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Concept Note

Metamorphosing the Education System: Instigating Blockchain Technology to Universities for Generating Tamper Proof Certificates

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Abstract

Education sector is transforming day by day in terms of technological advancements and complexity. One of the potential problem education system facing, specifically by the Universities is in delivering authentic degree certificates which cannot be forged by anyone else. Fake certificates are a big problem in India, where six million students graduate over every year. The paper supports to deliver a solution in generating tamper proof certificates through the implementation of Block Chain and Inter Planetary File System (IPFS) in the University system.

A process model is reengineered which uses ethreum block chain as the core engine with smart contracts enabled in it, incorporating the application of IPFS. University can save the file in the IPFS system and can save hash into the block chain for double verification by implementing unique hashing algorithm called SHA-256 and asymmetric encryption. The process and application of Block Chain technologies in Universities for delivering digitally authentic certificates without any hassle is explored.

Keywords: Block Chain, IPFS, Ethreum Block Chain, Encryption, Decryption

1. Introduction

It's quickly becoming deceptive that Block Chain technology is practically far more than just Bit coin through, government, healthcare, education, finance and other sectors advanced uses are seen every day. Basically, block chain is a decentralized dispersed digital ledger collectively preserved by a network of computers called nodes, resembling a huge record book shared among many people. In block chain technique, data cannot be altered by a person without everyone else who maintains the histories agreeing to the change — this makes it safe. Inter Planetary File System (IPFS), a p2p system which helps to connect all devices or nodes with respect to content. In certain standpoints, IPFS is comparable to the World Wide Web, but IPFS may be seen as solitary Bit Torrent group, exchanging matters inside one Git repository. IPFS combines dispersed hash table, an incentivized block exchange, and a self-verifying namespace. Adding certificates like sensitive contents in IPFS and block chain it becomes impossible to alter the data and helps in providing authenticity.

The document data will be added to block chain by the university in which the candidate have the access and give online resume and share with employers. The block chain provides a determined public record, protected against changes to the institute or impairment of its personal confidential records. Further, the system opens chances for direct awarding of certificates and emblems by reliable experts and teachers. The block chain grants public indication that a student identity obtained an award from a recognized identity, but does not, confirm the reliability of either party. A university could still grant a fake certificate or a student can still trickster in an exam. The block chain can solve the problem quickly and reliably checking the presentation of a degree, but not its cogency.

1.1 Research Problem

One of the major problem universities addresses is the validity of the degree certificates and making it a tamper proof one. Fake certificates are a big problem in India, where six million student graduates over every year. The companies hiring thousands of fresher's every year find it

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very difficult to verify the certificates and records of the prospective applicants and for the purpose they have to spend crores of rupees. A digital certificate based on block chain technology could report this problem. Block chain technology is a highly potential one to alter how the current centralized system is employed and helps to eradicate its major flaws, it helps to disperse the entire process and bring transparency to it. Block chain has got a lot of demand in the university or in education system; one of such thing is to deliver a fiddle proof certificates with proper authenticity.

1.2 Scope of the study

Block chain is a fresh and highly evolving technology which has got a vast potential in various fields such as finance, education sector, governance, healthcare, land associated documents etc. The study will help to comprehend the current problems in universities about the validity of degree certificates and how presentation of Block chain can develop the situation. It helps to detect the various options of Block chain in Education Sector. The study will help in bordering an appropriate method for execution of Block chain in University for digitalized degree certificate

1.3 Objective

To explore the possibilities of Block chain applications and to develop a model for its effective implementation in Universities for generating tamper proof certificate.

1.4 Research Methodology

Exploratory study is conducted here. Primary and Secondary data were collected for the study. Primary data collected using a structured interview schedule and secondary data was collected from various journals and other related areas relevant to this study and from case studies of already existing practices. Qualitative type of analysis is carried out for the study.

2. Review of Literature

There were several disadvantages of a distributed system including statement overhead and security issues which were linked in misusing system access by treacherous nodes (Tama et al., 2017). The Bit coin system is considered to be the very first Block chain that were linked together in convinced sized groups known as blocks, where the wedges were created through the authentication of each signature were by the third parties known as miners. Miners practice the authority of computation in reaching the cryptographic proof of authenticity of a business, and further make Bit coins from Bit coin system software in implementing a block (DuPont, 2014). Block chain incorporates a shackle of transactions, where fresh contacts are authenticated, and then presented to the end of the present chains of blocks (Forte et al., 2015). One-way hash / cryptographic mess functions relate a mathematical meaning to data, then to convert data of random size and further into a new digital thread of a predefined and secure length called a hash (Zobrist, 1970)(Knuth, 1974).

To convert any data of random size it is easy to use cryptographic hash function, which converts data into a hexa numbers called hash (Zobrist, 1970). The hash needs to be easy to calculate in one direction, from data to hash, but the contrary calculation, from hash to data needs to be as tough as possible.

Public key or asymmetric cryptography systems works by delivering a unique pair of key to each one on the system named a public key and a private key (Fujisaki & Okamaoto, 1999). In turn, applying the two different keys in exact way, in communication with the public and private keys of other users can disturb privacy and substantiation. For privacy, a sender encodes a message with the public key of the designed recipient, and then creates the encrypted note public (or sends it directly to the proposed recipient), who then decrypts message with their private key. For confirmation, a contributor encrypts a message with their private key, and then makes this encrypted note open. At this position, anyone can use the sender's public key to verify that the encrypted data were definitely created by the sender. This stroke of using a private key to encrypt a message and then creating the encrypted message public for the analysis of others is called a digital signature (Diffie & Hellman, 1979). As a result, the overall public key cryptography systems distinct secrecy (privacy) and authentication (digital signatures) are done through these two-different means.

Block chain technology has already been embraced by Sony Global Education and University of Nicosia (UNIC). Both Universities uses bit coin block chain technology to save the hashes. Sony global education uses Hyperledger

platform which is an open foundation collaborative effort created to improvement of cross-industry block chain skills to save the certificates and UNIC operates with the help of proof of existence website, a facility in securely storing an online dispersed proof of existence for every file. The documents are not stored in file or in the bit coin block chain but as a cryptographic summary of the file.

Block chain can be the transformational strength in education providing a provable, by far shareable and enduring evidence of educational chronicles and rewards (Sharples and Domingue, 2016). The unique essentials of the block chain are that it is a solitary linked record of digital actions stored on each contributing computer.

2.1 Development and Protection of Reliable Digital Records

Reliability and Authenticity

Reliability of records embarks on with the procedure of record formation stating who created the record and by what means they created. Record reliability is the standards for existing records management such as ISO 15,489 (ISO, 2001) and ARMA's Generally Recognized Recordkeeping Principles, ARMA International 2013, two most broadly established universal international recordkeeping principles for management of existing records.

Authenticity is trusting upon launching and conserving the identity and veracity of a record from its creation and thereafter (Rogers, 2015). When ordinal records are created they are often preserved for a period of time in the schemes that have engendered. Assuring reliability include measures such as access control, user substantiation, audits trails and certification that demonstrate the normal functioning, steady maintenance and regularity of upgrades of records system. These activities are also closely linked to standard IT Security controls indicating that preserving the safety of a system will facilitate ensuring the honesty of the data within it.

Long-term digital preservation

The records having sustained value to society or of historical significance needs phases of long-term conservation even from the start of their creation. Long-term preservation of material in digital form requires addressing permanency of authentic information. Quick changes to software, hardware, and network links to associated information and failure to imprisonment or loss of semantic evidence are taken into account.

Bit coin Block chain technology

A distributed transaction ledger where different nodes work together as a unique system for grouping of bits which is then encrypted as one block or one piece and bound together comprises the Bit coin Block chain technology. The first and disreputable application of the Block chain technology is Bitcoin, a form of digital crypto currency. Bit coin Block chain technology essentially establishes a distributed public ledger comprising the payment history of every Bitcoin in movement and provides proof of who possess what at any specified juncture. The distributed ledger is replicated on thousands of computers called Bit coin's nodes around the world and is openly available (The Economist, 2015).

Proof of Existence

This is a facility for anonymously and securely storing an online dispersed proof of existence intended for any file. The documents are not stored in file or in the bitcoin block chain; all they store is a cryptographic summary of the file, related to the time in which you submitted the document. In this way, you can later certify that the data been at that time. This is the first online service letting you to publicly prove that you have convinced information without revealing the data or yourself, with a regionalized certification based on the bitcoin network.

The main advantages are guarantee and privacy and help to get a decentralized proof which cannot be altered by any person. The document's existence is forever validated by the block chain even if this site is cooperated or down, so no need to hinge on or need to trust any central consultant. All previous data time stamping keys lack this freedom.

SHA-256

It is a cryptographic hash function of 'signature' for a text or data file. SHA-256 creates an unique 256-bit signature for a transcript. A hash is not 'encryption' as it cannot be decrypted back to the original text. This crafts it fit to relate 'hashed' versions of texts. Such applications include hash tables, veracity verification, challenge handshake verification, digital signatures, etc.

3. Analysis: Existing Practices of Issuing Degree Certificates in University System

To issue a certificate, University process starts with entering marks of the corresponding subjects for the respective semesters and is kept in universities private server. It is then moved to the default certificate template, after getting confirmation and approval. University employers have to spend huge money in order to verify the certificates as it is cross checked twice and thrice. It is then given for printing and further arranged by office labors to be sent straight to the students address by means of enumerated post. All the printing effort happens in the university itself. The price estimated for the printer is approximately 20-30 lakhs and upkeep charge includes ink and other printing resources which emanate another 20 lakhs. One of the main costs other than printer is for the paper and in order to safeguard the certificate with suitable genuineness a hologram may be provided in the certificate.

In order to design that much numbers of certificates it is really time consuming and the procedure after printing is multifaceted too. Proper precautions need to be taken care as it's highly confidential. It will take more than one month to print the certificates and the distribution will take more than a month to reach all the graduates. For every certificate to be send over post to the graduates, the cost accounts to twenty five rupee per envelope. Each year about forty thousands of students are passing out from different streams, different specialization and from different academies across the state, hence the price included is enormous which may account to 10 lakhs a year. So roughly total cost including manpower for the certificate issuing process in Universities will be around 40-50Lakhs per year. And above all, Bogus Certificates is a vast problem in India as these certificates can be easily replicated.

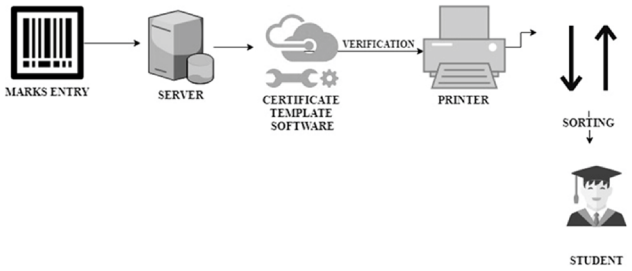

Figure 1: Existing process of issuing degree certificates in the University system

4. Possibility of Block Chain Applications in Universities

As education models evolve, technical innovation is predictable to diversify the ways in which tests are planned and individuals are estimated. Open and protected handling of academic data will become conceivable through the approval of application packages, leading to the appearance of new educational services in the upcoming. To study the possibility of block chain application, already executed real cases of Sony Global Education and University of Nicosia which applied Block chain in two different approaches is discussed.

4.1 Sony Global education

- Sony uses Hyper ledger which is an open foundation collaborative exertion created to advance cross-industry block chain technologies and updates its certificates in hyper ledger allowed block chain and uses it for authentication; this is done by giving Hyper ledger remuneration.
- Sony would let education and training administrations to donate data to the system and would bond together all education and training data about each individual and make it provable.
- Sony would make it possible for establishments with adequate permissions to analyse the data in order to recognize education and training tendencies among the population and to evaluate the efficiency of different education and training platforms.

4.2 University of Nicosia

- The document (PDF) is hashed with a protected hashing algorithm (SHA-256) and is encrypted. The Hash is kept to the Bitcoin transaction as enduring record with help of Proof of existence website.
- Can cross check the catalogue document or certificate with help of using the same SHA-256 algorithm and authenticate the diploma.

5. Implementation of Block Chain in University for Generating Tamper free Certificate

The marks entry is done with the help of a portal, which enables barcode scanning of paper and facilitates in the

entry of the marks. It is then transferred to the university private server. From the university private server it is transferred to certificate template software and is verified by an office staff, then the pdf of digital certificate is generated & this pdf document will be encrypted with students public key with the help of asymmetric encryption, then generate a private key too, which is transferred to the student by the university.

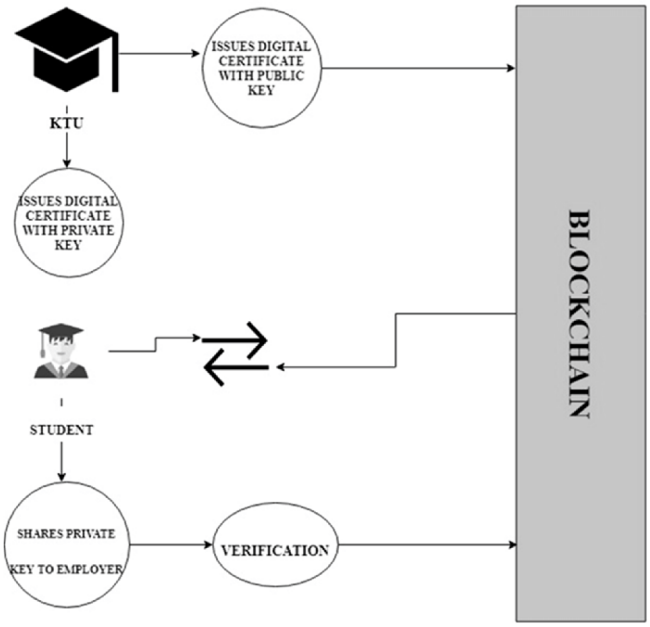

Figure 2: A framework of Block Chain application in University for generating tamper free certificate

When the pdf is uploaded to IPFS system, it generates a Hash value of SHA-256 hashing algorithm to create the value, this hash is then saved to the ethreum block chain and the value of the hash is also delivered to the university. Here ethreum block chain is used with a special program called smart contracts for the purpose of saving the hash of students. It will be saved in a directory called "Graduate MBA 2018" making it easy to search for the hash. One of the important features here is that, each hash in the directory is time stamped with exact time and date when the hash is uploaded. Student gets the hash value and private key from university where students can share the both to a prospective employer or any other authority, so that employer can crosscheck the authenticity.

Employer searches for the hash in the block chain and once found can assure whether the specific candidates degree is authentic or not. After cross checking in the block chain, the employer can also search for the pdf file in the IPFS system with the same hash key. Once the file is found it has to be decrypted using the private key and the original pdf degree certificate can be downloaded by the employer.

6. Proposed Model and Recommendations

The problem of university and employer in terms of cost and with the authenticity of the university certificates can be solved by implementing this proposed model in the university process. Basically it can be considered as a reengineering process where it completely focus in changing the process of physical certificate distribution system and provide all the stake holders transparency and authenticity of the process.

In the proposed model (figure 3), block chain technology can be implemented and IPFR system applied to provide authenticity and transparency to the document. The proposed model uses a hashing algorithm to hash the particular document and helps to save it in the blockchain where the hash saves to the ethreum block chain and is further time stamped so that no one can alter it or change it. It also uses asymmetric encryption system to ensure the certificate is only viewable to those the student needs. IPFR is incorporated in this proposed model in order to save the file in a distributed network, so that no can hack the file. In order to retrieve the file, the same hash can be used to save / restore to the block chain to search the pdf file in the IPFS system. The content can be viewed only with the help of a private key.

Here the block chain technology used is Ethreum block chain, where it contains a special program called smart contracts. It creates a directory to save the hashes that too according to the needs of the client. Overall this model helps to solve the current issue faced by the education sector in terms of the cost and the authentication issue.

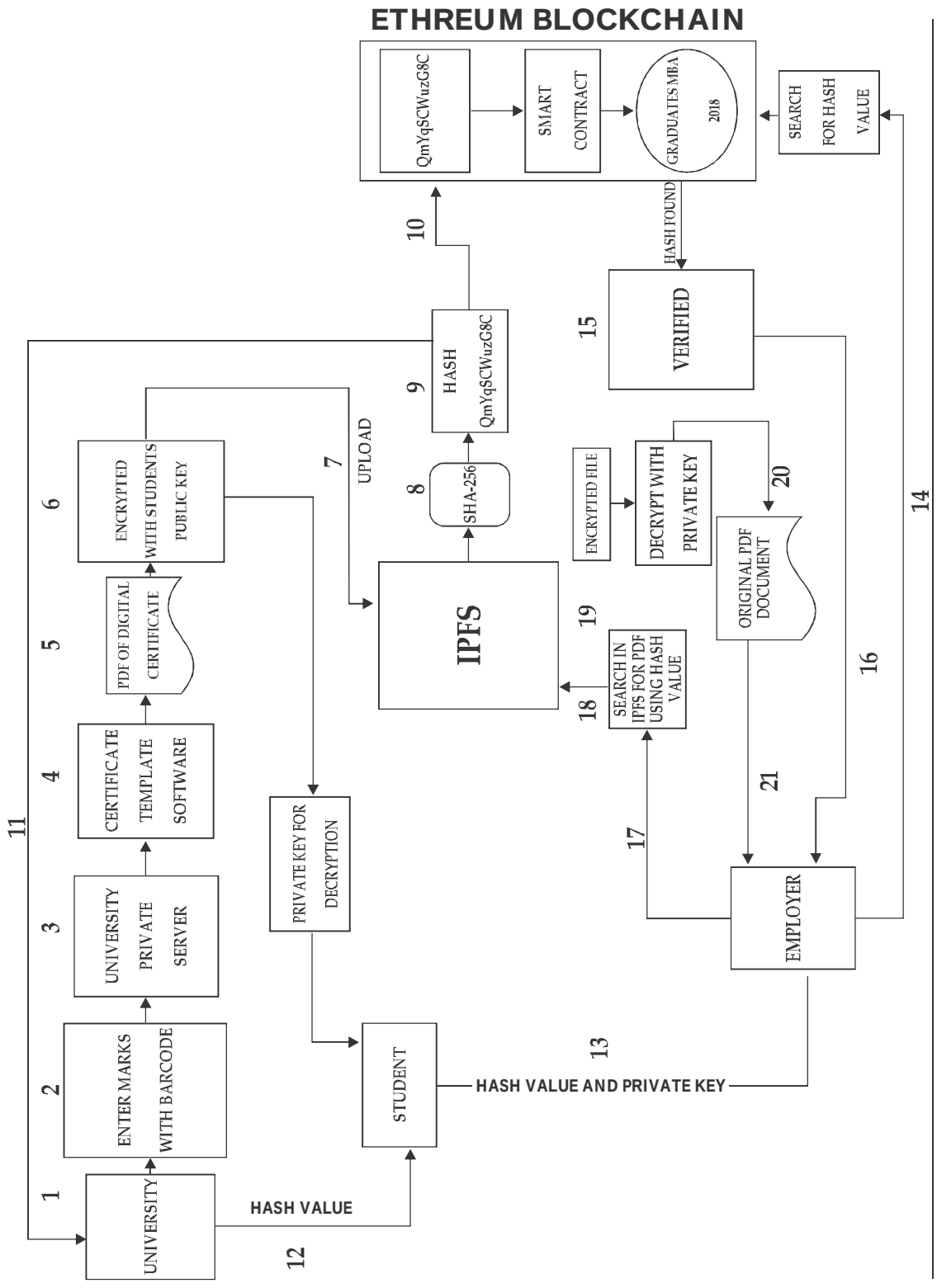

Figure 3: Proposed Model of Block Chain Implementation in Universities

6.1 Process Work Flow of the proposed model

University: The marks entry is done with the help of a portal, which enables barcode scanning of paper and facilitates in entry of the marks, then it is further transferred to the university private server. From the university private server it is transferred to certificate template software and is verified by an office staff, then the pdf of digital certificate is generated & this pdf document will be encrypted with students public key with the help of asymmetric encryption, there generate a private key too, which is transferred to the student by the university.

IPFS (Inter Planetary File System): When the pdf is uploaded to IPFS system, it generates a Hash value, they use SHA-256 hashing algorithm to create the value, this hash is then saved to the ethreum block chain and the value of the hash is also delivered to the university.

Block chain: Here ethreum block chain is used, which a special program has called smart contracts for the purpose of saving the hash of students. It will be saved in a directory called "Graduate MBA 2018" making it easy to search for the hash. One of the important features here is that, each hash in the directory is time stamped with exact time and date when the hash is uploaded.

Student: Student gets the hash value and private key from university where students can share the both to a prospective employer or any other authority, so that employer can crosscheck the authenticity.

Employer: Employer searches for the hash in the block chain and once found, can assure that the student's degree is authentic. After cross checking in the block chain, he can search for the pdf file in the IPFS system with the same hash key. After file is found it has to decrypt using the private key and will get the original pdf degree certificate to the employer.

7. Findings of the Study

- Certificate verification is done by the employer through email or seeking help with technical support.
- Employers are spending crores to verify certificates.
- Printing charge comes around 20 lakhs.
- Fake certificates are major problem in the country.
- Physical delivery of the certificate is time consuming and can take more than one month.
- Postal cost involved for university in each year will comes around 10 lakhs.
- The total cost for entire process comes around 40-50 lakhs.
- Universities use barcode mechanism to save the marks with the help of a portal.
- Universities use certificate template software in order to save the marks in the certificate in the preferred format.
- Hash value is used to save data to the block chain.
- Proposed model uses ethreum block chain and smart contract.
- Employer can verify the certificate by searching the hash in a particular directory in block chain.
- It is impossible to leak data from block chain because it used highly distributed ledger mechanism to store data.
- Employer can retrieve the file from IPFR using hash value and decrypt the file with a private key.

8. Conclusions

There is a need of technological advancement in the education sector in order to deliver proper outputs on time. Especially in the education sector, one important aspect equalent to delivery of knowledge is delivery of authentic certificates. Today, one of the major problem university facades is to deal with the process of traditional certificate delivery to the respective graduates. By proposing a model for the generation of tampers proof certificates with the help of latest technology called block chain and IPFR system solves the problem of traditional certificate delivery method.

The same type of methodology has already been adopted by the Sony global education and University of Nicosia, but in the proposed model it helps to deliver far better certificate issue system and storage by incorporating IPFR with Ethreum block chain. The proposed model delivers better process than other existing models, with the additional option for saving the document in distributed storage system in a secured manner. The documents that stored in any centralized storage can be easily deleted or can cause error. The IPFR system helps to retrieve the entire

file without any damage with the help of highly decentralized storage system. Considering the cost of physical delivery and printing, adoption of this process in university can save lakhs of rupees and will create a transparency in the process.

The world is changing radically day by day in terms of threat and in terms of technology so one should adopt the best practices available today in order to save the valuable contents and also for the security purpose, its better late than never.

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Online Portfolio Selection using a new stochastic Multi-Armed Bandit Algorithm

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Abstract

Online Portfolio Selection Problem is a sequential decision-making problem where a decision-maker, using the information on assets available till that time period, repetitively selects a portfolio over available assets maximizing a long-term return that must be calculated at the end of each time period. Typically, multiple assets need to be 'explored' and a profit maximizing asset be 'exploited', hence this problem falls into explore-exploit class of Machine Learning based decision-making problems. Multi-Armed Bandit algorithms suit well to such explore-exploit scenarios, and there are instances in extant literature where these algorithms were applied to the same. In this work, we employ a newly-proposed Multi-Armed Bandit algorithm named effSAMWMIX to solve a naïve portfolio selection problem which is a variant of Online Portfolio Selection problem. In a naive portfolio problem, all the weight in resources for a time period is invested in a single asset. We compare the performance of effSAMWMIX vis-a-vis other Multi-Armed Bandit algorithms such as KL-UCB, Thompson sampling as also the benchmark Buy & Hold strategy. We tested the algorithms on real-world market datasets (the Fama-French FF48, FF100 and ETF139) as well as simulated datasets based on parameters drawn from real-world indices. We report our results where effSAMWMIX has achieved better cumulative wealth and Sharpe Ratio when used as a naive portfolio algorithm.

Keywords: Online Portfolio Selection Problem, Multi-Armed Bandit, Geometric Brownian Motion, effSAMWMIX, KL-UCB, Thomson Sampling, Naive Bandit Portfolio

1. Introduction

Decision making under uncertainty has always been a challenge - so much so in the case of Online Portfolio Selection Problem (OPSP). An Online Portfolio Selection Problem (OPSP) (Borodin & El-Yaniv, 2005; Dannoura & Sakurai, 1998; Fiat, 1998; Li & Hoi, 2014; Mohr & Schmidt, 2013; Schmidt, Mohr, & Kersch, 2010) is a sequential decision-making problem, where the decision-maker (Agent henceforth) must select a portfolio given a set of assets, with an aim to maximize a long-term return or reward. OPSP often encounters great deals of uncertainty due to the changing economic and political environments (Kumar & Garg, 2012; Merton, 1969). The rapid availability of price information, especially in Internet-based modern-day economies and indices, creates the need for fast portfolio selection algorithms based on the available albeit limited information. OPSP could require simultaneous optimization and the best asset (choice) identification. OPSP thus requires optimization of a suitable investment metric at every purchase decision time to identify the best choice of an asset to invest in.

In solving any Portfolio Selection Problem (PSP), the investor decides on a strategy to allocate the available (but finite) wealth among the available choice of assets. Every asset is a diverse investment opportunity and the realization of the asset allocation strategy builds a portfolio. An asset is termed risky if the prices of the asset are uncertain and such riskiness needs to be incorporated into the portfolio allocation process. The time between any two portfolio allocation decisions is called a period. If there is only one decision during the whole investment period, it is called a Single-Period PSP. A multi-period PSP requires

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sequential decision-making over the time horizon of investment where the investor needs to stay very actively and thus is proposed as an online decision-making problem. Investor's role, during the decision making, is to optimize an objective function, which could be the Return on Investment (RoI) or Risk of losing wealth (Risk) or a combination of both (Risk & Return). Thus, portfolio decision making could also involve the management of Risk and maximize the RoI. The following section briefly discusses the OPSP and introduces a Machine Learning (ML) perspective of the OPSP problem.

Extant literature addresses OPSP primarily in two ways. The first one considers risk management to be factored into the objective function whose performance measure is quantified by Cumulative Wealth (CW). CW is the terminal wealth obtained from the portfolio at the end of a multiperiod investment horizon (Li & Hoi, 2014). The objective function considers the net risk of the asset choice decisions with respect to the CW that is sought to be maximized (e.g. maximize the Sharpe Ratio). Thus, this closed-form objective function technique operates based on this innate risk-based decision to measure the quality of its performance. Such performance measures are seen in seminal work such as (Markowitz, 1952; Mossin, 1966) and the more recent (Lisi, 2011; Rockafellar & Uryasev, 2000). These ideas are characterized by building statistical models of the asset prices in the market. The input to these statistical models requires a forecasting model in the form of an equation (DeMiguel, Martín-Utrera, & Nogales, 2015). The forecasting model, in turn, requires a calibration based on historical data of asset prices or market capitalization data (Fama & French, 1992).

The second way to address OPSP is based on utilizing the modern-day computing infrastructure along with intelligent ML techniques that include Neural Networks or RL Algorithms (Shen, Wang, Jiang, & Zha, 2015). ML algorithms are solely based on the empirical observations motivated by dynamic rise and fall of the asset prices. Algorithms (or Strategies) like Follow-the-Winner (Agarwal, Hazan, Kale, & Schapire, 2006; Li & Hoi, 2014), Follow-the-Loser (Li & Hoi, 2012) etc., are a couple of those which make use of such dynamic price changes. In brief, an ML Algorithm's approach to OPSP is to concretely explore the available information of past asset prices and based on its indigenous technique, provide a suggestion as to how the portfolio allocation be done for the next period. The algorithm typically intends to maximize the cumulative wealth at the end of the multi-period investment horizon.

In this research work, we propose and demonstrate a version of effSAMWMIX (proposed in our working paper (Villari & Abdulla, 2017)) referred henceforth as NBP-effSAMWMIX. Using this NBP-effSAMWMIX, we build a Naive Bandit Portfolio (NBP) algorithm like (Shen et al., 2015) and compare the same with NBPs that implement existing Stochastic Multi- Armed Bandits (SMAB) like UCB1 (Auer & Ortner, 2010), KL-UCB (Garivier & Cappé, 2011) and Thompson Sampling (Agrawal & Goyal, 2012; Kaufmann, Korda, & Munos, 2012; Thompson, 1933). We address the NBP versions of UCB1, KL-UCB and Thompson Sampling algorithms as NBP-UCB1, NBP-KLUCB and NBP-TS respectively. In the following sections we review SMAB algorithms (referred as SMABs) and describe how we constructed an NBP algorithm using such SMABs. To analyze the performance of these OPSP strategies, we implemented the proposed NBP-effSAMWMIX algorithm on a synthetic data set obtained by simulating stock prices using Geometric Brownian Motion (GBM) (Marathe & Ryan, 2005). We followed these with similar experiments on real-world market data (standard datasets) obtained from sources reported in literature (Bruni, Cesarone, Scozzari, & Tardella, 2016). Li & Hoi compared the performance of ML based OPSP algorithms against 'Buy & Hold' strategy which is a benchmark strategy (Li & Hoi, 2014). We also, in this work, compared the performance of above mentioned SMAB algorithms with that of 'Buy & Hold' strategy in order to validate these ML algorithms against a baseline strategy.

2. Stochastic Multi-Armed Bandits & The Naive Bandit Portfolio Algorithm

2.1 Stochastic Multi-Armed Bandit (SMAB) problem

A Multi-Armed Bandit (MAB) problem is a sequential decision-making problem which spans over iterations of decision-making horizon H, with decision made at indices $t \in \{1,2,...,H\}$. In each round (or iteration) t the decision maker chooses an action a_t from among a set of K fixed action choices that are available and obtains a noisy reward X_t^a which is always bounded by [0,1]. In MAB terminology

the words Choice, Action and Arm are used alternatively. Here X is the reward obtained by the MAB algorithm for choosing arm a in iteration t. The act of choosing an action is called pulling an arm as each available choice is an arm for a Multi-armed Bandit. The choice of which 'arm' to 'pull' is based on a goodness function of each arm, that is also updated for each arm as t proceeds towards H. The cumulative reward of a MAB algorithm is thus given by

$$C = \sum_{t=1}^{H} E\left(X_t^{a_t}\right) \quad (1)$$

where a_t is the chosen action in iteration t. Of all the K action choices, say the choice a^* that could give the best possible reward is known (somehow, say through an oracle policy). We denote the reward obtained by pulling this arm to be X_t^* at any iteration t, thus the maximum expected reward for this oracle policy is

$$O = \sum_{t=1}^{H} E(X_t^*) \quad (2)$$

The objective is to maximize the cumulative reward *C* and obtain a value as close to the maximum expected reward O as possible. Thus a MAB objective function tries to minimize the Regret ($\overline{R} = O - C$), which is the difference between the highest possible expected reward and the expected reward obtained by the algorithm (Lai & Robbins, 1985). Any MAB operates under certain assumptions on reward distributions {Xta}. For an SMAB, the rewards of each arm a ∈ {1,2...,K} accrue with a probability distribution v^a on [0,1]. Any indication of v^a is unknown to the SMAB. The rewards $\{X_t^a\}$ from arm a are assumed to be independent and identically distributed (i.i.d) across the horizon of decision-making iterations i.e., 1 ≤ t ≤ H and are independent of reward distributions of other arms. There are a few other MAB settings like the adversarial MAB (Auer, Cesa-Bianchi, Freund, & Schapire, 1995) where the environment chooses the rewards to minimize the C of the algorithm, however we deal with SMABs where the rewards follow the i.i.d. assumption stated above. This limitation of reward being bounded between [0,1] is a requirement for applying SMAB algorithms. In real-world scenario where the stock returns could be any number between [-∞,∞], the returns are normalized to be between [0,1] without losing any information on the same.

2.2 The Naive Bandit Portfolio algorithm

A Naive Bandit Portfolio algorithm uses an SMAB as a decision-making engine. We take the term 'naïve' from (Shen, Wang, & Ma, 2014), since the algorithm does not decorrelate (or take any decision based on) any possible correlations between the K assets. The inputs to the SMAB are the time horizon H, number of available arms K (where each arm represents an asset), the time period between decisions is Δt which could be a day for daily returns or a week for weekly returns. The random variable X_t^a is the reward obtained when an asset a is chosen in decision period t and W_t is the cumulative wealth obtained until the iteration t. We explain later the precise form that the return X_t^a takes, but currently we assume that asset a has a price process $\{\rho_t^a\}_t^H = 1$ Here, ρ_t^a is the price of an asset a at iteration t. Then the gross return on asset a in iteration t is denoted by R_t^a and is obtained as $R_t^a = \frac{\rho_t^a}{\rho_{t-1}^a}$. The gross returns vector at t over the time for a portfolio with unit investment in each of the K assets can be written as $R_t = (R_t^1, R_t^2, \ldots\ldots R_t^K)'$. Similarly, price vector ρ_t represents the prices of all available assets at time iteration t while 1<t<H as mentioned before. In a typical scenario where prices are being simulated using GBM, ρ_0 has all elements such that $\rho_0^a = 1$.

The portfolio investment decision made is determining of weights proportionate to which investment will be made in K assets. Thus, the weights vector required at time t is represented as $\omega_t = (\omega_t^1, \omega_t^2, \ldots. \omega_t^K)'$ The a^{th} element of t^{th} vector, ω_t^a, represents the proportion of the available capital invested in asset a. This $\omega_t^a > 0$ is determined by the SMAB algorithm with the additional condition that ω_t sums to 1, i.e., $\sum_{a=1}^{K} \omega_t^a = 1$. The Cumulative Wealth (is indicated in equations by) W_H, which is the realized wealth at the end of time horizon H, is calculated as shown below

$$W_H = \rho_0 \prod_{t=1}^{H} \omega_t . R_t = \rho_0 \prod_{t=1}^{H} \sum_{a=1}^{K} \omega_t^a . R_t^a \quad (3)$$

The S_t^a to be used in the SMAB algorithm is the Sharpe Ratio of past returns R_t^a. However, here a parameter τ indicating the moving-window setting is used in (Shen et al., 2014). This moving-window is the number of periods of data, prior to the current decision-making period, the algorithm should consider while calculating S_t^a. Thus, for an NBP, the true return for an asset a in iteration t is given as $X_t^a = S_t^a$ where

$$S_t^a = \frac{\mu_t^a(\tau)}{\sigma_t^a(\tau)} \tag{4}$$

The τ denotes the moving-horizon time period. Here, $\mu_t^a(\tau)$ is the average of previous τ returns $\frac{1}{\tau}\sum_{s=t-\tau}^{s=t} R_s^a$ before t. For example, when =100 , μ_102^a (100) is the mean return of past 100 periods before the period t=102. Similarly, $\sigma_t^a(\tau)$, is the standard deviation of the returns $\{R_s^a\}_{s=t-\tau}^{t}$. For our work, we consider τ = 120 where mean (μ) and standard deviations (σ) of the past 120 time periods is taken in to consideration for calculating S_t^a. As mentioned previously, for an SMAB algorithm to operate, an assumption that the reward $S_t^a \in [0,1]$ is necessary. To obtain S_t^a in [0, 1], we normalize the S_t^a based on data for every asset a in period t as given below.

$$\overline{S}_t^a \equiv \frac{S_t^a - min_b(S_t^b)}{max_b(S_t^b) - min_b(S_t^b)} \tag{5}$$

S_t^a is given as input to the NBP algorithm (see Algorithm 1). From the NBP Algorithm 1, notice that an SMAB is implemented to compute the weights vector for any iteration $t \in \{\tau + 1,\ldots,H\}$. Current work compares the performance of the proposed NBP-effSAMWMIX with analogous SMAB-based NBP-UCB1, NBP-KLUCB, and NBP-TS algorithms - where the kernels are different bandit algorithms. The functioning of the NBP versions of each of these algorithms is presented below.

2.3 NBP-UCB1 algorithm

UCB1 is a first-generation SMAB algorithm that updates both exploration and exploitation components, to store them additively in a UCB parameter (Auer, Cesa-Bianchi, & Fischer, 2002). UCB here is an acronym for Upper Confidence Bound. The following UCB1 parameter is updated in every iteration for every arm (asset)

$$U_t^a = \hat{\overline{S}}_t^a + \sqrt{\frac{2\ln(t)}{N_t(a)}} \tag{6}$$

where $\hat{\overline{S}}_t^a$ is the mean of the observed (normalized) Sharpe Ratios of arm (asset) a until iteration t, at the instances that arm a has been pulled. Also, N_t (a) is the number of times arm a has been played until iteration t. To explore the rewards obtained if any arm is pulled, UCB1 allows mandates all arms are pulled at least once. Thus, the minimum value of N_t (a) will be 1. In the context of this work, the Sharpe Ratio ($\overline{S}_t^a$) which is the normalized risk-adjusted returns from the asset. The asset to be invested in at iteration t is calculated by

$$a_t = argmax_{a\in 1,2,\ldots,K}\left(\hat{\overline{S}}_{t-1}^a + \sqrt{\frac{2\ln(t)}{N_{t-1}(a)}}\right) \tag{7}$$

Followed by updates $N_{t+1}(a_t) := N_t(a_t) + 1$ and $N_{t+1}(a) := N_t(a)$, for $a \neq a_t$. The $N_t(a_t)$ - sample empirical mean $\hat{\overline{S}}_t^a$ is updated with the new sample $\overline{S}_t^a$. While $\hat{\overline{S}}_t^a$ represents the exploitation component, the term $\sqrt{\frac{2\ln(t)}{N_t(a)}}$ is the exploration bonus adjusting for arms that have not been tried out enough. UCB1 captures the principle of "optimism under uncertainty", with the parameters getting updated simultaneously with knowledge related to both exploration and exploitation. Note here that though $\overline{S}_t^a$ is analogous to reward in this MAB, it is not i.i.d (since there is dependence on other assets due to normalization). However, relaxing the i.i.d. assumption only entails loss of certain properties like logarithmic regret, and doesn't render a MAB unsuitable for OPSP. With other details specific to this OPSP, the NBP-UCB1 is written as Algorithm (1).

Algorithm 1: NBP-UCB1 Algorithm

1. **WithInputs**: K (assets), H (Horizon), Δt, R_t, τ
2. **For** t $= \tau + 1$ to H, **do**
3. Calculate moving $-$ window average return $\mu_t^a(\tau) = \frac{1}{\tau}\sum_{s=t-\tau}^{t} R_s^a$
4. Calculate standard deviation $\sigma_t^a(\tau)$ of the returns $= \{R_s^a\}_{s=t-\tau}$
5. Calculate $S_t^a = \frac{\mu_t^a(\tau)}{\sigma_t^a(\tau)}$
6. Calculate $\overline{S}_t^a = \frac{S_t^a - min_b(S_t^b)}{max_b(S_t^b) - min_b(S_t^b)}$ to normalize S_t^a
7. **end For**
8. **Initialize UCB1**, $\hat{\overline{S}}_{\tau+K}^a := \overline{S}_{\tau+a}^a . N_{\tau+K}(a) := 1$ for all $1 \le a \le K$
9. **For** every iteration t $= \{\tau + K + 1, \tau + K + 1 \ldots H\}$
10. Choose asset $a_t = argmax_{a \in 1,2,\ldots,K}\left(\hat{\overline{S}}_{t-1}^a + \sqrt{\frac{2\ln(t)}{N_{t-1}(a)}}\right)$
11. Update $\hat{\overline{S}}_t^a := \frac{N_{t-1}(a_t).\hat{\overline{S}}_{t-1}^a + \overline{S}_t^{a_t}}{N_{t-1}(a_t)+1}$ and $N_t(a_t) := N_{t-1}(a_t) + 1$
12. For all other $a \neq a_t$, $\hat{\overline{S}}_t^a := \hat{\overline{S}}_{t-1}^a$ and $N_t(a_t) := N_{t-1}(a_t)$
13. **end For**

2.4 NBP-KLUCB algorithm

KL-UCB is proposed in (Garivier & Cappé, 2011), wherein KL stands for Kullback-Leibler divergence, an information theoretic measure of how well-sampled an empirical mean is with respect to other empirical means. It differs from UCB1 in the exploration bonus term (analogous to $\sqrt{\frac{2\ln(t)}{N_t(a)}}$) above) which is derived by employing KL -divergence. KL-UCB is reported to possess improved regret bounds where the exploration term incorporates the distance between estimated reward distributions for the arms when calculating the UCB parameter. The NBP-KLUCB that employs KL-UCB as its decision engine as given in Algorithm (2). Notice in NBP-KLUCB that each iteration involves an optimization problem (marked as equation) and that this is solved by gradient descent algorithm using a heuristic in (Garivier & Cappé, 2011).

Algorithm 2: NBP-KLUCB Algorithm

1. **With Inputs**: K (assets), H (Horizon), Δt, R_t, τ
2. **For** t $= \tau + 1$ to H, **do**
3. Calculate moving $-$ window average return $\mu_t^a(\tau) = \frac{1}{\tau}\sum_{s=t-\tau}^{t} R_s^a$
4. Calculate standard deviation $\sigma_t^a(\tau)$ of the returns $= \{R_s^a\}_{s=t-\tau}$
5. Calculate $S_t^a = \frac{\mu_t^a(\tau)}{\sigma_t^a(\tau)}$
6. Calculate $\overline{S}_t^a = \frac{S_t^a - min_b(S_t^b)}{max_b(S_t^b) - min_b(S_t^b)}$ to normalize S_t^a
7. **end For**
8. **Initialize UCB1**, $\hat{\overline{S}}_{\tau+K}^a := \overline{S}_{\tau+a}^a . N_{\tau+K}(a) := 1$ for all $1 \le a \le K$
9. **For** t $= \tau + K + 1$ to H, **do**
10. $a_t := argmax_{a \in 1,2,\ldots,K} \max\left\{q \in [0,1]: N_{t-1}(a).d.\left(\frac{\hat{\overline{S}}_t^a}{N_{t-1}(a)}, q\right) \le log(t) + c.log(log(t))\right\}$

11. Calculate value of d in step 10 as $d(p,q) = p\log\left(\frac{p}{q}\right) + (1-p)\log\left(\frac{1-p}{1-q}\right)$
12. Set the value of c in step 10 as $c := 0$. c Calculateis a heuristic in (Garivier & Cappé, 2011)
13. Update $\hat{\bar{S}}_t^a := \frac{N_{t-1}(a_t).\hat{\bar{S}}_{t-1}^a + \bar{S}_t^{a_t}}{N_{t-1}(a_t)+1}$ and $N_t(a_t) := N_{t-1}(a_t) + 1$
14. For all other a $\neq$ a_t, $\hat{\bar{S}}_t^a := \hat{\bar{S}}_{t-1}^a$ and $N_t(a_t) := N_{t-1}(a_t)$
15. **end For**

2.5 NBP-TS (Thompson Sampling) algorithm

Thompson Sampling (TS) was proposed within (Thompson, 1933) in 1933 but remained less popular compared to other MAB algorithms for the lack of proofs on the regret bounds. The empirical performance of TS is reported to be better than UCB (Gopalan, Mannor, & Mansour, 2014) and is considered to be a competent algorithm owing to its practical usability (Russo & Van Roy, 2016). The proof for logarithmic regret in the Thompson sampling SMAB, under typical conditions, has come only recently (Agrawal & Goyal, 2012; Kaufmann et al., 2012). Hence, we compared the performance of NBP-TS with NBP-effSAMWMIX in this work. The NBP-TS that employs TS as its decision engine is given in Algorithm (3).

Algorithm 3: NBP-TS Algorithm

1. **With Inputs**: K(assets), H(Horizon), Δt, R_t, τ, S_t^a
2. **For** t = $\tau + 1$ to H, **do**
3. Calculate moving − window average return $\mu_t^a(\tau) = \frac{1}{\tau}\sum_{s=t-\tau}^{t} R_s^a$
4. Calculate standard deviation $\sigma_t^a(\tau)$ of the returns = $\{R_s^a\}_{s=t-\tau}$
5. Calculate $S_t^a = \frac{\mu_t^a(\tau)}{\sigma_t^a(\tau)}$
6. Calculate $\bar{S}_t^{a_t} = \frac{S_t^a - min_b(S_t^b)}{max_b(S_t^b) - min_b(S_t^b)}$ to normalize S_t^a
7. **end For**
8. $s^a := 0, f^a := 0, \forall a$ where s^a is "success counter" and f^a is "failure counter"
9. **For** t = $\tau + 1$ to H, **do**
10. **For** $a \in \{1,2,\ldots..K\}$**do**
11. Draw random variable θ^a according to distributions $Beta(s^a + 1, f^a + 1)$
12. **End For**
13. $a_t := argmax_a(\theta^a)$,
14. With $\bar{S}_t^{a_t}$ as the Bernoulli parameter, obtain a random variable $r_t \in [0,1]$
15. Update $s^{a_t} := s^{a_t} + r_t$ and $f^{a_t} := f^{a_t} + r_t^c$ where r_t^c is complement of r_t
16. **End For**

2.6 NBP-effSAMWMIX algorithm

The algorithm Efficient SAMWMIX (or effSAMWMIX) differs from UCB1 or KL-UCB since it avoids searching for a maximum among K values, as described in (Villari & Abdulla, 2017). Instead, it picks a 'soft maximum' using a Boltzmann Exploration structure, but with tailored step sizes as the iteration t approaches the total horizon H as indicated by t $\rightarrow$ H. In each t, effSAMWMIX calculates a pull probability vector ϕ_t over the K arms and pulls one of these arms according the probability mass function in ϕ_t. This ϕ_t vector is then updated with the learning the iteration t, notably based on the term $\bar{S}_t^{a_t}$ noticed at iteration t. The best arm a^* would be such that the probability of pulling the best arm is as close to 1 as possible $\phi_t^{a^*} \rightarrow 1$, while for all other arms indicated by a, the probability of pulling (choosing) the arm $\phi_t^{a \rightarrow 0}$. The update equation for φ is given in equation (8)

$$\phi_{t+1}^a = (1-\gamma_t)\frac{e^{\left(\sum_{r=1}^{t}\eta_r \hat{\bar{S}}_r^a\right)}}{\sum_{b=1}^{K} e^{\left(\sum_{r=1}^{t}\eta_r \hat{\bar{S}}_r^b\right)}} + \frac{\gamma_t}{K} \qquad (8)$$

Here, $\tilde{\bar{S}}_r^b = \frac{\bar{S}_t^b . I_{a_t=b}}{\phi_t^b}$ where $I_{a_t} = b$ is the indicator function if $a_t = b$. It is to be noted here that the difference between empirical means of the type $\hat{S}_t^b$ in the previous algorithms UCB1, KL-UCB and TS, and the quantity $\tilde{\bar{S}}_r^b$ here. The effSAMWMIX algorithm does not depend on inequalities on empirical means (e.g. Chernoff Bound, Hoeffding Bound) for its proof of logarithmic regret, whereas the other algorithms do. The learning component above is the step-size γ_t and the inverse temperature parameter η_t is given in equation (9) and (10).

$$\gamma_t = \frac{K\left(4 + (d + d_t)\right)}{t(d + d_t) - (d + d_t - 2d^2)} \tag{9}$$

$$\eta_t = \frac{1}{\left(\frac{K}{\gamma_t} + 1\right)} \log\left(\frac{1 + d\left(\frac{K}{\gamma_t} + 1\right)}{\frac{2K}{\gamma_t} - d^2}\right) \tag{10}$$

Note that d_t in equation (9) is obtained by a heuristic that must be iteratively calculated rather than obtained as input. Further, the term d is a negligibly small quantity (say $0.05 \text{but} \neq 0$, which should satisfy the condition that $d < min(\Delta^a)$ (for $a \neq a^*$), where $\Delta^a = E(X_t^*) - E(X_t^a)$ (using notation from 2.1). The NBP-effSAMWMIX that employs effSAMWMIX (Villari & Abdulla, 2017) as its decision engine is as given in Algorithm (4). In equation (9) and equation (10), d is a pre-set small value while d_t is computed at each iteration t using an iterative heuristic as given in Algorithm 4. The usage of the computed d_t obtains a tighter and more accurate bound on regret of effSAMWMIX compared to the base algorithm SAMWMIX (Abdulla & Bhatnagar, 2016).

Algorithm 4 : NBP-effSAMWMIX Algorithm

1. **With Inputs**: K(assets), H(Horizon), Δt, R_t, τ, S_t^a and d
2. **For** $t = \tau + 1$ to H, **do**
3. Calculate moving − window average return $\mu_t^a(\tau) = \frac{1}{\tau}\sum_{s=t-\tau}^{t} R_s^a$
4. Calculate standard deviation $\sigma_t^a(\tau)$ of the returns $= \{R_s^a\}_{s=t-\tau}$
5. Calculate $S_t^a = \frac{\mu_t^a(\tau)}{\sigma_t^a(\tau)}$
6. Calculate $\bar{S}_t^a = \frac{S_t^a - min_b\left(S_t^b\right)}{max_b(S_t^b) - min_b(S_t^b)}$ to normalize S_t^a
7. **end For**
8. **Initialize effSAMWMIX**:
9. $C_0 := K + 1$ and $\sigma^2 = 2K$ (Please note that this σ^2 has no relation to Asset Price Variance)
10. $\eta_0 := \frac{1}{C_0}\log\left(\frac{1 + C_0 d}{\sigma^2}\right)$, $Z = \frac{(4+d)K + d}{d^2}$
11. **For** $a \in \{1, 2, \ldots . . K\}$ **do**
12. Initialize $\phi_{Z+K}^a \leftarrow \eta_0 \left(\frac{Z}{K}\right)\left(\frac{S_t^a}{1/K}\right)$
13. **End For**
14. **For** $t \in \{Z + K, Z + K + 1, \ldots . , Z + H\}$ **do**
15. Pick the asset a_t which has maximum value of ϕ among all K arms
16. Calculate adjusted reward $\tilde{\bar{S}}_t^{a_t} = \frac{\bar{S}_t^a}{\phi_t^{a_t}}$

17. **Assume** $d_{tStep} :=$ 0:01, heuristic to obtain d_t start:
18. **For** $d_{iter} = 1,2, \ldots . \frac{t-Z}{H-K}$ **do**
19. $K_t \coloneqq d + d_{iter}$ and $\gamma_t = \left(\frac{K(4+K_t)+K_t}{t.K_t^2}\right)$
20. $C_t \leftarrow \left(\frac{K}{\gamma_t}+1\right), \sigma_t^2 \leftarrow \left(\frac{2K}{\gamma_t}-1\right)$ and $\eta_t \leftarrow \frac{1}{C_t}\log\left(\frac{1+C_t K_t}{\sigma_t^2}\right)$
21. $P_t \coloneqq \sum \phi_t^i + \exp(\sum \eta_t \overline{S}_t^{a_t})$
22. **If** $\exp\left[\sum \eta_t \left(d_t \overline{S}_t^{a_t}\right)\right] > P_t$
23. $d_t \coloneqq d_{iter} - d_{tStep}$
24. Go to Step 30
25. **End If**
26. $d_{iter} \coloneqq d_{iter} + d_{tStep}$
27. **End For**
28. **Assign** $K_t \leftarrow d + d_t$
29. $\gamma_t = \left(\frac{K(4+K_t)+K_t}{t.K_t^2}\right), C_t = \left(\frac{K}{\gamma_t}+1\right), \sigma_t^2 = \left(\frac{2K}{\gamma_t}-1\right)$
30. $\eta_t = \frac{1}{C_t}\log\left(\frac{1+C_t K_t}{\sigma_t^2}\right)$
31. **Update** $\forall a \in \{1,2, \ldots . . K\}, \phi_{t+1}^a = (1-\gamma_t)\frac{e^{\left(\sum_{r=1}^t \eta_r \bar{\bar{S}}_r^a\right)}}{\sum_{b=1}^K e^{\left(\sum_{r=1}^t \eta_r \bar{\bar{S}}_r^b\right)}} + \frac{\gamma_t}{K}$
32. **End For**

The performance of the NBP algorithms are compared against both simulations and real-world benchmark datasets as explained in the following sections.

3 Experiments

We conducted the experiments on both simulated datasets and real-world datasets. The simulated datasets are synthesized using Geometric Brownian Motion, with requisite mean μ and standard deviation parameters σ obtained from actual time series.

3.1 Stock prediction on Simulated Geometric Brownian Motion Datasets

Geometric Brownian Motion (GBM) is also known as Wiener Process in which the logarithm of a quantity that varies at random will follow a Brownian Motion (Wilmott, 2000; Wilmott, 2013). GBM is formally a mathematical modeling technique that is often used to model short-term stock price movements (Ladde & Wu, 2009). Since the stock price movement is often unpredictable the GBM's random walk model tends to predict the stock prices with reasonable accuracy (Fama, 1995). These suggestions have been validated recently to a fair extent by work such as (Reddy & Clinton, 2016). Our work utilizes the GBM technique to build a synthetic dataset to test the performance of the NBP algorithm that utilizes effSAMWMIX, UCB1, KL-UCB and TS as the SMAB engine for the NBP.

The GBM data set is generated using the daily closing prices, which are the input for the mean μ and σ used in the GBM model. If the price of stock at time 0 (indicated by t_0) is ρ_0 and a one-dimensional Brownian process X_t is available for $t > 0$, then ρ_t is calculated using GBM simulation as given in 11 (Ladde & Wu, 2009; Marathe & Ryan, 2005).

$$\rho_t = \rho_0 \exp\left[\left(\mu - \frac{\sigma^2}{2}\right)t - \sigma(X_t - X_0)\right] \qquad (11)$$

For existing time series obtained from databases, the returns at discrete time step t, for each asset a, are calculated using the following equation (12)

$$R_t^a = \frac{\rho_{t+1}^a - \rho_t^a}{\rho_t^a} \qquad (12)$$

Where ρ_t^a is the closing price of the asset on day (period) t. If H is the total number of periods for which the returns are computed, then the mean return $\hat{\mu}$ is calculated as follows

$$\hat{\mu}^a = \frac{1}{H} \sum_{t=1}^{H} R_t^a \quad (13)$$

Also, an estimate standard deviation of all the returns $\hat{\sigma}$ is calculated as given in 14 with the Sharpe Ratio (needed in each experiment) being $S = \frac{\hat{\mu}}{\hat{\sigma}}$.

$$\hat{\sigma} = \sqrt{\frac{1}{H-1} \sum_{t=1}^{H} (R_t^a - \hat{\mu}^a)^2} \quad (14)$$

In each experiment, from the S&P 500 Stock data set (Bruni et al., 2016), we have randomly picked K stocks from the same so that the SMABs will have K arms (assets) to choose from. In the following experiments we take K = 5 and K = 15 to generate two independent GBM datasets. Each of the stocks have the periodic closing prices from November 2004 to April 2016. Note that the purpose of using S&P 500 Stock data set is only to obtain realistic values of μ and σ so that the GBM simulated data could represent a near realistic scenario.

Our experiments report the average results over multiple runs to nullify any outlier effect of extremely favorable or unfavorable results. Using each simulated data set, we run each of the NBP algorithms for obtaining the terminal cumulative wealth. We conduct 100 such experiments where each algorithm runs and report the average of these returns.

This newly generated stock closing price data will now be the data set on which the NBP's performance is evaluated (when the NBP uses a different SMAB for decision-making process). The naming convention for the GBM simulated portfolio data set with 5 assets i.e., K = 5 is GBM05 and that with 15 assets i.e., K = 15 is GBM15. The results of the experiments on GBM05 and GBM15 datasets are given in Table 1, the horizon H employed for simulation was 632 (approximately 3 years) and τ used was 120.

Table 1: Terminal Cumulative Wealth on GBM Datasets

Cumulative Wealth (per unit $)					
Dataset Name	**Market Buy & Hold**	**NBP-UCB1**	**NBP-KLUCB**	**NBP-TS**	**NBP-effSAMWMIX**
GBM05 Dataset	1.1736	1.3789	0.8623	1.5167	1.6213
GBM15 Dataset	1.2881	1.4024	1.5597	1.7045	1.7867

NBP-effSAMWMIX performed better than when NBP-UCB1, NBP-KLUCB, NBP-TS. Also, NBP-effSAMWMIX has acquired a better CW than the Buy & Hold strategy, wherein all 51 of resource is assigned to each of the 5 stocks throughout the iterating time horizon H. Results are similarly favorable for NBP-effSAMWMIX when simulated portfolio consisted of 15 assets. The terminal cumulative wealth acquired per a unit investment for benchmark datasets is shown in Table 3.

3.2 Stock prediction on real-world benchmark datasets

We choose benchmark datasets from (Bruni et al., 2016) and (Li, Sahoo, & Hoi, 2016) where the datasets are validated for the comparative performance of portfolio selection models. These datasets are generated using real-world price values obtained from major stock markets. They are reported to contain error-free (cleaned data) of weekly return values, which are adjusted for dividends and stock splits. These publicly available datasets help in an unbiased comparison of the different NBP-SMAB portfolio selection strategies that are tested in this work. We chose these datasets to get a variety of data in terms of region, market type, the number of assets and the number of periods. For example, MSCI measures the equity market

performance of global emerging markets and DJIA gives the stock market data from the USA, which is a developed economy. Of these real-world databases, DJIA,TSE and MSCI are considered for evaluation in OLPS tool box for portfolio selection which is a pioneering work on strategies for portfolio selection problem (Li et al., 2016). NASDAQ100, which is a weekly returns data, is made publicly available by (Bruni et al., 2016) for evaluation of strategies. on In Table 2, we provide the details of the datasets we considered for this work. These datasets help us comprehensively evaluate the stock prediction algorithms on variety of data i.e. data on daily returns, weekly returns, data from developed economy and on data from emerging markets.

Table 2: Summary of the benchmark datasets from real markets

Dataset	Market	Region	Time Frame	# Periods	# Assets
DJIA (Li et al., 2016)	Stock	USA	January 14, 2001 -January 14, 2003	507	30
TSE (Li et al., 2016)	Stock	CANADA	January 4 ,1994-December 31,1998	1259	88
NASDAQ100 (Bruni et al., 2016)	Stock	USA	June 2002 -April 2016	596	82
MSCI (Li et al., 2016)	Index	Global	January 14, 2001 -January 14, 2003	507	30

The abbreviations of each of these datasets is briefly clarified as follows

- DJIA: Dow Jones Industrial Average Data
- TSE: Toronto Stock Exchange Data
- NASDAQ100: Nasdaq Inc. Stock Exchange data consisting of weekly returns data for the time between June,2002 and April,2016
- MSCI: Morgan Stanley Capital International (emerging markets)

In Table 3, we report the terminal cumulative wealth achieved by each of these algorithms over the four-benchmark datasets mentioned above. NBP-effSAMWMIX has achieved the highest cumulative wealth when compared to other NBP algorithms. Except in the case of NASDAQ100 data set, NBP-effSAMWMIX has performed better than the Market Buy & Hold strategy as well. On DJIA and TSE datasets, NBP-effSAMWMIX has performed similar to albeit slightly better than NBP-TS. However, it has distinguishably better performance on MSCI data set. On the NASDAQ100 data set, the Market Buy & Hold strategy is a clear winner from the early investment periods and none of the NBP algorithms could match its performance. Except for this case, NBP-effSAMWMIX achieved the highest wealth level in all the datasets including the simulated GBM data sets.

Table 3: Terminal Cumulative Wealth on Benchmark Datasets

Cumulative Wealth (per unit $)					
Dataset Name	**Market Buy & Hold**	**NBP-UCB1**	**NBP-KLUCB**	**NBP-TS**	**NBP-effSAMWMIX**
DJIA	0.85	0.48	0.93	0.8	0.96
TSE	1.58	1.96	1.85	2.02	2.15
NASDAQ100	5.31	1.85	4.06	2.92	4.38
MSCI	0.96	1	0.92	1.06	1.24

Since multiple experiments are conducted, we also report a technique to use the Sharpe Ratio (SR) with the p-values over the investment period to infer the best-performing algorithm. The SR values indicate the risk-adjusted returns for the investment periods. The p-values are required as it is important to test whether the risk-adjusted returns are drawn from the same distribution for two-investment strategies. It is known that if the risk is higher, the peak returns could also be higher. Thus, in order to compare the if an OPSP is better than another, we tested for the similarity of SRs in distribution. To compute the p-values for the case of non-i.i.d returns, we adopted the Studentized circular block bootstrapping technique (Ledoit & Wolf, 2008; Shen et al., 2015). The essence of circular block bootstrapping technique is that it uses a number of bootstrap repetitions represented by M and a input block size b which is used to resample new blocks of data pairs from the observed pairs with replacement. Following the testing parameters reported in (Shen et al., 2015), we used $M = 1000$ and $b = 5$. These p-values are used to further quantify the statistical significance of the difference in SR between the two comparing portfolios. The Null hypothesis (H0) is that the Shape Ratios of the portfolios in comparison have the same mean.

For the results shown in Table 4, we set the Market Buy & Hold strategy as the benchmark with 1000 bootstrap samples at 95% significance level and with block size 5.

Table 4: Results on Benchmark Datasets - Terminal Sharpe Ratios (and Corresponding P-Values

Datasets		Market Buy & Hold	NBP-UCB	NBP-KLUCB	NBP-TS	NBP -effSAMWMIX
DJIA	Sharpe Ratios	64.4551	61.837	55.2489	65.1978	58.1901
	p-values	1	0.4765	0.001	0.8751	0.4476
TSE	Sharpe Ratios	123.6978	96.5608	91.7642	148.3123	152.0979
	p-values	1	0.045	0.003	0.001	0.001
NASDAQ100	Sharpe Ratios	32.0086	32.2987	27.8164	38.4079	36.0387
	p-values	1	0.8931	0.015	0.001	0.001
MSCI	Sharpe Ratios	63.6745	79.4278	58.6742	71.801	73.6678
	p-values	1	0.001	0.001	0.002	0.012

Note: The p-values provided are reported in comparison with Market Buy & Hold Strategy

Further in the following paragraphs, we explain with Table 4, for a better comprehension of how NBP-effSAMWMIX exhibits a performance which is better than others and if not, is at least as good as the best performer. For example, the most basic component of Toronto Stock Exchange (TSE), which is presented below for easier reading.

Table 5: TSE Data set: Terminal Cumulative Wealth, Sharpe Ratios and p-values

Datasets		Market Buy & Hold	NBP-UCB	NBP-KLUCB	NBP-TS	NBP -effSAMWMIX
TSE	Cumulative Wealth (per $)	1.58	1.96	1.85	2.02	2.15
	Sharpe Ratios	123.6978	96.5608	91.7642	148.3123	152.0979
	p-values	1	0.045	0.003	0.001	0.001

The Sharpe Ratios i.e. risk-adjusted returns of NBP-effSAMWMIX are the best (152.1) among the five competing strategies. In addition, its corresponding p-value is 0.001 < 0.05. This indicates that we can reject the hypothesis that claims the mean SR value of NBP-effSAMWMIX and mean SR value of Market Buy & Hold are same. Thus, NBP-effSAMWMIX not only has a cumulative wealth of 2.15, which is the highest but also has a higher risk-adjusted return whose distribution is different from that of the Market Buy & Hold Strategy. This suggests that for TSE data, NBP-effSAMWMIX performs better than the rest of the strategies.

Table 6: MSCI Dataset-Terminal Cumulative Wealth, Sharpe Ratios and p-values

Datasets		Market Buy & Hold	NBP-UCB	NBP-KLUCB	NBP-TS	NBP -effSAMWMIX
MSCI	Cumulative Wealth (per $)	0.96	1	0.92	1.06	1.24
	Sharpe Ratios	63.6745	79.4278	58.6742	71.801	73.6678
	p-values	1	0.001	0.001	0.002	0.012

Consider the example of MSCI data where the risk-adjusted returns of NBP-effSAMWMIX are not the best. Here, the SR values of NBP-UCB are higher (79.43) than that of NBP-effSAMWMIX (73.67). Though the SR values of NBP-UCB and NBP-effSAMWMIX are better than Market Buy & Hold strategy, since the p-values of both these are less than 0.05, we can infer that the risk-adjusted returns of both these strategies are neither better nor worse than Market Buy & Hold strategy. Thus, it makes sense to look at the cumulative wealth value to decide on the best strategy. NBP-effSAMWMIX, which has a CW of 1.24, is the best strategy for the MSCI data set. Using similar logic, NBP-effSAMWMIX is the best performer on DJIA data set as well. On NASDAQ100 data set where CW obtained by NBP-effSAMWMIX (4.38) is less than that of Market Buy & Hold (5.31), the SR related p-values is 0.001. This indicates that the risk-adjusted returns of NBP-effSAMWMIX could not be from another distribution. Also, CW of NBP-effSAMWMIX is better than the rest of the strategies (Table 3). To comprehensively conclude the effectiveness of NBP-effSAMWMIX over competing for NBP strategies, we performed the

experiments on datasets used in (Shen et al., 2015) by obtaining the same through personal communication. The details of the datasets we obtained are given in Table 7. Note that their reference is an Equal Weighted (EW) portfolio, which is not a popular strategy for industrial practitioners due to higher turnover and additional transaction costs for frequent rebalancing of portfolios (Lynch & Balduzzi, 2000).

Buy & Hold strategy is still popular among long term investors and the datasets we considered are over a horizon of at least a couple of years (see Table 3), our previous results were presented with Market Buy & Hold strategy as the reference. We could replicate their experimental results and the results we present below are to visualize a direct comparison with those published in the literature. We follow the same format as used in Shen et.al's work (Shen et al., 2015).

Table 7: Description of Shen.et.al's datasets

Dataset	Time Frame	# Periods	# Assets
FF48	January 01, 1963 -December 31, 2004	498	48
FF100	January 01, 1963 -December 31, 2004	498	100
ETF139	January 01, 2008 -October 30, 2012	252	139

- Datasets are taken from (Shen et al., 2015)
- FF48, FF100: Fama & French Datasets with portfolios representing different industrial sectors
- ETF139: Exchange-traded funds (weekly data) from Yahoo! Finance

These datasets (Table 7) are publicly available but since Fama & French datasets are updated on a regular basis, the data set values get updated with time. Hence, to replicate and comprehensively compare the results from (Shen et al., 2015), we utilized the same data sets obtained from the authors. Since we could replicate the values of Equal Weighted Portfolio (EW) and NBP-UCB1 on these datasets, we did not perform the experiments on Value Weighted Portfolio (VW), Minimum-Variance Portfolio (MVP) and Online Moving Average Reversion (MAR). Instead, we used the data available from that publication and compared it against the performance of NBP-effSAMWMIX on the same data set. The results with the values of Cumulative wealth, Sharpe Ratios, and the corresponding p-values are given in the Tables 8 and 9 given below. It is interesting to note that OLMAR, an advanced OPSP algorithm that is reported to have superior performance (Li & Hoi, 2012) is outperformed by fundamental portfolio strategies like Value-Weighted portfolio (VW) and Equal Weighted portfolio (EW). Since we are comparing NBP algorithms, on the data from the following, the attention is on the results of NBP-UCB1 and NBP-effSAMWMIX. In Table 8, OBP stands for Orthogonal Bandit Portfolio, MVP represents minimum-variance portfolio, MAR represents on-line moving average reversion portfolio. While EW, VW and MVP strategies are typical baseline strategies studied in the finance literature, MAR (Li & Hoi, 2014) is an advanced online portfolio selection strategy. It is seen (in Table 8) that on these datasets as well, NBP-effSAMWMIX strategy has delivered a better cumulative wealth than NBP-UCB1.

Table 8: Cumulative Wealth obtained on Shen et.al's datasets

Portfolio Terminal Cumulative Wealth (per $)							
Dataset	**OBP**	**NBP-UCB1**	**EW**	**VW**	**MVP**	**MAR**	**NBP-effSAMWMIX**
FF48	61.75	35.23	54.77	48.06	25.1	42.34	42.22
FF100	626.04	76.91	123.92	198.32	73.73	57.74	92.62
ETF139	1.42	1.35	1.2	1.19	1.05	1.21	2.38

Also, the p-values of their Sharpe ratios indicate that the risk-adjusted returns are neither worse nor better than the EW strategy. Being unable to reject H0 is a favorable result for NBP-effSAMWMIX as it could mean that risk adjusted returns bear a distribution with a similar mean as that of EW (and that of NBP-UCB1) while the cumulative wealth is higher than that of NBP-UCB1 in all the three datasets. Especially on ETF139, NBP-effSAMWMIX outperformed the rest of the algorithms indicating the potential advantage of the same.

Table 9: Portfolio Sharpe ratios (%) with the significance level measured by p-values with respect to EW.

Dataset		Portfolio Sharpe ratios (%) with the significance level measured by p-values with respect to EW.						
		OBP	NBP-UCB1	EW	VW	MVP	MAR	NBP-effSAMWMIX
FF48	Sharpe Ratio	26.15	25.68	24.3	23.37	22.38	24.48	22.8759
	p-value	0.64	0.8	1	0.22	0.72	0.93	0.1259
FF100	Sharpe Ratio	34.89	26.09	26.97	29.76	18.01	23.6	20.612
	p-value	0.01	0.82	1	0	0.19	0.22	0.0529
ETF139	Sharpe Ratio	25.47	15.45	6.01	5.85	6.82	7.61	32.0148
	p-value	0.05	0.04	1	0.22	0.94	0.44	0.3506

4 CONCLUSION

In this work, we reported the implementation of the effSAMWMIX inside of a Naive Bandit Portfolio algorithm. In our working paper (Villari & Abdulla, 2017) we showed that effSAMWMIX has a better performance than KL-UCB and Thompson Sampling when the rewards followed a range of mathematical distributions. We intended to exploit this advantage (of effSAMWMIX) over competing SMAB algorithms reported in the literature by employing effSAMWMIX as a decision engine in a Naive Bandit Portfolio (NBP) algorithm. Along with NBP-effSAMWMIX, the NBP versions of KL-UCB and Thompson Sampling are reported for the first time. Our results include the cumulative wealth values on both simulated and benchmark real-world datasets to evaluate the empirical performance of the proposed algorithm. While competitive as an NBP engine, the performance on NASDAQ100 data set requires us to assess the data set and analyze why none of the NBP algorithms could beat the Market Buy & Hold strategy (while they could in the rest of the cases). This could be because NBP does not consider asset correlations while making the decision. To further this work, we intend to do an Orthogonalization of the portfolios in order to remove the correlation and evaluate the performance of effSAMWMIX in such a scenario (Shen et al., 2015).

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A Conceptual Analysis on Accreditation and Ranking of B-Schools and Its Impact on Quality Education

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Abstract

Even though there are thousands of business schools in India,only a few have been able to focus towards excellence in global context and have been able to deliver the quality output. Excluding the top b-school of the country only 7% of the MBA graduates are able to fetch a pay scale which is equal to or more than their return on investments. It is essential for the institutes to understand the quality parameters and form the strategies to upgrade the quality education as per the international standards. The present study compares the current system of management education and dwells to identify the required steps to be taken by an institute so that it may set itself apart from the regular course of working to upgrade and meet the international standards. Thisresearch work identifies the remarkable role played by various statutory bodies constituted and expanded by the Government of India for the purpose of quality assurance and accomplishment of sustainable excellence in the Indian higher education system. Paper also discusses how the quality of management education can be improved by participating in national / international accreditations / rankings.

Keywords: B-schools, Management Education, Accreditation and Ranking, Quality Improvement and Value Addition.

Introduction

Currently India has around more than 5500 business schools in operations. In 2016, the Associated Chambers of Commerce and Industry of India reported that despite of the increased number of B-Schools; a low quality of educationcoupled with economic slowdown has left only 7% of MBA graduates employable. Only the IIMs and a few private universities / institutes are capable to cater as well as maintainthe quality requirements.

Quality, across the discipline is a challenge for India and here ranking and accreditation play a significant role to encourage business institutes to meet the government specified norms.Alumni of IIM Bangalore, Kshirsagaradds "A large part of jobs of the future will have to be generated, therefore innovation is a key". Indian institutes will have to encourage the research based projects and foster a mindset of innovation andresearch andcultivate entrepreneurial skills.

The NIRF ranking 2017, recognized IIM-Ahmedabad on the top of the chart, followed by IIM-Bangalore and IIM-Calcutta. NIRF, National Institutional Ranking Framework while conducting its survey for 2017 had considered more than 3300 institutes which were evaluated on around 20 parameters.

Many of the tier 1 Indian Management institutes initiated on the quality standards howeveronly a few from tier 2 and tier 3 business schools follow the global benchmark practices. The process of accreditation or participation in b-school ranking helps an education institute to identify the areas where the improvement is required. In the process of accreditation, a private body evaluates a higher education institution as a whole or a particular educational program in order to formally recognize it as having met certain predestined minimal standards. It plays a significant role in current global scenario.

This paper is an attempt to understand and explore the

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accreditation process and its significance in making Indian higher education system a world class higher education system. The study focuses on the quality issues of management education and explores how participation of these institutes in accreditation and B-School ranking can bring the possibilities of excellence in the quality. To attain these objectives reviews of the available research work is done. The paper highlights: the core distinguishing parameters of the top B-Schools of the country in comparison to others;key indicators that an accreditation process looks for; and the standards that have to bemaintained to apply for the accreditations.

The paper is an attempt to develop a conceptual framework focusing on the emerging concern of management education and its approach towards the development as per the global scenario. The research concluded with an insight on significance of accreditation and its future prospects.

Management Education and its Quality: History and Review of Studies

A study by Chowdhary, K. (1977), stated that after independence, government made a series of efforts to professionalize management education in India. As a result of this intervention, several institutions of management came into being in the 1950s and 1960s. 21st century India witnessed a radical change in its educational structure and initiated new age courses as per the industry demands which have added economic value in today's time. Management programs have been introduced with a new dimension as per the need of changing time. Initially the management education offered had handful of specialization options Marketing, Finance and Human Resource but now to further facilitate the industry demand, management education has started to offer specialization in more functional area likes Operations, Information Technology, International Business, Supply Chain Management, Retail and logistics, Hotel Industry, Tourism, Business Management and so on.

Sangeeta Sahney et al (2004) discussed that Indian educational system has been too fast, radical, and broughtground-breaking changes over recent years. Panandiker, V. A (1991) stated that knowledge and knowledge-creation will be the center theme of the management education rather than concentration on technology. He further added that individuals will need not onlybread and car but future will be more founded on knowledge, wisdom and ideas. The transformation of management education is the need of the industry there foreone needs to focus upon the contours to design the dynamic system of management education.

Education should insure the quality of life and it is possible only with value driven management programs, stated Sahu K.C. (1991). Value driven individuals who are the example of dedication and hard work in a spirit of service can influence and change the mindset of unproductive work force. Margaret MacNamara, et al.(1990) stressed upon action learning in management education as Indian management institutes are repeatedly carped for focusing more on theory a quantitative analysis and neglecting qualitative developments.

A.Gill (2003) emphasized on market oriented perspective of management and strategic alignments in the age of globalization and advancement in information technology.L.R.Irala (2006) concluded that there is an exceptional growth in management institutes in India but continuous upgradation to meet the international standards and dynamic economy will be a challenging task and can only be achieved by financial autonomy and intellectual capital of these business schools.

Zoogah et al. (2015) focuses on the objective of the management education that it should aim high and work prudently for the development of the country. The outcome would have a positive impact on progress, employment, foreign collaboration, capital mobilization and entrepreneurship. He also pointed out on a fact that environment of the institute, available resources and human resources are the key drivers of higher education in any country.

The different quality models in the higher education sectors had been discussed in the study conducted by Hodgkinson & Kelly (2007). The argued models were Total Quality Management (TQM), the European Foundation for Quality Management (EFQM) the Kaizen process,school-wide quality steering groups, two paradigms of organizational self-assessment, and subject reviewer training.

The increasing interest in TQM has compelled institutions to cope with tremendous pressure from their customers to update and improve the quality of their services. But Sulaiman et al. (2013) in their study discussed that even when the perception of TQM is positive, it could be applied where a culture of collective consciousness or teamwork is accepted within educational institutions.

Quality in education or B-School is becoming a matter of concern and ranking and accreditation is perceived as an instrument in facilitating service quality in higher education. Accreditation process serves many purposes such as quality assurance for them and theirstakeholders, advantage in marketing their institute and the ability to benchmark and network with their peers. Gidley et al. (2010) also discussed in support that accreditation and ranking is becoming qualitative tool that distinct B-Schools in terms of reputation and provide a short-term competitive advantage until others achieve accreditation. Also an institution seekscertification when it sees the potential for increasing competitive advantage domestically and believes that lack of certification would reduce its ability to sell into the global market.

Many institutions are also seeking international accreditation for numerous reasons: international accreditation is becoming need due to lack of accreditation opportunities at home; international accreditation enhances the institutions position in terms of quality and accreditation by a reputable foreign accreditation body increases global recognition (Marginson& Vander Wende, 2006).

Excellence through Accreditation and Ranking

Quality is a process that defines the work of any organization valuable, measurable and its ability to be improved. The number of library resources, faculty members and their degrees, size of students and local reputation are the internal factors and however these are no longer the exact measures of satisfaction demanded by the international standards. Instead of the internal factors of a B-School an output efficiently using resources, producing quality educated and employable graduates determined the quality of higher education.

To encourage and prove the quality standards of the institute the accreditation process by different agencies have pre-determinedparameters andbenchmarks whichare helpful to find out the standing of the institute in terms of it achieving the mission and goals and also determining the areas to focus through a rigorousassessment process by the experts of the key areas.

Even with a given mission of the organization there has to be a mindset of rising expectations and according to that continuous improvement in performance is always a significant requirement that strengthens the curriculum, develops the teaching pedagogy with innovative teaching aids and enhances the intellectual activities. These all processes become an integral part along with experts' reviews and assessments of the outcomes.

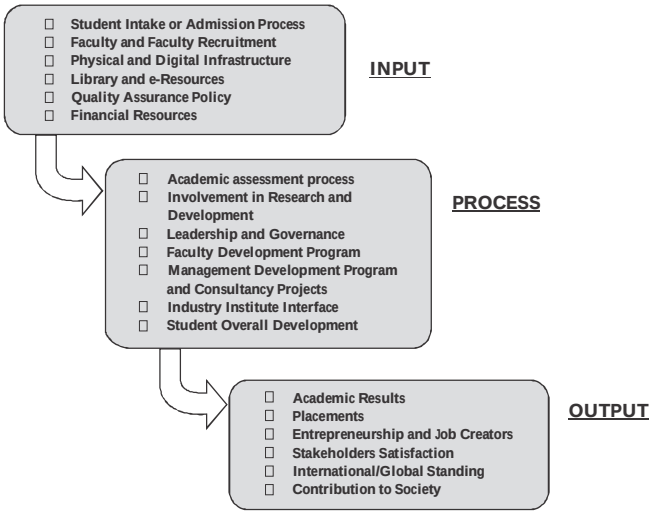
In India, National Accreditation bodies in India precisely NAAC (National Assessment and Accreditation Council) and NBA (National Board of Accreditation) were established by UGC and AICTE respectively with an objective to assure quality education as per the pre-determined parameters.

The accreditation process is based on the level of competency and credibility to the offerings of the institute that assures the quality and the business school standards.

There are many institutes in the country which have been accredited not only by the national bodies but also have met the international standards by international accreditation agencies such as The Association to Advance Collegiate Schools of Business (AACSB), The Association of MBAs (AMBA) The European Quality Improvement System (EQUIS) and so on.

While each of the discussed accreditation agency have different parameters which will be evaluated throughout the process, the rigorous working of participating institutes in turn contributes for the assurance of the quality as per the set parameters. The whole accreditation process focuses on three parameters INPUT, PROCESS and OUTPUT. The figure 1 shows the criteria which the agencies evaluate under these three parameters:

Figure 1: Significant Parameters of Accreditation Process



Source: Author's Compilation

Institutes participating for the accreditation need to score on the mentioned parameters. Top ranked B-Schools,global as well as Indian are performing well in all the three parameters. The polished and experienced intake of students makes the input process more meaningful. The hard-hitting entrance process of these B-Schools allow them to get the outstanding talent. The Global B-Schools are not only admitting the students on the basis of defined entrance of management stream but results of English test like GRE, IELTS etc. are the initial requirement for the admission.

Core difference between TOP B-Schools (GLOBAL & INDIAN) and Others B-Schools of INDIA

Why few B-Schools are on top position and rest many others are on the verge of survival? As the intake of top B-Schools is undoubtedly better therefore commendable results are seen in the performance. The faculty members of these institutes are with rich academic or industrial experience, admirable research orientation and excellent academic background. The fee structure of top B-Schools areon a higher side and that is the reason they are able to offer lucrative packages to retain excellent talents.

Contrary to this, the intake procedure of students, in other university affiliated or autonomous B-Schools is on the basis of state level or national level entrance test. Here the students have an access to pan India institutes for choosing the best as per their convenience and availability of finances. The colleges do not have sovereignty on the admission process, fee structure and curriculum design.

Next the teaching pedagogy adopted by faculty of top B-Schools is more rigorous and based on the practical and analytical approach. The intellectual capabilities of students incite subject experts to come up with creative teaching - learning approach. The curriculum of these institutes include more of real life cases and field work projects where the students put themselves to the problem faced by top managers and find the solutions, pursue their own entrepreneurial ideas. After completion of half of the course variety of elective choices focusing on the demand of current business scenario is offered giving students opportunities to become expert of specific domain.

Contrast to this, university affiliated colleges are still using the traditional approach of teaching and even the syllabus offeredby these courses is not revised on a regular basis. Through the feeding of unrevised syllabus with traditional teaching pedagogy, the institutes are unable to produce leadership, entrepreneurial, analytical and problem solving skills in the students, therefore their students find it difficult to survive in a competitive business environment no matter whether they work as entrepreneur or employed elsewhere.

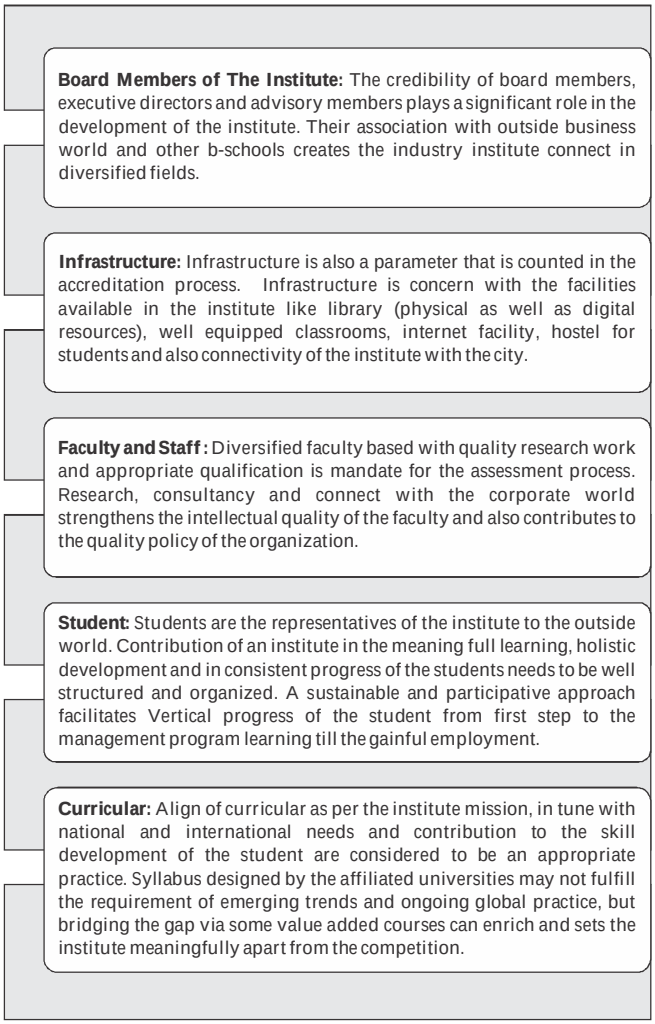
Another important difference in process of top B-Schools and others are the student development activities, active alumni association, academic industry interface through internship programs and sessions by industry experts, renowned and eminent speakers, set the students apart from the crowd. Theyget ability to crack venerable job opportunities and even have more confidence in choosing entrepreneurial ventures. There is a huge gap between the placement percentages of an average and a top B-School, only 7% pass outs are able to get desired and deserved jobs and remaining 93% are fighting even for their survival or they get the jobs with very low packages.

To bridge the gap, average B-Schools need to work on the various parameters to improve upon the process and the output. They have not much choice over the intake of faculty and students. There is a need to change in the

process of delivery, more practical approach, connecting the students to the locally situated industries for live projects, faculty development programs and consultancy projects as this may only help in improving the final output. The performance of these institutes can be enhanced by working upon the various mentioned factors and these will lead them to score even in the accreditation done by national and international agencies.

The figure 2 highlights the different evaluated parameters which are taken into account by the different accreditation agencies focusing on outcome based assessment perspective of quality education.

Figure 2: Standards for Ranking and Accreditation Framework



Source: Author's Compilation

Key findings on Accreditation and Rankings' Contribution in Quality Improvement of B-Schools

Above mentioned criteria are the building blocks of the accreditation and ranking process. The authorized agencies of the accreditation evaluate the educational program on various mentioned criteriain line with the stated mission of the organization. Institutes participating in accreditation and ranking work to improve themselves as per the predetermined evaluation criteria and thus an overall improvement is ensured inthe working of the institution. Experienced board members, members of advisory board enrich the institute and strengthen the overall working with their expertise.

Continuous enhancement in infrastructure promotes a better teaching learning environment. Effective ambiance, connectivity and communication, proper arrangements for extracurricular activities, library, innovative learning resources and their incessant upkeep promotes and maintains the quality of the academic performance. It is also observed thatinstitutes working for the accreditation ensure for the continuous development of faculty as well as of the students. Assessment is done on the quality of teaching, its learning outcome, feedback and initiatives taken for the improvement on the basis of feedback

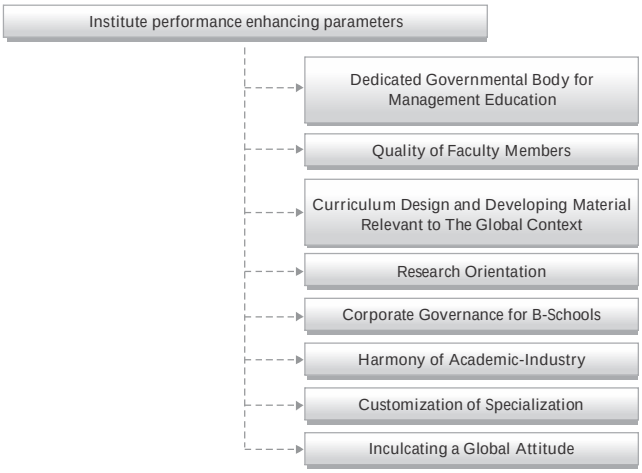
received. It increases the efficiency and effectiveness of the system. Research orientation, innovative teaching-learning approach, keep the important stakeholders abreast of recent trends in national and international scenario.Students with innovative approaches survive even in adverse situations. Apart from the classroom learning, personal guidance and counseling helps in achieving the attainment level. Value based education system nurtures a lifelong learning and inculcate a social and good citizenry characteristic in student community. Institutes preparing for the accreditation and ranking not only look after faculty and their teaching style but also initiate the regular up gradation in the syllabus as per the need of local and global trends. Incorporating value added courses help bridging thegap between traditional theoretical knowledge and modern learning approaches, as demanded by the industries.

Constructive, professional and well-structured alumni network may contribute for the development of the institute by improvising industry-academia interface.A sound alumni base shall also ensure to attract better profile of students, thereby improving the overall education value-chain.

Emerging Concern of Management Education in India

Management education in India has not incorporated the changes required as per the industry needs. Before this gap go broader, corrective measures need to be taken to enhance the quality and meet the global requirement. This section of the study develops a conceptual framework; it focuses on emerging concern of management education in India that needs to be addressed with utmost priorities for all the reasons discussed earlier.Figure 3 focuses on the parameters that could play a significant role in enhancing the performance of an education institute.

Figure 3: Conceptual Framework to Enhance the Institute Performance



Source: Author's Compilation

Factors mentioned in figure 3 are elaborated further to understand how the improvements can be done to improve the quality of the management education and insist the institutes to apply for the accreditation and ranking that in turn may help to rise their standards.

- **Dedicated Governmental Body for Management Education:**

  The government should appoint the nation level task force that will be accountable for the educational issues and improvement that could lead toenhancement of standard of management education and give a strong foundation as well as a rigor to the system. Challenges like quality of research and publications, academia - industry interaction, world class teaching – learning process should remain at the core of the task force including other objectives.

- **Quality of Faculty Members:**

  UGC and AICTE sanctions pool of resources to large number of institutions but these institutions are unable to attract/ prepare competent faculty members and standard results. Appointment of faculty resource at lower compensations, heavy work-loads worsen the quality and no time is left for the growth as an individual. The hired part time faculty base does not

contribute to the development of the institute. Attention should be paid on the versatile development and staff development programs and faculty developments programs should be incorporated on the regular basis. The sanctioning body should also properly assess and ensure the development process.

- **Curriculum Design and Developing Material Relevant to The Global Context**

  Curriculum should be revised periodically and should be matched with the requirements of the industry. Updated curriculum should keep pace with the advancements. Most of the Indian universities do not revise the syllabus due to the bureaucratic setup and B-Schools who are university affiliated are unable to give a quality output. Guidelines should be revised on a regular basis for the institutes imparting management education; monitoring of the governing bodies will also play a significant role and ensure that the universities could help in bringing the resemblance and rationality between what is educated and what is practiced.

- **Research Orientation**

  Management institutes should work for inculcating environment that is conducive as well as encouraging research. Regular researches not only lead to updating the knowledge but also provides recognition to the institute. Management institutes should motivate and inculcate the research interest among the faculty members and the appropriate way is to provide incentives to those who are meaningfully occupied in the area of research and coming up with a quality work. The governing bodies need to extend the research related support not only to government institutes but also to the private institutes for the comprehensive development.

- **Corporate Governance for B-Schools**

  Incorporating corporate governance into management education will definitely improve the quality of working and it has to be made a mandatory part of accreditation process. Independent management specialist should be enforced for the governance of management education and strong monitoring. Also independent audit committees should be formed for the administration of B-Schools. Corporate governance should focus not only on the mandatory disclosure of the information but also the audit of that information. The authentic information could be a useful tool for the stakeholders especially students for the selection of the institute.

- **Harmony of Academia-Industry**

  Industry interface is most important to any management program. It has to be emphasized at the greater extent so that the graduates can explore the real-time problem situations and get the practical exposure. To understand the dynamics of the industry, managementstudents are expected to be exposed with industrial training. Student assessments should be done based on their internship, its authenticity and learning from it. Industry exposure will lead to an experience related to real life situation which are more complex and critical. Comparison between top B-Schools and others reveals that all the top b-schools' strengths lie in their industry -academia association including strong alumni support.

- **Customization of Specialization**

  To face the challenges and to cope with the dynamics there is a need of specific skill set and expertise. This could only be possible by offering specialization in diverse areas. Apart from the regular specializations, new demands of industries should also be met by offering specializations in contemporary industries likeblock chain, artificial intelligence, data analytics, hospital management, disaster management, infrastructure management, tourism management and so on. These fields need industry based customizations in order to be able to deliver the skill-sets desired by relevant industries. Curriculum design, appointment of specialized faculty members and industry interface into these areas should be taken care to meet the versatile requirement and the holistic development of India's education sector.

- **Inculcating a Global Attitude**

  Success depends upon how fast an individual (or an organization) adopts and enhances knowledge and skills. In the era of an entirely new industry 4.0, where innovation is taking place in every single minute, one has to cope with these challenges and update them

rapidly. Sharpening skills and pace of learning is the core process to sustain in this innovative and globalized environment. This sum ups that global mindset need to be developed. Business schools should create a differentiated mix of teaching and training to create global managers.

Conclusion

The numbers of B-Schools in India are burgeoning; survival and upholding the standards are key challenges. The study discussed the present situation of management education in Indian context and quality issues faced by the higher education sector. Holistic management education should focus on attitude, corporate awareness, grooming and developing managerial skills. Strengthen industry academia interface by inviting well known personalities in the area of management, ensuring that students are associated with the live projects, result centric learning, lateral thinking and case based study and inculcate comprehensive understanding in the management students. Monitoring and approvals for the process which have been designed to attain the above said elements is an essential chore.

The article discussed how participation in accreditation and ranking would help to enhance the quality of management education and meeting the international standards. Principal objective behind ranking and accreditation ideology is to promote the benchmark practices in higher education.B-schools must look over the quality standards and the assessment process to ensure the excellence in education industry. Continuous improvement, system transparency, leadership skills and regular upgradations as per the current and future scenario will set aB-School apart from the crowd. Although itis tough to meet the international standards, continuous regular improvements, confidence and support of stakeholder may convert the challenges into fruitful rewards. Outcome based learning, feedbacks from the stakeholders and working on the stipulated requirements may bridge the gaps and put the institute forward for striving in the competition. Alignment of input, process and output as per the global standards will allow the Indian institutes to have respectable positions in international forum.

Quality of higher education decides the quality of skilled human resource; the assurance of the quality is therefore a vital aspect. On the basis of reviews, it can be concluded that established various statutory bodies like NAAC, NBA and NIRF has addressed on the quality assurance. They provide noteworthy recognition to those who have honestly followed and competently integrated and attained the said vision, mission and objectives with anaim for continuous improvement in quality. On the basis of available resources these institutes shouldtruthfully pursue and competently attain the desired outcomes along with the commitment for continuous improvement in quality for sustainable growth.

The article is a theoretical observation based on available literature. Certain limitationsare there in the present article, such as responses could have been taken from academician and members of statutory accrediting bodies through personal interaction, quality improvement before and after participation in accreditation and ranking process.Thus, there exist the avenues of potentialresearch in this field. Present article has addressed certain issues which might have gone untouched and need a detailed investigation. Based on the discussions in the paper, future research can be planned to evaluate and authenticate the proposed theoretical framework.

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Importance of trust in corporate media communication in the light of Ethical Psychology

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Abstract

Trust has long been measured a vital feature that impact people's association with news. However, the boost in the number of information accessible online, collectively with the surfacing of new medium and services that act as mediators and enable interactivity about the news, may have changed this association. Applying relative questionnaire (N = 358), this study examines the influence of personal trust in the news, on resource preferences and online news engagement behavior, in exact sharing and commenting from the angle of "Ethical psychology. The results illustrate that persons with low levels of trust be inclined to prefer non-conventional news sources like digital-born providers, social media, and blogs and are most probable to engage in different kind of online news contribution. In search of substitute views and striving to authenticate the credibility of news may be the motivations after these associations.

Keywords: Ethical psychology, truth, trust, digital media, social media, corporate media communication.

Introduction

After depth analysis of the mystifying issues in media I find that there are one way or another, violations of some basic ethicopsychological values such as accuracy, objectivity, truth, fairness, honesty, privacy, etc. in utmost of the contentious cases. Hence, a improved understanding of ethical psychology, its implications and of contradictory ethical values in media seems to be the answer to put self-control on rising contentious issues of ethical implications.

We perceive the world and the society through the lens of media. It is well rooted that trust in the news effects how people perceive the news, with a towering level of trust associated to the exercise of conventional news sources. There are many factors to look again at the affect of trust subsequent the current changes bring about by the expansion of online news Tracking the Future of corporate media communication. Individuals at the present have unparalleled access and exposure to multifarious news sources. This provides individuals multiple choice, but also creates a additional imperative need to filter trustworthy information. Readers are still competent to go straight to the origin they trust. Though, in the digital era they also have the choice of rotating to mediators that tender news aggregation to build source selection faster and effortless as well as commenting the opinions via social media and other platforms.

The amplified recognition of interactive online platform has also empowered a new set of news utilization practices, agreed that they permit individuals to more effortlessly and widely share and rate news. Moreover, readers are also able to formulate their own assistance to news reporting, by uploading media, giving eyewitness version, and commenting on subject on social media, thus toting up an added width to the subject as a whole. For some, the result is that news is now became their general online activity, with the younger predominantly to mix news with social networking and pursuit and action. Nevertheless, slight interest has been paid to how trust in the news strengthens individual behavior.

Ethical Psychology aims to answer scientifically the fundamental question of human being. After being exactly the same in physical and anatomical constitute Why I think, feel, and act differently? "What constitutes me? Who am I? Am I just a organization of physical structure?. Ethical Psychology focuses on innate traits and ultimate goal of human being. Truth is the foundation stone of ethical psychology and eternal peace being the final destination. Ethical Psychology not only emphasis on Who

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am I? But also try to answer Why? Part of human being. In search of 99% which is non materialistic and we are putting all our efforts on 1% that's materialistic only. Subject matter of ethical psychology surpasses the range of cultural and racial bias that it is accepted across the world, fundamental in nature and valid to people across all genres. ***Truth*** *Same Irrespective of time, space and state always the same in present, past and future.*

Theory of Invisible self

Five Constituents of Internal body- 1.Vitality 2.Mind 3.Intellect 4.Reminiscence 5.Self

Ethical Psychology for Media- Trust in News

We have to **humanize** the news. News informs people and enables civic participation in democratic society. Due to the confirmed association between news and democracy, there has been lot of research on both the credibility and trustworthiness of news. Trust and credibility have been used interchangeably, But, truth is absolute. Trust is ultimate. Credibility is Believability. Credibility has to do with a comparatively purposive evaluation of the value and consistency of information from a known source.

Main component of Trust.

Credibility: Refers to the believability and reliability of person or source.

Integrity: Many associate integrity with honesty. While honesty is a key element, integrity is much more. It's having the guts to act in harmony with our values.

Intent: At the center of intent are motives, aim and the consequential behavior. Trust grows when our motives are right and based on common assistance — when we truly care not only for ourselves, but also for the natives we network with, lead or serve. Trust can be seen as a innermost element, next to precision, justice, narrating the whole story, being impartial. Today, trust in the media has been moving southward, the increase in the quantity of news accessible online has alarmed concerns about waning credibility and quality, and the impending damage to democracy that this might cause. Since it is impractical to communicate all the facts, individuals trust news organisations to decide on the most significant.

Review of Literature

"Facts are sacred, comments are free. Facts must not be tampered with; News must be reported with complete objectivity, without any distortion. Comparative credibility research began with opinion surveys of audiences by the Roper Organisation (1969, 1975) on behalf of the US Television Information Office. These surveys asked Americans which source of media, newspapers, radio, or television a person was more likely to believe if they contained conflicting reports. The surveys found that there was higher trust in print media than electronic media in the United States until 1960 when the dominance of television began to emerge (Roper, 1969; Roper Organization, 1975). A journalist should not mix news with views and must be careful enough to clearly distinguish between the two" – as said by the editor of the Manchester Guardian (Shamsi, 2005: P-49). His journalism was fearless and without any external pressure as Gandhi said, "a person who follows the path of dharma does not feel helpless" Collected Works of Mahatma Gandhi, Vol.56: P-183). Former Press Council of India Chairman P.B. Sawant noted that the code of ethics all over the world emphasizes the following: (a) Honesty and fairness, (b) reply to critical opinions, (c) objectivity in reporting, (d) prohibition to receive gifts, (e) respect for privacy, (f) distinction between fact and opinion, (g) not to inflame hatred, (h) not to use dishonest means to obtain information, and (i) general standards of decency and taste. (Sawant,P.B: 22,2) Nevertheless, Sonnenberg reported a study done in thirty one countries on the ethical code, and it was found that journalist adhered to fifty seven principles and ten principles were found to be common in all these countries. Sonnenberg, U, 2004). Gandhi said that we commonly call "wrong" or inappropriate. actions "unethical", doing so can obscure the fact that ethics is about how grapple with the difficult gray areas (Plaisance, 2008: P-22). Therefore, the society or the elite expect the press to be accountable to its constituents and press accountability is central to its behavior. (Pritccard, 2000: P-1-10) Again, in the Essential Report (2015), participants are asked 'How much trust do you have in what you read or hear in the following media? PEW's survey on the modern news consumer asked respondents: 'How much, if at all, do you trust the information you get from?' (a range of news sources) (PEW, 2016, p. 36).

Online News

The relationship between news and democracy has not changed in the digital era. News media allow citizens to be informed, participate in civic activities, and feel connected to their local communities. Precise trickiness and absence of power are besides recreated by and add to an issue of doubt (Stoker, 2017, pp. 35–36). In entirety, the open issues for which PT is shorthand are epistemic (false learning, contending truth claims); guardian (doubt of society-wide definitive truth-tellers, trust in small scale truth-tellers); and ethico-moral (cognizant negligence for true proof—bullshitting—or deliberate, key deceptions/lying—untruthfulness), the last of which is regularly sectioned or preoccupied into institutional rationales of political methodology (Harding, 2008).

Fake News

Today, the hearts of the people still beat, but the occupation of journalism is worsening to figure out what people desire, weakening to shape out how to produce trust, failing at how to be democracy's watchdog and deteriorating at continued existence Possibly most troubling of all, research shows audiences can't easily discriminate between genuine, qualified journalism and those photos, text or videos manipulated to present a vague view of reality – so-called fake news. Era of sensation and breaking news will not last long it's a psychological phenomenon. Lying :These recently talked about types of PT falsehood can contain lies. However there is a distinction between them. What is lying? As per Mahon, "The most broadly acknowledged meaning of lying" is Isenberg's: "an announcement made by one who does not trust it with the goal that another person will be persuaded it" (Isenberg in Mahon, 2016). Post-truth (PT) is a periodizing idea (Green, 1995; Besserman, 1998) that alludes to a truly specific open nervousness about open truth cases and expert to be an authentic open truth-teller. It lies in the recurrence and volume of the expanding measures of work to create and endeavor to expose or clear up mistaken or misleading explanations, the expansion of "actuality checking" and gossip or trick de-bunking associations, normally singular organizations or wings of news associations; it lies in the market for them, as well (Graves and Cherubini, 2016).

Moving into a new media ecosystem

Readers have acquired control over information, The media finds itself in a moment of transformation, and requires to move from the previous top-down ecosystem – in which publishers commanded which information was circulated to the public. We were the gatekeepers, and they were a receivers that, with a few exceptions, would not react.

Audience engagement: Enhancing audience engagement is significant, because engaged users are most likely to trust a the brand. Credibility: the media houses are assigning an growing awareness to the management of audience' perception of their credibility (Merritt 1988; Meyer,2004); since research recommend that readers is less likely to patronize news they do not believe credible, just like products with low brand equity. This way, media which are perceived to be credible have a higher likelihood of being patronized by readers or consumers (Meyer,2004. Oyejedi,2010). Tell the audience what you're doing. By building a relationship between press and the readers they serve, news corporations are able to persuade more people to devote more time in its journalism, gaining trust and becoming more transparent. Meet the audience. "We come from a custom in which we did not want to meet the readers. We were the gatekeepers that would provide, and they were a mass that, with a few exceptions, would not react. The plan calls for more clearness concerning the work reporters are doing, clearer classification of the diverse content they create – from unbreakable news to opinion pieces – and taking the readers more critically. Data into visualization. Why is data visualization significant? Because of the way the human brain processes information, using charts or graphs to envisage huge amounts of complex data is easier than poring over spreadsheets or reports. Data visualization is a speedy, simple way to communicate concepts in a worldwide style – and you can test with diverse scenarios by making minor adjustments. It can be done by identify areas that need attention or improvement, clarify which factors influence readers behavior, help you understand which story to place where, predict future interest.

Objective of study:

Our aim is to comprehend how language, source, association with source represented by duration and participation, are correlated with the level of trust.

Hypothesis:

H0-1 There is no significant difference exists between Content and Trust.

H0-2 There is no significant difference exists between Source and Trust.

H0-3 There is no significant difference exists between Duration and Trust.

H0-4 There is no significant difference exists between participation and Trust.

Methodology

This study seeks to investigate how language, source, duration and participation are correlated with the level of trust. To measure the degree or strength of a relationship between two variables a researcher would find a 67 correlation coefficient, and in this study the we will use the most common correlation coefficient – the Pearson product-moment correlation coefficient (Howell, 2006). Thus, we tested by using Pearson Correlation for theoretical concepts .Structured questionnaire was filled by 358 respondents. The questionnaire was designed to assess, language, source, duration and participation and their relationship with trust. The scale used for each group of questions for factors is a 5 point Likert scale (1= totally disagree and 5= strongly agree).The survey was designed and delivered to individuals in their network. Then interviewees filled out the questionnaire and returned it to the author. Data for this study was collected through structured questionnaires 358 respondents composed of 52 corporate leaders, 141 managers, 105 individuals, 12 writers, and 47 officials. The respondents mainly comprises of male (81%), and female (19% percentage). The mean (average) age of the answerer establish to be between 29.6 years. In educational level, of the answerer were under graduate 24% and 76% are post graduate.

Table 1: Sample Descriptive Statistics

Gender	**N**	**Percentage**
Male	290	81%
Female	68	19%
Total	**358**	100%
Age (Years)		
20-25	111	31%
26-30	151	42%
31-35	53	15%
>36	43	12%
Total	**358**	100%
Education		
Bachelors Degree	86	24%
Masters Degree	272	76%
Total	**358**	100%

Results Table 2: showing the correlation relationship between Language, Source, Duration, Participation & Trust.

		Language Hindi	Source	Duration	Participation	Trust
Language Hindi	Pearson Correlation	1				
	Sig. (1-tailed)					
	N	358				
Source	Pearson Correlation	.398	1			
	Sig. (1-tailed)	.001				
	N	358	358			
Duration	Pearson Correlation	.401	.289	1		
	Sig. (1-tailed)	.001				
	N	358	358	358		
Participation	Pearson Correlation	.275	.294	.312	1	
	Sig. (1-tailed)	.001	.000			
	N	358	358	358	358	
Trust	Pearson Correlation	.584**	.420**	.534**	.485**	1
	Sig. (1-tailed)	.000	.000	.001		
	N	358	358	358	358	358
	**. Correlation is significant at the 0.01 level. *. Correlation is significant at the 0.05 level (1-tailed).					

Result and Discussion

The results given in above represent the relationships between Language, Source, Duration, Participate & Trust. The results are thus interpreted as under:

H0-1 There is no significant difference exist between Language and Trust.

Their exist positive relationship between Language and Trust.

The results further show a positive and significant relationship between Language and Trust (r=0.584, P<0.01). Language plays a crucial role in strengthen trust. Kassis Henderson (2005) has made the connection between language and trust formation in the context of teamwork. A number of researchers have pointed that language-related issues can considerably impact trust formation (Jonsen et al., 2011). For instance, Barner-Rasmussen and Björkman (2007) found a strong relationship between language skill and perceived trustworthiness in the relationship between diverse units of an MNC. Feely and Harzing (2003) recommended that language barriers can distort and damage relationships.

H0-2 There is no significant difference exist between Source and Trust.

The results further show a positive and significant relationship between news source and trust (r=0.420, P<0.01). This finding agrees with that of an previous study that revealed that media source is positively associated with non-mainstream news exposure (Tsfati and Cappella 2003). Kiousis (2001) suggested that early research into source credibility by the Yale Communication Research Program (Hovland, Janis, & Kelley, 1953; Hovland & Weiss, 1951) centred on perceptions of credibility in relation to individual communicators, such as a public speaker. Tsfati and Ariely (2014) conducted a secondary analysis of data collected from 44 countries for the World Values Survey. They found that levels of medium political interest, interpersonal trust, and exposure to television news and newspapers were positively correlated with trust in media. News Source is also confirmed to be an antecedent of behavioral intention to strengthen Trust. Most of the readers would have some sort of experience in accessing the internet. Thus, with the understanding the readers have, they would feel that confident regarding the truthfulness of news.

H0-3 There is no significant difference exist between Duration and Trust.

Results from the same table above revealed that there is a significant positive relationship between duration and trust (r = 0.534, P< 0.01). Regarding duration, we have found that the time duration enhance the trust in the news source. Conclusion from Research Intelligencer by Brand Keys survey further conform our findings "The BBC (British Broadcasting Corporation) is the "most trusted" outlet for news in the United States, according to a Research Intelligencer by Brand Keys survey. The firm surveyed 4,012 viewers who rated broadcast and cable brands that they watch more than three times per week "to determine how much trust those brands engendered."

H0-4 There is no significant difference exist between participation and Trust.

The results further show a positive and significant relationship between individual's participation and trust (r=0.485, P<0.01). More specifically, those with low trust in the news are more likely than those with moderate or high trust to engage in either sharing or commenting type behaviour.

News participation is accepted as a construct that influences behavior intention towards trust. From this study it can be concluded that participation could be increased if the readers perceive that most of the people who are important to him / her trust the news.

Conclusion

According to the results of the present study, conforms that trust as an effective tool to justify and forecast individual behavior in collective news reading and sharing. Therefore, from a methodological point of view, these results are adequate if we evaluate them with earlier studies of the model. Most important results found in the present work is the fact that variables like language and source, which are not typically studied in the field of readers' behavior, have to be two key variables to study, in order to understand and predict not only readers' interest but also their behavior. These results point out the evident need to introduce psychological factors to understand human behavior in the media. There is a need to strengthen media and psychological fields in order to understand certain human behaviors in the media field, such as individual readers' behavior. Age was also a significant variable in the Study. Younger people are further probable to have a inclination for non-reliable (face book, internet-born) news sources than older people. Similarly, those with lesser levels of interest in the news are more likely than those with a higher level of interest to articulate a favorite for non-reliable news sources.

Suggestions

We need to go deep in order to build a more reliable bridge between ethical psychology and day to day media' activities. Therefore, further research must be focused on improving existing models or proposing new ones, which allow us to apply the results found in basic research.

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Appendix:

Questionnaire

The data used to address these research questions come from Questionnaire.

Q1. Do you give importance to content specific news?

(1) Yes (2) No

Q2. Which is your main source of news?

(1) websites/apps of newspapers (2)websites/apps of other only online news outlets (3) social media, (4) blogs, and (5) others Like Friend, WhatsApp etc.

Q3. For how long you are using that source?

(1)Months (2) Years

Q4. Do you share or participate in news coverage?

(1) Share a news story via a social network (2) rate (3) comment.

Q5.Can you trust all news most of the time?

(1)strongly disagree, (2) tend to disagree, (3) neither agree nor disagree, (4) tend to agree, and

(5) strongly agree.

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Fake News generation by the News Agencies and Individuals and its impact on the society

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Abstract

Fake News is a relatively recent term which has been used frequently in media since United States Presidential Election 2016. This term indicates deliberate false news creation in order to spread it among people to gain undue advantage – economically, politically, ideologically, socially or in some other way. In political arena, Fake News is spread among the electorates before the election in order to mislead people and influence their opinion, and gain political mileage from that manipulation. Due to advent of social media and social networks, disseminating information or news among masses currently may happen very fast through social network and internet, and millions of social media users may get reach of any news within minutes and get influenced also. So far this is quite difficult to judge validity of any news or information spread through social media, and hence there have been planned efforts to mislead people and their opinions for various agendas.

Keywords: Fake News, US Presidential Election, Donald Trump, Third-person perception, TPP

1. Introduction

Spread of 'Fake News' in the society in organized manner, by collective effort and in large scale has been perceived as a new reality and tangible issue across globe mainly since the event of United States Presidential Election in the year 2016. Since then, 'Fake News' term has got quite frequent usage in the media, within the political world and also among the common people during discussion of many events, incidents, trends etc.

What is "Fake News"

Fake News or false information can be associated with news or information shared through various media i.e. in printed or textual format e.g. News Paper, Magazine, Books etc., as well as in digital format e.g. shared through social media, electronics communication media etc. Apart from text-based or textual Fake information, also it can be represented by information and expressions in the form of doctored, fake memes, audio, video, picture or image etc. In present time not only the false stories or news abound in the news industry, even to substantiate those false stories and claims, other digital proofs are also being made up and floated frequently in the internet and social media. For example, images and sound / video files are also many times manipulated, tampered with or created falsely to convey wrong or false information. The false information pages will generally have links, in order to mislead people to other false news sites; the pages will generally render false images, false audio / video files to users to boost and trumpet credibility of their own sites.

Although false information or claims can be propagated through various media, but because of recent advent of social media and internet, the false information and propaganda can reach to millions of users within very short time in uncontrolled manner. This uncontrolled way of sharing information via social media and internet is a relatively new feature of news or information dissipation among a large population across globe, and it has brought qualitative change in the information and news sharing industry fundamentally in new way. Social media like Facebook, Twitter, Tumblr, Whatapp, Instagram etc have billions of users, and each day millions of messages, pictures voice and video files are being shared through the social media among this vast number of users in very short

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time. These features of social media and internet – its huge user base, rapid information sharing capability in uncontrolled and very fast manner have brought an explosive growth of digital news in the society. We have entered into modern world where we always remain connected through mobile and social media. In the hind sight, people have almost lost and forgotten the earlier rules and regulations, basic ethics which have been established and paramount in the printed and electronic news media for past decades; now through social media and internet, any fake and doctored news or propaganda can be shared to millions of users very fast in unrestricted manner, and almost no check is present right now in society and institutions for preventing propagation of those fake information or false news. This kind of false information sharing through social media and internet have given rise of 'Fake News' dissipation in present age. Hence characteristically, 'Fake News' can be identified with the deliberate false information being shared through Internet and social media and its various robust messengers like Facebook, Twitter, Whatsapp, Tumblr, online blogs, online news sites, web pages, bulletin boards etc.

Origin of the term "Fake News"

"Fake News" term wars first coined by the Republican Party Candidate Donald Trump during 2016 US Presidential Election; he alleged that the Republican Party's opponents were spreading Fake News i.e., letting deliberate false news spread among people in order to influence the electorates and forming opinion against the Republican Party and the Republican Party candidate i.e. himself in order to gain undue advantage in the election. During the pre-election meetings, lectures, campaigns and rallies of the political parties in US, this "Fake News" term was used frequently by the political parties, their supporters and by media as well. During the pre-poll political gatherings and speeches, similarly the opponent Democratic Party and their supporters also alleged against the Republican Party and their supporters for spreading Fake News. Quite a many Fake News were spread regarding the political parties and their leaders/candidates during the pre-poll and the election process, and those were shared through various News media, e.g. News Papers, Social Media as Facebook, Twitter, Whatsapp, Tumblr etc., and also via Internet, mails, Web pages, News blogs etc.

2016 US Presidential Election - Impact of Fake News

For many people, win of the Republican Party Candidate Mr. Donald Trump in the 2016 US Presidential Election was a matter of shock and surprise as they did not really expect that result. Hence, after declaration of result, many people voiced their suspect and opinion that the unexpected result could be partly attributed to the Fake News which was shared with the mass and the electorates through social media. Many people suspected that deliberate, misleading news had the influence and capability to form people's opinion during the critical moment of the Presidential Election, i.e., last few days or weeks or months before the election and thus contributed to the change in the expected result. Also it has been noted that as most of those Fake News were shared through electronic and social media, e.g., Facebook, Twitter, Whatsapp, etc., those Fake news could reach to millions of people in relatively much shorter timeframe compared to the time which the print media news would have needed to reach same number of people. This type of development where facts and figures get diluted by uncontrolled fast spreading rumor, false information and propaganda generally shakes foundation to the established rules and regulation of the society, and poses severe challenges for the democracy and the democratic institutions as those news can influence large number of people and their opinion very fast; still there is no way those news or information can be verified for authenticity soon. In fact, it was found during US Election 2016 that many of Fake news were intentionally created by individuals as well as News agencies or News organizations, with specific political or financial motive behind those. The situation became so severe that credibility of the news and news agencies were lost to many people, and those news vitiated the situation, also effectively biased peoples' opinion where facts and figures became secondary, rather fabricated false news prevailed over Truth at least for considerable span of time.

2016 US Presidential Election - Sources and Causes of Fake News

Among the false claims that were circulated during Republican Party's pre-election propaganda, one very

famous claim was of Pope Francis endorsing Donald Trump for the presidential election. This piece of news was published by a news site called "Ending The Fed". Among some of the top fake stories that were well known during 2016 election were: "Obama Signs Executive Order Banning The Pledge Of Allegiance In Schools Nationwide", "Obama Signs Executive Order Declaring Investigation Into Election Results; Revote Planned For Dec. 19th" etc. In this respect, Facebook had to face considerable criticism by many people as it did not have any mechanism to check reliability and sanctity of the news items before sharing those among masses, and many of the messages propagated through Facebook were fetched from unchecked websites which generated the fake news. Because of that, the social networking leader was termed as "dust cloud of nonsense". In Macedonia itself, considerably high number of sites (greater than 100 in number) generated news content favoring Trump, as claimed by certain news agency. Without prior precedence of generation of Fake News in this massive scale and the unstoppable manner in which those were shared with masses, it hints strongly that a relatively new, parallel industry has been developed with task of false information generation and sharing through the internet world as well as social networks. Beyond that, certain companies even provided users or individuals the flexibility to generate false news on their own using apps and distribute those in their social networks.

Sometimes false news are generated and spread only by tweeting some gossip. Case study of Sapna Maheswari in The New York Times on 20th November 2016 can be referred to know how the false news that anti-Trump protesters were bused in actually got fabricated with a single, ill-informed tweet by a man with just 40 followers. Another apparently false story, that Trump fed police officers working protests in Chicago, was also started with a single tweet — by a man who wasn't even present there but was passing along a claim made by "friends."

Another false news model worth mentioning is generally based on the site URL which is quite similar to the very well known and reputed site's URL e.g. for ABC (URL: abcnews.com). Here in this case, URL of the ABC news station's website is abcnews.go.com, and fake news are available at the similar-sounding URL abcnews.com.co. These false news channel's URLs are developed and hosted to mislead people so that they get into the false news sites and start interaction, thus generate web traffic; these false news websites make profit out of advertising on the sites or by making arrangement for transactions frauds in the sites, hence web traffic is vital for them.

In the political world, false information is deliberately concocted and circulated by political parties and their supporters who do not least care for the truth and who want to get political advantage by spreading false news, or want to damage someone's image and reputation, otherwise want to earn revenue by attracting online traffic.

Election in Germany – Concern of Fake News

After US election, similar concerns related to chance of false news impacting the near future voting result (for 2017 Election) was raised in Germany by the German Chancellor Angela Merkel. She expressed her concern in the German Parliament by saying "Something has changed — as globalization has marched on, [political] debate is taking place in a completely new media environment. Opinions aren't formed the way they were 25 years ago…….Today we have fake sites, bots, trolls — things that regenerate themselves, reinforcing opinions with certain algorithms, and we have to learn to deal with them." She also warned in her speech "Populism and political extremes are growing in Western democracies".

Impact of Fake Information on Taxonomy and related causes

Fake News has not only kept itself confined within political world, although definitely political world is the biggest facilitator of Fake News generation and spreading as of now. Fake News has already spread its reach to many other fields. For example, Taxonomy is a branch of science with frequent wrong species classifications done by the researchers followed by publication of those wrong identifications in the journals in near future. Researchers, many a times, wrongly assume that they have discovered new specifies which are actually existing ones (i.e., not a new discovery). They also get their discoveries published in journals without getting those first verified by authorized Taxonomists. In several cases, they even do not lodge their voucher materials in a reputed museum, also never provide authenticate illustrations of the species they

had been investigating into. These activities effectively lead to publishing wrong information or data in the journals. Thus misidentification of species has become a frequent incident in Taxonomy. Related other common issues linked with the researchers, even after their wrong classifications being identified and highlighted, the researchers do not go back to correct their mistakes or wrong identifications which were recorded or documented by them earlier. This may be due to their lethargy, inhibition to accept previous mistakes or simply 'Don't care' attitude. Hence the recorded documents many times are found to have lots of misidentifications and misclassifications that lead to wrong claims and misunderstandings in near future, but after certain point those claims and wrong identifications get challenged based on the factual verifications, and finally get rejected causing much disgraces and dishonor to researchers themselves.

In the museums of natural history, the scientific staffs are overloaded with administrative and other types of responsibilities because of staff shortage, funding issues and job cuts; hence there is a trend to lessen staff responsibility for managing specimens by stopping specimen curation responsibility, removing the need for specimen curation and loans, rather only maintaining species photographs. Since very few non-taxonomic scientists can distinguish species based on only photographic evidences, potentially this trend increases problems of classification correctly.

Also, in recent time, there is a trend to look down anatomy, morphology etc. as old branch of sciences and consider those as dying science whereas only giving credence or importance to relatively modern scientific streams e.g., gene-sequencing, population ecology, pollution research etc. This attitude is wrong as Taxonomy which depends on collected specimens related to type species, still stands as basis of almost all biological sciences. Thus looking down Taxonomy or similar existing old science branches or giving them less importance will cause further erosion of knowledge how among researchers, and potentially spread across Fake or wrong Information with greater extent.

Fake News - Impact on Society

There has lot of confusion about the actual impact of Fake News on society, and hence the topic may lead to big debate and prolonged discussion involving contradicting views. The main issue in assessing the impact of Fake News is lack of dependable, recorded or proof of data related to Fake News spread in the society, and also unavailability of any well accepted technique for measuring the actual impact of Fake News. Still Fake News is a reality of the day and its impact is perceived and apprehended by many people in this age; public concern regarding the effects of fake news prevails. A growing concern is that fake news may cause confusion in the fact-checking process and eventually undermine an informed citizenry. Interestingly, both Republicans and Democrats in the US have voiced concerns about fake news (Jang, S. Mo. Kim, Joon. K., 2017). While some Democrats claim that the election results were greatly influenced by fake news, some Republicans argue that mainstream news organizations (e.g., CNN) have published fake news stories to hurt Mr. Trump (Zaru, 2017). 88% of Americans believed false news had resulted in misunderstanding among people about actually what happened and 25% of them acknowledged of sharing false political news online due to ignorance (Pew Research, 2016).

Third-person perception (TPP) Impact

One interesting observation by research is that, as per own perception of the Individual who has received Fake news, there remains a considerable difference of impact of it between the individual himself / herself, and the rest others (who also were recipient of the Fake news). This perceived difference of impact between self and others is called third-person perception or TPP. This occurs as one thinks that rest of the people is influenced by greater extent than he / she and his / her own group. In view of the degree of false news impact, Americans have been found generally confident in their own ability to identify false news, although the statistics proves other way. According to Pew research (2016) findings, despite of respondents' claim for their capability of identifying false news, 45% of them were somewhat found confident or sure, 39% of them were very sure, 9% was not so sure, and 6% was not at all sure. Individuals think others get easily swayed by false news than they themselves are. Also, Individuals feel other political groups get easily swayed by false news than their own political groups. Hence, Republican Party voters

believed that the influence of fake news was greater among Democratic Party voters than on Republican Party voters including themselves. Similarly, Democratic Party voters perceived that Republican Party voters were more influenced by fake news than Democratic Party voters including themselves. Supporting the self-enhancement explanation of the TPP, American voters generally think that they are smarter than others and they are not easily influenced by false attempts for persuasion.

In a nutshell, Fake News has brought significant challenge to the established industry of News generation and sharing. In the post Truth world, the line of difference between truth and false has become blurred; objective truth now has assumed lesser significance and influence compared to the emotion and personal belief that are dominant at this moment. In this juncture of history, Fake News appears with its ambition and threat to thwart the established facts, figures and values of the societies around us, and it tries to redefine all yardsticks for societal judgment and decision making capabilities.

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Crisis Communication and Contingency Theory: What We Can Learn from Nestlé Maggi's Case

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Abstract

FSSAI discovered excessive levels of lead and monosodium glutamate in Nestlé India Limited's flagship brand Maggi. Social media platforms like Facebook and Twitter were used by people across India to talk about a supposed #MaggiBan with anger, anxiety and anguish never seen before by the brand to which Maggi replied using auto response. The biggest revenue generator for Nestlé– Maggi accounted for roughly a quarter of the company's $1.6 billion in revenue in the country (Fry, 2016) – stumbled into a Public Relations debacle.

The brand reputation earned with years of hard work and trust building was shattered in a matter of a few days, eroding consumer confidence. This study assesses crisis communication done by Nestlé using a case study approach with the lens of contingency theory. It was noted during analyses that responses by the brand before and after crisis were better as compared to during the crisis. Social media should have been better used by the brand during the crisis to placate the angry consumers and manage their expectations.

Customers felt a difference in the taste of Maggi post crisis, but very few respondents had stopped consuming Maggi. The former legacy of Maggi, trust of respondents on the brand and the advertisements released using nostalgia as an appeal post crisis are helping Maggi immensely to recapture the market.

Keywords: Nestlé Maggi; Maggi; crisis communication; contingency theory; social media; Facebook; Twitter; YouTube; case study

Background

"The only way to put out a social media fire is with social media water!"

- Ramon DeLeon, Marketing Mind at Domino's Pizza

When Maggi instant noodles arrived in India in 1983, they instantly caught everybody's imagination with their "2 minute noodles" strategy. Maggi has since been a popular snack that kids could cook, a "meal" and sometimes even a lifesaving instant dish. Each one undoubtedly has his / her Maggi memories to share. Thus, people were aghast when the news of Maggi being unsafe for consumption spread across the country. The brand got into a mess for supposedly having high levels of lead and monosodium glutamate as an artificial taste maker in its contents.

One random incident and the biggest revenue generator brand of Nestlé – Maggi accounted for roughly a quarter of the company's $1.6 billion in revenue in the country (Fry, 2016) – stumbled into a Public Relations (PR) debacle. The hard earned brand reputation and image of years was shattered in a matter of a few days, eroding consumer confidence. Nestlé India would definitely understand this dynamic better now as the following excerpt from an article in Economic Times stands to concur, "Impacted by the Maggi controversy, foods maker Nestlé on Friday reported sales decline of 22.6 per cent for the October-December '15 quarter over the corresponding year-ago

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quarter," (2016).

As Schiller (2007) explains, "In times of crisis, while corporate communication executives are preparing manicured statements, customers are [simultaneously] blogging, e-mailing, and posting photos out of rage and desperation because the very people who should be listening to them aren't". The PR team at Nestlé would understand this dynamic better, as when the crisis exploded, the team chose to stay in denial. This further dented the brand's reputation. Full year net sales decreased 17.2 per cent mainly because of the Maggi crisis (ET Bureau, 2016).

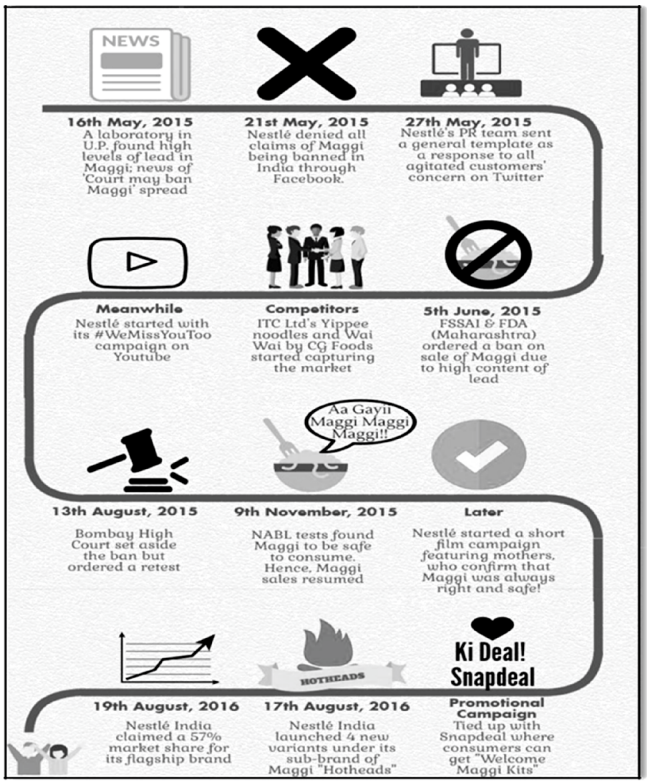

Figure 1: Timeline of Events

Source: Authors

Companies are now rapidly changing their crisis communication strategy by using the internet and its various social media platforms, more because word of mouth travels faster with Web 2.0 as compared to traditional media. Several corporate communication executives and PR practitioners across the globe are facing this problem of drafting messages instantly and maintaining a control over its flow.

Traditionally, companies had nearly 48 hours to respond to a crisis. But, with the advent of Web 2.0, companies might now become aware of a crisis through news channels and / or social media! For instance, Mr. Sanjay Khajuria, head of corporate affairs at Nestlé was asleep in his Manhattan Hotel, when a call from one of his colleagues in India jarred him off his sleep. He was informed that a widely read Hindi language newspaper had reported the news about the health notice and state officials recommend FSSAI to soon ban Maggi. The speed with which news travels today has significantly increased, thus compelling companies to always remain alert and agile (Fry, 2016).

As Aula (2011) says, "instead of reputation belonging to the organization itself, it is to a large extent controlled and distributed by the organization's stakeholders." The important thing is that instead of seeing the crisis as a defeat, the company should recognize it as an opportunity and find the best possible way out of the crisis with minimum to no damage to its reputation and brand image.

A social scientific approach when applied to crisis communication on these lines can also be seen in Contingency Theory (CT). CT is a grand theory that attempts to explain how PR as a whole functions. Conflict drives CT. When conflict arises, the parties involved select a stance of how they will respond. The stances vary from accommodative (make concessions) to advocacy (advance your own position) (Coombs, et al., 2010).

Coombs, et al. (2010) review pertinent literature in their seminal document on crisis communication and CT. A crisis can be a conflict situation, hence, the applicability of CT to crisis communication. Managers will appraise the threat posed by a crisis by examining the threat type (internal or external) and threat duration (long term or short term). The threat level then serves to guide the manager's stance in the crisis. The CT research has yielded insights into how stakeholders will react to crises based upon the threat posed by the crisis (Hwang &Cameron, 2008; Jin& Cameron, 2007).

Through the integrated appraisal model, CT has begun to address concerns about emotion and crises. The extant research suggests that anger and anxiety are two dominant

emotions that emerge from crises and that the type of emotion generated in a function of crisis type (Jin, 2009; Jin&Pang, 2010). Situational Crisis Communication Theory (SCCT) has explored the connection between emotion and crises too.

The SCCT research demonstrates a clear connection between anger and attributions of organizational crisis responsibility. Greater anger "motivates" people to engage in saying to others or posting online negative information about an organization in crisis – the negative communication dynamic (Coombs & Holladay, 2007).

Both theories are now exploring the relationship between crisis response strategies and emotions generated by a crisis. We can see there are similarities between CT and SCCT both in how they conceptualise and approach crisis communication. The research lines and results are compatible and their results can be integrated to a degree (Holtzhausen & Roberts, 2009).

Lee (2004, 2005), noted the corporate apologia research can be viewed as sender oriented. The focus is on the sender selecting a message. There is no concern about how the stakeholders might react to the message or their interests in the crisis. Both SCCT and CT are more receiver oriented. Both try to understand how stakeholders will react to the crisis and to the crisis response strategies utilised by crisis managers. Drawing on the social scientific crisis communication research, crisis managers take action based upon the anticipated reactions of the stakeholders and not just their own concerns (Coombs, et al., 2010).

Literature Review

Crisis

Several authors have defined crisis over the years, but this study aims to quote the definitions only appropriate to the case on hand. Coombs (2007) states, "A crisis is the perception of an unpredictable event that threatens important expectancies of stakeholders and can seriously impact an organization's performance and generate negative outcomes." Coombs also mentions that "no organization is immune to crisis" and thus, all organizations should be prepared with their crisis management plan.

It is also true that 'a crisis can be viewed as a threat to an organization' (Allen &Caillouet, 1994; Barton, 1993). This could be a threat to the organization's reputation and image, which is one of the many important reasons as to why a brand needs to be prepared with a PR plan that can be activated during the crisis. "Reputation is described by The Penguin English Dictionary as 1: overall quality or character as seen or judged by others; 2: fame; 3: recognition by other people of some characteristic or ability", (Griffin, 2008).

The organization does not only have to maintain its image amongst its stakeholders, it also has to prove its legitimacy in the society. According to DiMaggio & Powell (1983), "Legitimacy is critical to the successful operation of an organization." Due to legitimacy issues, people's trust started fading in Maggi. The brand should have responded immediately across various channels to justify themselves or inform consumers about the situation at hand.

Fearn-Banks (2007) defined crisis as a "major occurrence with a potentially negative outcome that affects an organization and its publics, products, services, or its good name and interrupts the organization's normal flow of business". The most significant characteristic of a crisis is that it causes immense damage to the reputation of the company if ignored, mismanaged or unplanned. The story would have been completely different for Nestlé, had they made decisions faster.

Crisis Communication

Crisis communication can be described as communication that companies use before, during and after a crisis, and it can be of great strategic importance to a company (Heradstveit& Hagen, 2011). It is really important for managers or executives in-charge of corporate affairs of an organization to listen to the public in order to maintain trust and reliability. The goal of the company is also to inform the public so that they can have a more rational view on the decisions made during the crisis (Brønn& Berg, 2005).

Every organization is aware that crisis cannot be averted. Such is the nature of business. So after the organization has accepted that it most likely will face a crisis at some point, the next step is to figure out how to cope with such a situation, and further how to prevent it (Smith, 1990). