

E-ISSN: 2581-8868

Volume-04, Issue-05, pp-72-77

www.theajhssr.com

Research Paper

Open Access

Efficient Market Hypothesis "EMH" through the application of Distributed Ledger Technology "DLT" tools.

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ABSTRACT

The academic model of efficient market hypothesis EMH theory has always been the base for capital market and corporate finance but quite challenging while implementing in the realistic market scenario. It's rational for an investor to expect all available financial news and information reflecting the security prices to the extent that no one can earn extraordinary profit from trading of financial instruments. While the management of companies applies the best possible practice to be impartial, the time gap from the publishing of significant decisions till the arrival to the portfolio manager or market player creates a vacuum for insider trading or even arbitrage dealings.

Accessibility by every investor of the given market data at the same level of information about the pricing of tradable securities is almost impossible with human based supervision. The industry and experts are attempting to resolve the issues of announcements, news and data management through technological tools and automation. This article outlines the possibilities of achieving an efficient market theory by applying the distributed ledger technology (DLT) based tools like blockchain, cryptography, smart contract, public keys etc.

KEY WORDS: Market Hypothesis, Technology adoption, Extraordinary gains, Smart Contract, Distributed Technology and Real-time information release.

I. INTRODUCTION

The model of market hypothesis is always fantasizing the corporate financial sector experts. The theory has been challenged since 1970 as Fama has defined the Efficient market hypothesis "EMH" and plays a more prominent role in the valuation, pricing and investment decisions. The intrinsic valuation of share price plays a crucial role in private equity investors and venture capital funding agencies decision-making process, mainly influenced by the available public information, firms planning, detailed future business model, and recent part performance. While for the SMEs, investors rely on the published report of the targeted investment firm through regulators, stockbrokers, exchange houses and public new agencies. In both cases, the future price of investment is derived through the news or financial data. But in practical scenarios, they cannot receive or access the relevant information at the appropriate time. Until the data reaches the genuine end-user, the insider trader creates the bull/bear run and earns extra profit by utilizing classified information faster. Even the internet and security exchanges try to provide reliable knowledge more quickly. Still, the reporting period to the exchange/broker and the deal confirmation always has a time lag; that gap allows arbitrage for speculative investments. The issue of EMH, trading price and evolving technology adoption is tried in several different time frames. During 1990, with the development of the internet and emails, the experts' views were to achieve the perfect market is quite possible. But later, during 2020, the experiments on fintech represented that the issue is not just the timely information accessibility, It's the integrated views with the complete cycle of news that is important. Only announcements and resolutions can't stop the role of insider traders.

Any substantial transaction that can influence the investor's sentiments must be presented in a correlated and integrated way for the public announcements. SMEs has the same impact of non-accessibility of data or available information in small frictions, which requires higher skill to correlate. It is the new tactic to hides classified data by management in a complex corporate structuring world.

The evolution of distributed technology has provided a platform where all interested parties are connected on decentralized and authenticate transactions. The chances of error are meagre, and the best part of the system is that it can be accessible to the public key holder with the complete trail of transactions relevant to that contract/arrangement. The user has the shared code to views all records and transactions of the entries with the origin and lives status. The data can't be manipulated due to cryptography security layers. The smart contract embedment allows the release of data and publishing of information to everyone same time without influence of any individual.

Since the technology allows cloud-based computing, it can be updated and shared from any geographical location. These tools gave scope to evaluate the application for the financial market better governance to target the strong form of the economic or capital market.

The paper tries to explain the benefits and way forward of the DLT application. The revaluation can be based on the shared ledger, intelligent electronic contracts, encryption and transparency perspective to see the influence of the investor's sentiments on the trading.

II. LITERATURE REVIEW AND RELATED WORK

The foundation of corporate finance philosophy and security trading starts with the market hypothesis and the impact of the information on the pricing. As stated by Cochrane and Moskowitz (2017), in the absence of the efficient market hypothesis, the emergence and success of the stock exchange and Wall Street would not be in realism. Fama and French (1992) validated different forms of markets based on the information availability and the impact of extra profitability earned due to such data. Adopting the version of a strong form of market hypothesis would make it impossible to beat the market by using any private or classified information. The model developed on below mention base of assumptions:

- ❖ No transaction or insignificant cost for securities trading.
- ❖ Information is readily and free of cost available to all market participants.
- ❖ Most investors have a similar time horizon for the target securities
- ❖ Investors have homogenous expectations precisely due to the implication of current information for the current security price and expected future prices.

The concept underlying a strong form of EMH implies that prices of financial products must reflect sufficiently enough information to allow investors to make a predictive value for informed decision-making. No one can financially gain from any trade by possessing additional information about the company. The valuation of equity for the market viewpoint has several traditions of calculation. One of the trusted ways is through the financial statement performance-based analysis (Fama and French, 1993). The past monetary results and the anticipation based on the business plan, management action and future expansions reflect through the market prices. The company's decisions about utilizing cash flow instant influence the market trend, like the decision on dividend distribution rates (Shiller, 1998). The driver for these financial performances is the base of Price Equity "P/E" ratio valuation of share of equity price (Basu, 1977). As he mentioned that stocks of companies with low P/E ratios earned a premium for investors during the same market conditions. The investor gets higher returns on the stock acquired from lower ratios in comparison with similar traded stocks. DeBondt and Thaler (1989) provided detailed evidence about the linking of company financial profitability and market reaction against each announcement. The linking is required technological support where investor can evaluate it in live environment.

The estimation and the planning are key information drivers for an investor to decide about the company's future. The faster the availability of this information accessibility provides a better opportunity to earn extraordinary profit. (Shane Smith, 2021). As mentioned by Klein (2006), there is no free lunch in the financial world. The concept is further linked to the arbitrage trade is not possible without the risk of mutated information. In Frittelli (2010) article, the indifference of the price of securities in two markets creates the opportunity of arbitrage trade because the market reacts differently based on the efficiency level and accessibility of base-level information: usually, it's no better than semi-strong form. Charron (2017) further research on the concept of no-free lunch and the price is the only right way theory.

He even mentioned the incapability of forecast of market pricing of securities is mainly because of weak market form. The future expectation, capital assets pricing method and reflection of intrinsic value of product influence. Yen and Lee (2008) defined the model of inefficiency instead of evaluating EMH for a different type of market cause weak form. Rubinstein (2001) presented investor rationality on the market reaction; he ignored the human factor and stated that all the investors would behave rationally if they had the same information accessibility. The study referred to as the "the price is right" concept of market and the behavioural markets. This theory is criticized due to ignorance of the unique nature of human factors; like the followers of Islam invest in sharia-based products even the profitability is lower than the conventional banks. The weak, inefficient, and semi-strong form of market open the doors for insider trade. The timing difference and high cost of news accessibility facilitate the insider to earn extra profitability through arbitrage. These types of transactions cause severe damage to the market and sentiments of genuine investors. (Shane Smith, 2021). As per recent study on the Indian financial market, which reflecting as a semi-strong form of market hypothesis, but in ground it's not working on the effective way due to several adverse economic ecosystem. (Kumar, 2021).

As defined by the security regulator of Bahrain, the insider trader who has any beneficial interest, direct or indirect, in identified shares, financial securities, derivatives regardless of whether they trade or are held in the name of the person or not. In addition to that, it includes tipping off, revealing classified data or information to a third party, to enable such parties to trade in the targeted securities based on the undisclosed market available information (Article 57, Central Bank of Bahrain, rule book) The issues of market forms and information management required the involvement of emerging technology as D'Avolio, Gildor & Shleifer (2001) stated that evolving technologies change market perception and improve open, transparent, reachable capital markets. The new and information accessibility cost reached to negligible level because of technological enhancements.

