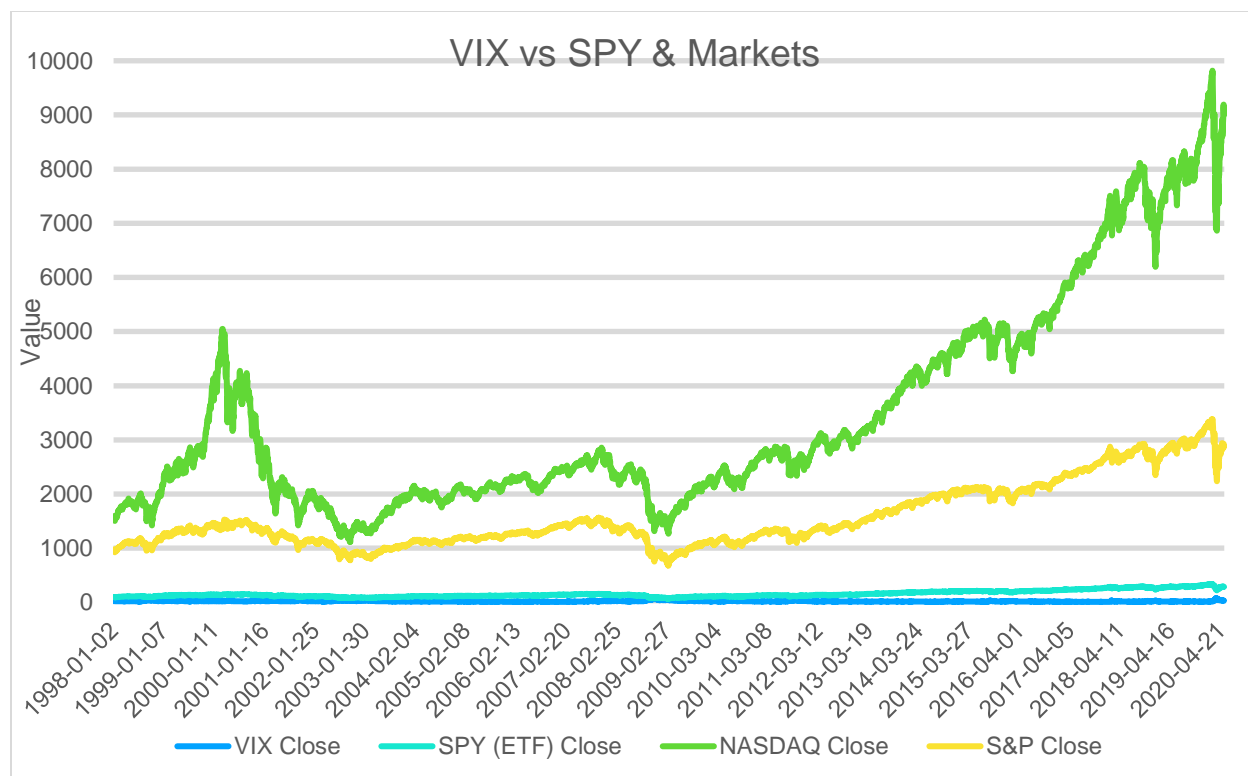
From 2008 on, the S&P Volume tended to be higher than the volume of DJIA. In 2017 we see a jump though of the DJIA, where it appears to more closely align with the S&P volume. On 3/17/2017 we see a 54% jump and 102% jump in the S&P and DJIA volume. A very significant jump is seen in the DJIA volume on 8/30/2019. The stock market soared from the opening leading the DJIA to hit all-time highs.

On the VIX, DJIA, NASDAQ, S&P Close chart we see that the VIX and NASDAQ move in some correlation during the early 2000s but approaching the times of the 2008 stock market crash they start to move in opposite directions. In November 2008 the market fell 40%; and on November 20th 2008 the VIX hit its peak above 80. In total during 2008- 2009 we observed a huge jump in the VIX due to the crash and the following market volatility. From 2009 until the onset of the pandemic, we see the VIX levels still staying relatively low, but a huge spike in the NASDAQ. NASDAQ is primarily a technology heavy index. As we have seen in the coronavirus pandemic, things have transitioned to being done virtually. This includes school, and work. Also, more people

are staying at home. NASDAQ has been hitting all-time highs since technology can be accessed from home during lockdowns globally.

Where in the VIX, DJIA, NASDAQ, and S&P chart we see the NASDAQ doing very well, there are some things that stay consistent throughout the years, even despite events such as the Dot. Com Boom and the 2008 financial crisis. This being the S&P which for over the span of 20 years has only slightly increased in this chart.

When looking at the VIX as an indicator for a buy and hold style strategy, we speculate that it can lead to dramatic returns. As a VIX of 30 or greater is quite high, it indicates incredible market volatility. The types seen during major corrections or crises when stocks tend to dramatically drop in value. Buying during these times would dramatically increase returns. As a VIX reading of 12 typically indicates very calm markets, 'business as usual' so to speak, returns would be less dramatic. This is something that is worth studying more in-depth, in specific time frames, rather than just using the VIX as the indicator. For example, rather than selling immediately after the VIX hits 12, it might pay to hold on for longer. This scenario came into play over the course of the mid- to late-2010s as the VIX was consistently low for extended periods of time.



Global Pandemic (final of the 4 hypothesis tests)

The global pandemic unfolded slowly leaving sufficient time for proactive and preemptive actions by governments and investors alike, whether institutional or individual. Very few people understood the coming apocalyptic scenarios that play out in slow motion. There was a total misunderstanding and underestimation of the severity and swiftness of the grip of Covid 19. Once the foundations of the scourge were unfolding the domino effect of the pandemic began to grip the entire world with fear, followed by economic lockdowns and seizing of the global supply chain. The stock market bore the brunt of this chaos as investors voted with their dollars. Compared to aforementioned economic events this one didn't have a clear horizon of relief let alone resolution.

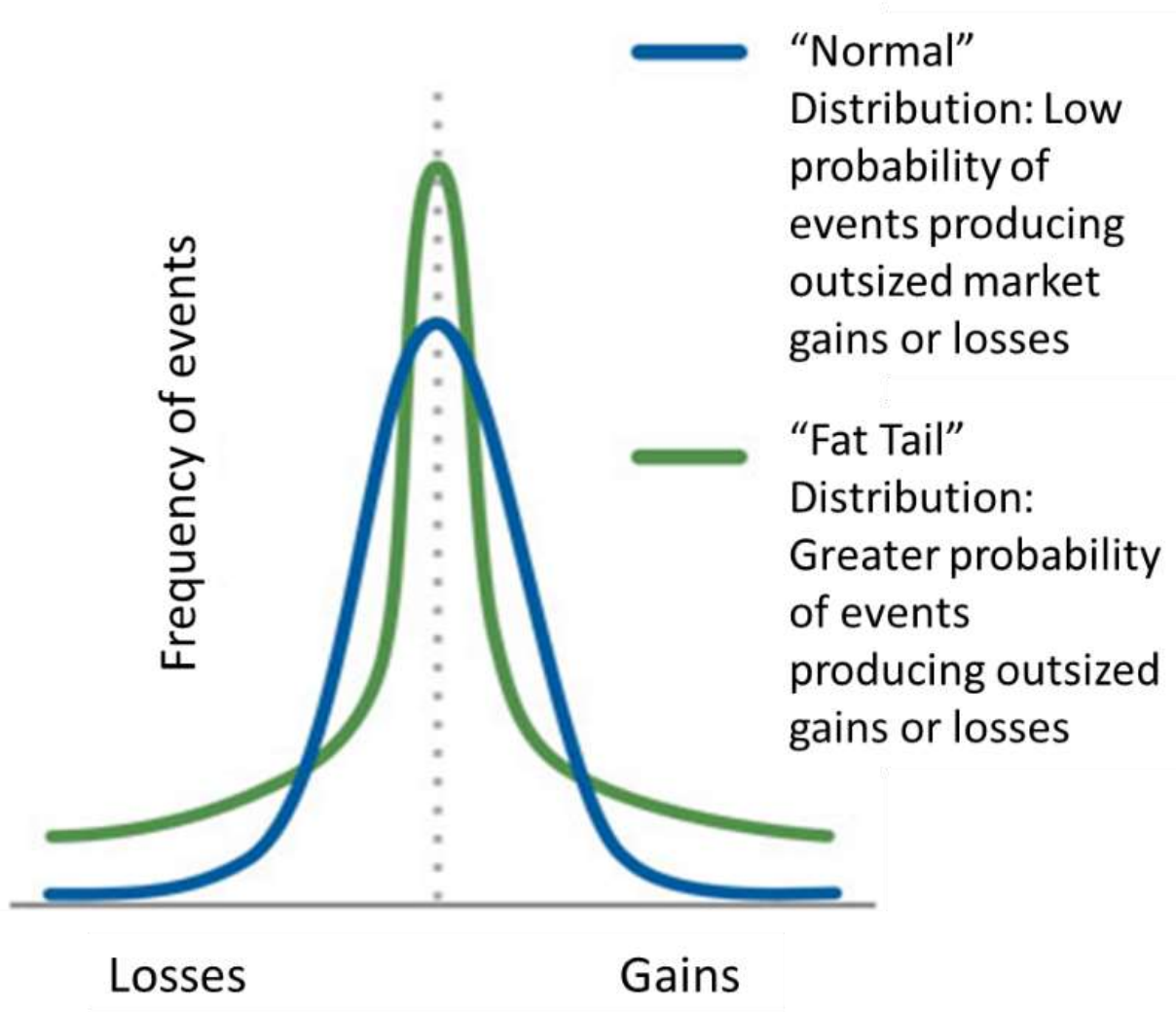
One could go down the list of affected industries but that in itself will fill volumes we are endeavoring to ascertain if this incredible 'knee jerk' reaction in the form of incredible VIX spikes can yield lasting and profitable long-term rewards by way of fer and lower entry points for investments.

The pandemic yielded the third highest spike in the history of the VIX behind only the 'Crash of '87' and the Great Recession of 150 and 85 respectively, however the turmoil was both longer lasting while shorter in extreme duration with horrific gyrations of the major indices.

Volatility Smirks:

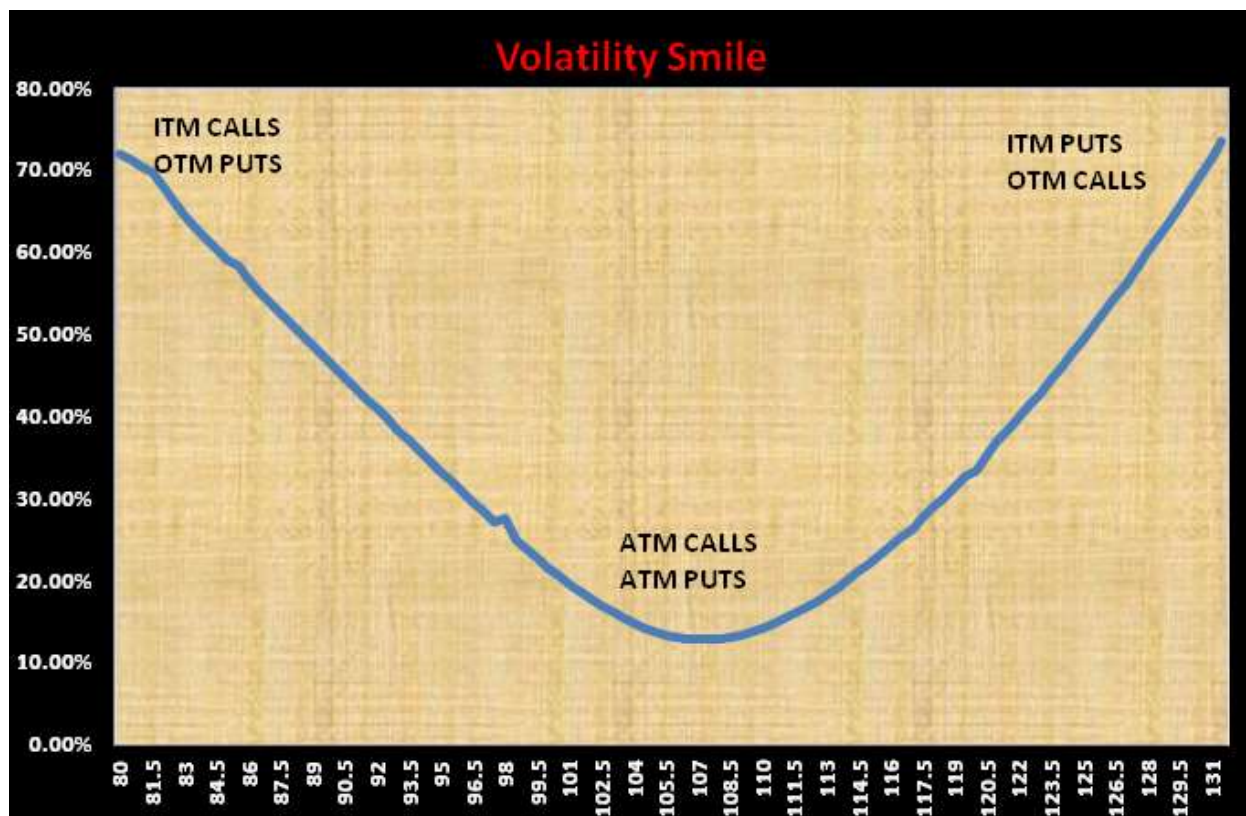
Theoretically, and according to the Black Scholes Option Pricing Model (BSOPM), all options series within a specific equity should exhibit the same implied volatility. The model relies on variables such as time, volatility, the risk-free rate, stock price and strike price. One can solve for volatility algebraically by holding all variables constant save for volatility, hence implied volatility. The model also assumes that volatility is static, therefore there should not be different implied volatility coefficients within an option series.

Post the 1987 crash equity options began showing a volatility smirk. It is believed that investor reassessments of the probabilities of a fat-tail have led to higher prices for out-of-the-money options. This was especially so when the market sold off dramatically as investors show a bias toward paying for volatility.



<https://www.livewiremarkets.com/wires/it-s-a-fat-tailed-world-after-all>

Investors effectively raise the probabilities of fat-tail which lead to higher prices for out-of-the-money options. This anomaly also implies defects in the BSOPM which assumes constant volatility and log-normal distributions of underlying asset returns.



Retrieved from:

<https://blog.fintelligents.com/volatility-smile-usage-in-the-market/>

Effectively the BSOPM was more accurate prior to 1987 Rubenstein (94)

Jackwerth, J. C., & Rubinstein, M. (1996). Recovering probability distributions from option prices. *The Journal of Finance*, 51(5), 1611-1631.

These studies are consistent with volatility smiles, the BSOPM model should therefore include this discrepancy. Later research incorporates additional factors such as stochastic volatility, interest rates and jumps.

Chen, S., Härdle, W. K., & Jeong, K. (2010). Forecasting volatility with support vector machine based GARCH model. *Journal of Forecasting*, 29(4), 406-433.

Therefore, we may conclude that there is a jump in volatility following market selloffs which may reverse over time supporting our arguments empirically.

Conclusions

One way to look at these four totally different economic/ financial dislocations is to the chain of events we could say they were all “Black Swan” events that came about totally by surprise but in retrospect could deconstruct the time leading up to the swoons that were to unfold. In short 1987, overleveraging, increasing interest rates, too many dollars chasing too few assets led to out-of-range earnings per share valuation of not only potential takeover targets but those of companies in the same industry, a true greater fool theory. This was exacerbated by the new technology in the form of the D.O.T. and Super D.O.T. systems allowing large computer-generated sell orders, caused by portfolio insurance rebalancing and index arbitrage. This was not a systemic event but simply a natural reversion to the mean, over a very intense and brief period of time.

The DOT.com bubble was the result of the most impressive and game changing event in a millennium, that being the emergence of the internet with its global data delivery and everything with .com after their name went to stratospheric levels that were unsustainable with over 90% of new issues over that time period retreat into oblivion over the next few years. The DOT.com VIX reading never reached the levels of the other three but the carnage in the NASDAQ indices and many of its components plummeted to values of 15% compared to levels during the peak. It took a much longer time to recover but did set in place a huge foundation to launch the power upward move of the Nasdaq that dwarfed the returns achieved by the broader market over the next 20 years.

The Great Recession, while not as devastating in terms of loss of life as the pandemic is quite frankly the most disturbing and economic destabilizing event of a global level, mostly the U.S.A. and Europe, possibly in history. The credit system of the civilized world had become frozen and could have led to the total collapse of the global economy and a dark age for trade. Looking back this entire ‘washout’ and cleansing of excesses once again led to dynamic and explosive advances in all major indices.

Pandemic

One could argue, forcibly, that this event is the true “Black Swan” of the subset of VIX spikes in that it was basically a total surprise to the vast majority of the world. The most impressive and horrific result was an explosive move in the VIX and downward implosion of all indices and the rebound and investors overreacted time and time again. Many industries were on the verge of complete dissolution, cruise lines, malls, airlines, restaurants, in person entertainment, indeed anything face to face. Once a vaccine was being formulated, finalized and distributed the global chain supply system had taken a major body blow. Surely this singular event is and will continue to change economic outlooks, trading partnerships, content delivery, worldwide travel and trade to name a few.

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Not Too Late To Get In

S&P 500 3-Month VIX

20.40 for Aug 30 2021

[Overview](#)
[Interactive Chart](#)


Historical Data

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Date	Value	Date	Value
August 30, 2021	20.40	July 26, 2021	21.74
August 27, 2021	20.61	July 23, 2021	21.65
August 26, 2021	21.86	July 22, 2021	21.86

While far from totally concrete the resulting data sets do indeed suggest a valid correlation of severe and or extended VIX spikes with positive equity returns over 6,12 and 24 months following the spikes, does exist. It is unclear if this strategy of all in and all out, reverting to all cash positions after at least 6 months of VIX readings below 15 can produce solid evidence and obviate opportunity lost versus a buy/hold portfolio maintenance. We need to make sure that we stay the course for at least 12 months, with new investments to circumvent profit eroding short term federal income tax events. A more structured approach of reducing risk by 10% for each quarter the VIX stays below 18 (an arbitrary level to provide some greater flexibility) and then utilize that cash once we have an upward breach of at least a 50 VIX reading and continue to commit 10% of

readily available cash for every 10-point VIX reading above 50. In addition, if we were utilizing a dollar cost averaging portfolio strategy, we could shift the investments into the highest rated “BETA” funds to take advantage of leverage greater than the overall returns of the Standard and Poor’s Index. Further discovery is discussed in our ongoing dynamic Endnotes

Endnotes

Certainly, any astute investor realizes that acumen regarding the VIX is essential for preemptive and proactive portfolio adjustments over the long term. Going forward the authors feel there is justification for further study of VIX as a Passive Strategy that would include betas of different market indices components, most likely in the form of ETF’s (Exchange Traded Funds). To go beyond that a further study would be to include medium term options on the highest beta funds with the highest delta (how much an option moves versus movement in the underlying instrument) and the smallest theta (time decay of the option).

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The Changing World Order by Frank Owarish, Ph.D., CEO, IISRT; former senior UN executive International Institute for Strategic Research and Training New York State registered think tank dealing with academic research <https://internationalinstituteforstrategicresearch.info/> Presented: CASA Singapore 2023

Introduction

The world has reached a population of 8 billion (Scherbov et al., 2011); the focus/structure of the paper is a compilation using available studies and credible news, capturing the essence of the ongoing transformation and shaping up a new world order. This paper highlights the significant challenges currently facing our world. It also focuses on some of the problems requiring urgent attention and offers solutions in broad brushstrokes (S. Owarish, personal communication, January 12, 2023). Progressive and regressive forces are at war after a lull. Instead of a large military budget for the superpowers, the resources should be used to address the many issues facing humanity. The tragedy is that we have the solutions and the means, but foolish politics and self-interests compound the problems.

The author believes that there may be bickering among world leaders, but no one wants World War 3, particularly a nuclear disaster. Instead of using resources for military confrontation, we should focus on constructive actions to improve the world by resolving economic and social issues in developing and developed countries. The author notes that this may sound like idealism and the vested military interests are very strong but let us beat swords into plowshares (United Nations, 2023)

World Trauma

The world has been dealing with the trauma of Covid 19, which is less of an issue now in several countries, although the risk of variant and resurgence is still there (Dzinamarira et al., 2022). China's zero Covid policy, perhaps because of the size of its population, warrants attention (Chen et al., 2020). It is expected that recovery from the lockdown will be fast. Also worthy of attention are several developing countries facing a lack of resources.

The Russia-Ukraine War caused major shocks and aftershocks to practically all world countries (Selyukh et al., 2022). There are several types of effects both for the developed countries from Europe to North America to developing countries around the world. The first set of countries is having to deal with energy issues with a steep increase in prices resulting in inflation which is proving difficult to mitigate with a ripple effect for the stock markets, in the case of the UK, even leading to a change in government leadership (Guenette et al., 2022). In the case of the US, with midterm elections in sight, the government leadership is trying to mitigate the price of oil, which has risen to a high-level (Frieden, 2020). The effort to bring Saudi Arabia, including OPEC, onboard failed with the claim of market manipulation—a significant rift between traditional partners. On the stock markets, investors seem less inclined for hi-sech stocks, some of which are

speculative and jumped to the energy bandwagon, going sky high (sommer, 2022). Green energy appears to be going to the back burner while developing countries face different issues (Rahman et al., 2022).

Countries in Asia seem to be facing less trauma and have more stability, and this is the case also for countries in the middle east, with the oil-producing countries having a windfall (Wang & Xu, 2022). The MENA countries are experiencing an economic boom. Countries in South America seem to be pursuing their dynamics, while drought is a factor in several countries (Khedair, 2022).

Looking at one set of underlying reasons, it should be recalled that Russia is a significant exporter of energy commodities and Ukraine of grains (Tan, 2022). At the start of the war, consideration of interdependencies may have been overlooked, resulting in a rude awakening, and it is now mission impossible to push the clock back. Besides, the vested interests may be pursuing their agenda. Lobbying can be very subtle. Several countries face the effect of climate change. Migration is a significant issue (Blanchard, et al., 2022).

The United Nations is caught in the middle, with the maestro having difficulty conducting; The Security Council chamber orchestra is in cognitive dissonance, and the entire orchestra of the General Assembly is in harmony on many pieces and at odds with other components. They remember Zubin Mehta performing on UN Day several years ago, calling for harmony. The UN Singers came up with Let There be Peace on Earth.

The world seems to be in disorder; in a nuclear confrontation, there will be no winner; the transition to a new world order is in progress, with Asia and the Middle East capturing the front seats (Saran, 2023).

The Major Issues

Ending the Russia-Ukraine War: both sides and all countries stand to win by the end of the war; the UN General Assembly has the proper tool to make this happen (Abonyi, 2022). Promoting cooperation between China and Taiwan: going past strategic ambiguity to a fair deal with allies on each side announcing a partnership between these two great countries. How about a confederation? (Asia Society, 2023). Fostering international cooperation: the United Nations does more than its fair share in helping countries maintain good relations (Clark et al., 2022). Dealing with migration issues: there are bad situations in several parts of the world; in some instances, the case is being correctly handled; but numerous mishandling problems come to mind (Madhav & Tyagi, 2022). Fighting poverty: abundant material shows that the United Nations (UN), World Bank, and WFP. FAO and other organizations are actively helping countries deal with the issue (Margulis et al., 2023).

Literature Review

Challenges: Climate change

There is a lot of bad news on climate. The US is experiencing extremely high temperatures, wildfires, and storms that cause flash flooding and kill people (Clarke et al., 2022). Europe started

to have wildfires, too, this Summer. For the past four years, Eastern Africa has been battling the worst droughts and locust swarms that are wiping out crops, leading to countless cases of malnutrition (Otto, 2023). Madagascar is a perfect example of a victim of climate change: the once lush and green island is turning into a red desert (Altaba, 2022). The World Food Programme warned that the island was at risk of seeing "the world's first climate change famine" as it faced a severe food crisis (Mehrabi et al., 2022).

The fourth-largest island on the planet and one of its most diverse ecosystems, Madagascar have thousands of endemic plant and animal species, such as lemurs (King, 2023). Four years of drought, linked by the United Nations to climate change and deforestation caused by burning or cutting down trees to make charcoal and farming, threaten both the ecosystem and the people. Starvation has become the companion of people living in the country's far south (Hasan et al., 2019). And ruffed lemurs, a representative species in Madagascar, could lose 38 percent to 93 percent of their habitat by 2070 due to climate change and deforestation, according to a paper published in *Nature Climate Change* (Weiskopf et al., 2021).

Asia and the Pacific region experience faster sea-level rises and are predicted to experience more intense heatwaves and heavier rainfall in the coming decades (Dhara & Koll, 2022). For example, the Intergovernmental Panel on Climate Change predicts more frequent high-intensity cyclones and storm surges (created by cyclones). Sea level rise alone is expected to submerge 17 percent of Bangladesh by 2050, leaving approximately 20 million homeless (Ahsan & Özbek, 2022). And extreme-weather events or the slow onset impacts of climate change, such as saltwater intrusion, will displace millions more people in the country. The small island developing States are recognized as among the most vulnerable to climate change.

COVID-19 Pandemic

The COVID-19 pandemic has killed over 6 million people worldwide, with the United States officially surpassing one million reported COVID-19 deaths in May 2022 (Rudan, 2022). Among the survivors, the disease is causing long-term adverse effects in many people, known as post-COVID conditions or "long COVID. Because of health inequities, some people from racial or ethnic minority groups and some people with disabilities may be more likely to not only contract COVID-19 (because to their environment, place of employment, or lack of access to healthcare), but also develop protracted COVID (Okonkwo, et al., 2021).

The small island developing States are among the most vulnerable to the continuing effects of the pandemic. The pandemic has severely hit their economies, which are heavily reliant on tourism and services exports.

Most African countries have so far escaped the worst health impacts of the pandemic, that is, deaths. Experts worry that Africa's people would be very vulnerable victims if other more transmissible and deadly subvariants of the Omicron virus emerged due to the low percentage of the continent's population that is fully immunized against COVID-19 (20% as of today, with many countries having less than 10% of their population immunized) (Oberemok et al., 2022). And Africa is not the only continent affected because unless the virus is tamed everywhere, it can reach

every continent's shores; the Monkeypox virus outbreaks in Europe and the United States are proof of that Liang et al., 2022).

Beyond its health impacts, the COVID-19 pandemic caused the most profound global economic recession in years. Today, 60 percent of workers have lower real incomes than before the pandemic; 60 percent of the poorest countries are in debt distress or at high risk of it; developing countries miss \$1.2 trillion per year to fill the social protection gap, and \$4.3 trillion is needed per year - more money than ever before - to meet the Sustainable Development Goals (SDGs) (Alfani, 2022; United Nations, 2022).

The socioeconomic fallout of the pandemic has been particularly terrible in Africa, the poorest continent in the world. Financial markets were no longer accessible to African countries, and commodity prices fell, mainly hitting oil-exporting countries (Buheji et al., 2020). The cessation of tourism also severely affected small island developing States such as Cape Verde, Mauritius, and Seychelles. And the measures taken by governments to contain the spread of the virus disrupted demand and production. The fallout pushed the region into its first recession in 25 years and threatens to undo over a decade of development progress (Sumer & Joseph, 2018).

In particular, the pandemic has pushed more people into poverty in Africa. The 2021 extreme poverty rate (proportion of the population living on less than \$1.90 a day) is estimated to have increased by three percentage points because of the pandemic (that is, compared to pre-pandemic poverty levels projected for 2021). (Moyer, et al., 2022). While 478 million people lived in extreme poverty in Africa in 2019, an estimated 490 million people did so in 2021, 37 million more than projected without the pandemic (Moses et al., 2021). No African country has been spared the socioeconomic effects of the pandemic, even the most developed ones like South Africa, Mauritius, Tunisia, and Morocco.

The COVID-19 crisis has clarified that global interdependence can be a source of strength and efficiency, but it can also increase vulnerability and amplify external shocks (Forbes, 2021). While developed country economies have been better equipped to address the negative socioeconomic impacts of the pandemic with online education and work, online services provided by the governments, and more flexible fiscal space, the pandemic has disproportionately impacted the least developed countries (LDCs) (Loayza & Pennings, 2020; UNCTAD, 2022).

Against this backdrop, the Doha Programme of Action, agreed on March 17 2022, aims at sustainable and inclusive recovery and increased resilience from COVID-19 in a sustainable and equitable manner, leaving no one behind (Rydz-Żbikowska, 2022). The Doha Programme of Action contains commitments by both LDCs and their development partners to undertake necessary actions to achieve sustainable development in LDCs (UNCTAD, 2022).

Russia-Ukraine war and food, fertilizers and energy crisis

While the pandemic and its effects are not over yet, the Russia-Ukraine war is another major shock that has exacerbated the global economic slowdown (Ben Hassen & El Bilali, 2022). It has triggered a devastating humanitarian crisis and aggravated the pandemic-induced strains of supply

disruptions and worsening financial conditions, leading to soaring prices and volatility in energy markets. It has also resulted in significant price hikes for grains, fertilizers, and other agricultural commodities, particularly those exported by the Russian Federation and Ukraine (Glauben et al., 2022).

All these factors have slowed economic growth in the world's largest and most developing economies and exacerbated inflationary pressures worldwide. The conflict has exacerbated food insecurity and extreme poverty in many countries, particularly those reliant on food imports and those living in poverty and vulnerable situations (Wudil et al., 2022).

In addition, the war's impact on food security, energy, and finance is now speeding up. Together with the world's other crises, the war threatens to unleash unprecedented hunger, deprivation, and a cost-of-living problem. While the latter is hitting vulnerable people and countries particularly hard, no government or community will be untouched by this cost-of-living crisis.

Food prices are at near record highs. Fertilizer prices have more than doubled, sounding an alarm everywhere. Without fertilizers, shortages will spread from corn and wheat to all staple crops, including rice, devastatingly impacting billions of people in Asia and South America (Beals, 2022). Record high energy prices are also triggering blackouts and fuel shortages in all parts of the world. Violent demonstrations in Sri Lanka and from Latin America to Africa over the dizzying spiral in fuel and food prices are a forewarning that more vulnerable countries could go bust (Fraye & Fernando, 2022).

In recent months, the spiralling international fuel and food prices have pushed Sri Lanka from a severe balance-of-payments crisis to bankruptcy, with its (former) Prime Minister declaring that the national economy had "wholly collapsed (Karam & Rising, 2022). The financial squeeze continues in many developing countries on top of the risk of debt default and economic collapse because of the COVID-19 pandemic, the inequality of recovery, and the climate crisis. The combined effects of the lingering pandemic and the conflict are expected to lead to a net increase of 75 million people in extreme poverty by the end of the year 2022 compared to pre-pandemic projections (Moyer et al., 2022). The situation has potentially destabilizing consequences for low- and middle-income economies.

Discussions and Solutions

There is only one way for the UN to stop this gathering storm: a political solution must be found, in line with international law and the United Nations charter, to end the Russia-Ukraine war. Until that happens, the world must take immediate action on two fronts.

First, the food produced by Ukraine and the food and fertilizer produced by Russia must be brought back into world markets despite the war. This will ease global food and energy shortages, stabilize worldwide food and energy markets, break the vicious cycle of rising prices, and significantly relieve developing countries.

The UN is coordinating two task forces to help find the package deal that allows for the safe and secure export of cereals from Ukraine through the Black Sea and immediate access to global markets for grains and fertilizers from Russia.

This deal is essential for hundreds of millions of people in developing countries, including in sub-Saharan Africa. The UN has been working closely with several Moscow, Kiev, Ankara, Brussels, and Washington partners to move this deal forward. As a result, the first ship carrying Ukrainian grain since the beginning of the war set off from the port of Odesa on August 1, 2022, under an internationally brokered deal, passed by Turkey for inspection before heading to Lebanon. It is expected to release large stores of crops trapped in the country, easing global food shortages and a growing global hunger crisis. Other ships would also depart Ukraine's ports through the safe corridors in line with deals signed in Istanbul in July 2022.

Second, the world needs to make resources available immediately to help the poorest countries and communities. Governments must be able to borrow the money they need to keep their economies afloat and their people thriving.

And there is no solution to this global crisis without a solution to the economic situation in the developing world. The global financial system must rise above its shortcomings and use all the instruments at its disposal with flexibility and understanding to support vulnerable countries and people.

To conclude, immediate actions at the global level are required to save lives and livelihoods over the following months and years. Policies to address specific impacts on energy and food prices should focus on those most affected without distorting prices. And as the pandemic continues, vaccination rates must rise to guard against future variants. Finally, mitigating climate change requires urgent multilateral action to limit emissions and raise investments to hasten the green transition.

Conclusion

The world has become more complex; however, the basic principles of international relations are still pertinent and can lead to tangible results, such as cooperation, competition, conflict, and dealing with each situation with the appropriate tools (O'Connor, 2022; Sor, 2022).

Zhao Lijian, a spokesman for the Chinese Foreign Ministry, stated on Friday, November 11, 2022, that the United States and China must cooperate to manage differences effectively, advance mutually beneficial cooperation, prevent misunderstanding and error, and return China-U.S. relations to the path of sound and steady development (McCarthy, 2022; Yadv, 2022).

They were concluding thoughts by Sam Owarish, Ph.D. : All current world leaders want the best for their people. The war in Ukraine is a wake-up call for all of us, showing how a regional war can affect the whole world. All countries want to be prosperous and technologically advanced (S. Owarish, personal communication, January 12, 2023). These objectives can only be achieved by cooperation and peaceful co-existence, recognizing that interdependence is real. All political

systems have their flaws. Human rights and social justice should be upheld in every country in line with principles UN Member States have worked together to develop (Cleary, 2019).

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Appendix 1

Some UN actions to help the world get over today’s global crises

Keynote Speech for Academic Conference of BAASANA, August 12 2022

Hanta Rafalimanana, Statistician-Demographer
United Nations Department of Economic and Social Affairs

The world faces mile upon mile of crises: climate change, COVID-19 pandemic and other disease outbreaks, conflicts and humanitarian emergencies, economic recession and inflation, food and energy crisis, financial crisis, and recently social unrest in many countries. And the list goes on and on. These crises transcend borders and set back hard-won progress on achieving (sustainable) development in the poorest and most vulnerable countries.

What is the United Nations doing to help the world get over these challenges?

Appendix 2

The world in 2030_Trends and Interactions



[Sean M Cleary](#)

Summary of this paper

Our Machine-Learning algorithms scan the text for the most important phrases or passages. These highlights, alongside their respective section titles, are shown below.

Introduction

Eight trends that will shape the decade

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Trend One

China is a critically important player in global development today and in future. The maturation of China's economy had led real GDP growth to slow from 14 percent in 2007 to 6.6 percent in 2018, projected to fall to 5.5 percent by 2024. The government has developed a new growth model focused increasingly on private consumption, services, and innovation, and less on fixed investment and exports.

[Go To Passage](#)

Economic Prospects In The Short-To Medium-Term

Meanwhile the external debt of emerging and frontier economies is rising due to capital flows from advanced economies with low or negative interest rates. Median external debt is now 160 percent of exports in emerging market economies, up from 100 percent in 2008. A sharp tightening in financial conditions would make their debt service problematical.

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Trend Two

FORECAST The U.S. will resist assuming new global security obligations, and contain or reduce those it presently has, in the decade ahead. This will encourage Russia to consolidate control of its "near abroad" while avoiding confrontation with NATO; and to project influence, backed by arms sales and limited power projection into the Levant, seeking to maintain good relations with Iran, while building closer links with Gulf monarchies. As its domestic economic position will not allow it to maintain a significant military presence in the Arab region, or to undertake military operations beyond the scale at which it engaged in Syria, it will encourage regional security dialogues to promote agreements that will boost its influence, while limiting the risk of confrontations that require it to take sides and engage militarily.

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Disruption Of The Rules-Based International Order

FORECAST The existing order and its institutions will be under stress throughout the decade. The UN@75 and Beyond initiative will trigger a process of institutional change that will transform the pillars of the global architecture -the United Nations, International Monetary Fund, World Bank Group and the World Trade Organization -and the systems of interaction between states, and with non-state actors, with which we have become familiar. This transformation will, however, be neither linear, nor smooth.

[Go To Passage](#)

In The East China And South China Seas

FORECAST China will continue to press its claims in both the East China and South China Seas, but will do so with care, to avoid triggering a military confrontation.

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Trend Five

Rapid advances in technology, notably ICT, have equipped economic actors and citizens with new tools in the past two decades to identify and pursue economic opportunities -analysing economic trends and market opportunities, creating new businesses with low barriers to entry, transferring financial assets, and collaborating with widely-dispersed partners. Technological advancement and economic policy have increased returns to capital and technology ownership, and reduced those to labour, widening economic disparity in almost all advanced economies, and weakening social cohesion.

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Weakening National Governance

As the productivity gap between firms at the productivity frontier and laggard firms becomes more marked, FORECAST This trend will continue throughout the decade, and even authoritarian states will not be exempt. China's recent experience in Hong Kong is an instructive example of the limitations facing all governments. The demonstrations have led Beijing to press for application of Article 23 of the Basic Law, providing that the territory "... shall enact laws on its own to prohibit any act of treason, secession, sedition and subversion" against the Chinese government.

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Trend Eight

System-wide stresses: Impacts of a growing, rapidly urbanizing human population on the earth system The percentage of persons aged 60 and older will rise in all these communities, fastest in Europe and North America, and much more slowly in Africa. This growth, notably in urban populations in Asia and Africa, and working age populations in Africa and the Middle East, will create extraordinary opportunities for human welfare, business and investment. Almost all new growth potential is in these emerging and developing economies.

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Scenarios To 2030 In The Context Of These Trends

"The world economy is projected to grow at 3.0 percent in 2019-a significant drop from 2017-18 for emerging market and developing economies as well as advanced economies-before recovering to 3.4 percent in 2020. A slightly higher growth rate is projected for 2021-24. This global growth pattern reflects a major downturn and projected recovery in a group of emerging market economies.

Note and Acknowledgements

The focus/structure of the paper is mine; however, I choose to do a compilation using available studies and credible news, capturing the essence of the ongoing transformation and shaping up a new world order. The world has reached a population of 8 billion. I credit my brother Sam Owarish with his thoughts: The paper highlights the significant challenges currently facing our world. It also focuses on some of the problems requiring urgent attention and offers solutions in broad brushstrokes. Progressive and regressive forces are at war after a lull. Instead of a large military budget for the superpowers, the resources should be used to address the many issues facing humanity. The tragedy is that we have the solutions and the means, but foolish politics and self-interests compound the problems