The evolution of decentralized information flow has further opened the path to look for an integrated environment. The deployment of a triple entry system and cryptography-based business approval of DLT can provide easier access to the end-user the complete set of related information in one transaction trail (Ian Grigg, 2005). Southurst (2021) provided a system named "Abendum" based on a triple entry accounting platform of DLT, which provide the fastest information to people on the forum within a secured network without compromising the time delay, emphasized that shared ledger entry application, hashing and public accessibility of financial performance the informed investor can be unbiased towards the other news or information. The used cases of distributed tools, like virtual coins, where blockchain-based information is readily available, reflect on the pricing of the coins. In such a market situation, no one can outperform the market price by using secrets or information due to distribution among all parties, which have full accessibility, except chances of higher luck from unexpected movement without any new information (Jakub, 2015). It established that the capital market has improved efficiency compared to the traditional market model, tested for Initial Coin Offerings "ICOs" after applying smart contract and self-governance, which provide the base for free accessibility to relevant information with complete trust and full transparency for execution. (Lachaari & Benmahane, 2021)

Serval scholars have emphasized that DLT may open many doors of opportunity for deployment for financial and related sectors. Offer to ripe better opportunities for future investigation (Perdana & Balachandran, 2021). The same system and process of the DLT have been tested for the fund clearing, and inter-party settlement of financial securities, these products has shown a positive response for further development (Priem, 2020).

III. METHODOLOGY

The research is on the application of the technology for attaining EMH is not new, yet the status has not been changed. The study is new from DLT adoption perspective. Since, the application has been not yet applied for the sector, the case study-based approach can't be practical, the researcher applied the survey method from subject matter experts from corporate finance, accounts, portfolio managers, investment advisors, auditors, qualified accountants, and information-technology consultants. A defined null hypothesis was explained through the questionnaire for the survey participants to comprehend their opinions on the subject. Due to the application of advance financial knowhow, only distinct professional groups were approached. Data collection carried through the personal contact calls and google survey form. More than 500 professional participants approached for the feedback. The study factored the proficiency, gender, technical expertise area and years of professional experience to have good representation of sample data. The scholar relies on the primary level data drivers. Through the primary data analysis, the reliability and the objectivity can be more trusted. It also allows the scope of further calculation of analytical factors. The researcher used the tool of response-based analysis through question circulated among the experts group. For this study, stratified sample collection method. In this method, the selection of any expert is purely depending on the probability of the individual within a distinct group.

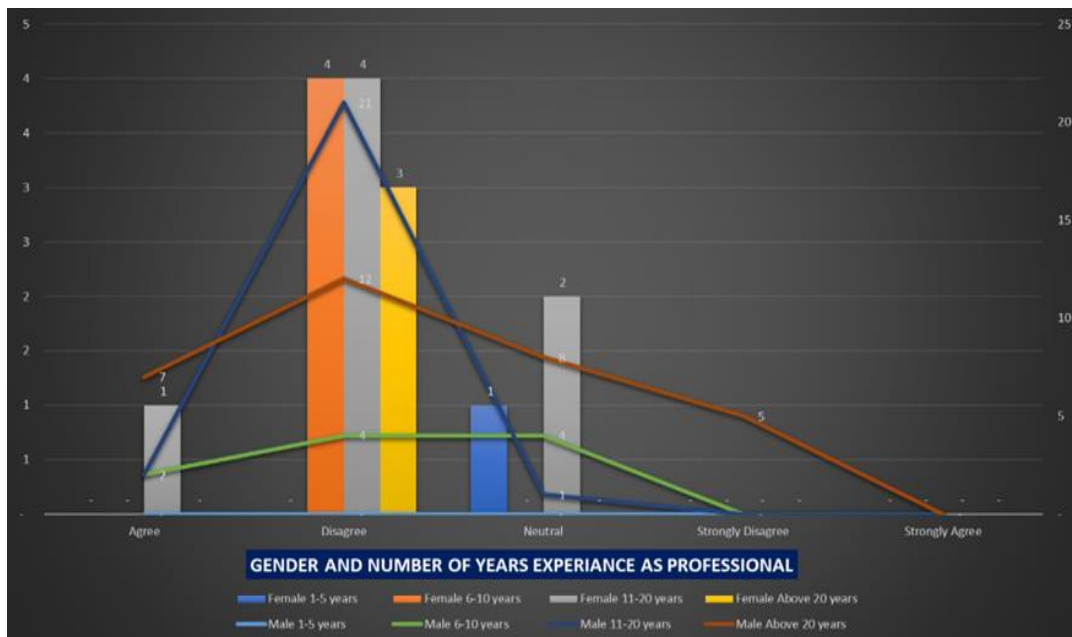
The survey question asked as “Is it possible to achieve the strong form of market hypothesis even without application of evolving technology like blockchain/DLT. The question provided 5 options of response as Agree, Disagree, neutral, Strongly Agree and Strongly disagree.

IV. DISCUSSION& ANALYSIS

The technical and the fundamental analysis are two significant criteria historically used by expert stakeholders to select securities and decide on investments on portfolios, as quoted by Halageri (2017). The idea and the technical evaluation for using both criteria very much influencing the EMH standing. The hypothesis for securing the strong form of the market has constantly been challenged and tried by many regulators and government agencies like SEBI, SEC, CMA, etc. But for applied tests, nowhere find a strong form of the EMH. Therefore, for this study, the researcher targeted focused groups survey responses with prior knowledge and experience of the capital and money market. There were 81 professionals and experts from the investment sector participants from different geographical and markets. The experience level of these participants varies from 2 years to 30 plus years. Maximum populations are aware of the financial statement analysis, fundamental and technical calculation method of equity valuation. Total 66 males and 15 females participated in the study. The female expert's response reflected that almost 74% of the population disagree that the chances of getting the next stage from semi to the strong form of market hypothesis are possible without applications of new technological tools like DLT/Blockchain. On the same page, male professionals have slightly diverse views as 64% disagree or strongly disagree that the EMH existent is possible without applying evolving technology.

Almost 19% responded from both the gender are neutral and interested in waiting until the technology stabilized to evaluate the impact on the market practices and influence of information on the security prices, out of that 50% of those responses reflected from experts who has above 20 years' experience in the share market from India and globally. This neutral response data also indicates that several senior professionals still don't trust and prefer to judge the DLT as an emerging technology due to deviations in technology daily basis and the high risk of cyberattacks. Null Hypothesis for the study "Strong form / Perfect market hypothesis is possible to achieve even without deploying technologies like Blockchain/DLT". Alternate Hypothesis defined by the researcher as "Strong form / Perfect market hypothesis is possible to achieve better way through the application of emerging technologies like Blockchain/DLT".

Picture 1: Survey data on gender and years of professional experience.



For the data analysis and evaluation, there were three variables taken for assessing this Hypothesis. The parameters are the experts' profile as information technology experts or financial investment professionals, the number of years of experience, and gender as male vs female.

in the integrated environment can guide the expected outcome from any new or planned business transactions or decisions. A proactive investor can be instrumental without dependence on brokers for classified news. The success story of Bitcoin, Ethereum, Ripple, Corda-R3 and similar products has given a benchmark for deployment of secured, immutable information to all stakeholders on the platform same time. The presence of public keys, smart contracts and hashing tools will make sure the information can't be leaked by anyone till it's released for everyone in the network. The study provides a means for self-tracking and automation, any possibilities of manipulation can be quickly reported and tracked by the regulator. The cost of preventions of insider trade is lot more than the adoption of the technology through governance by consensus. No technology, model or hypothesis sustain forever; every philosophy should challenge in due course to adopt the change and embrace the challenges of the time. The same applies to EMH, where the corporate units have a pragmatism approach towards adopting technology for all facets of operations. At the same time, the financial market still relies on the traditional way of working. The study advises for further review after every few years' time to gauge the latest progress of science, business process and threats. Because even we tighten the controls; still, human intelligence will find the gap to earn extraordinary.

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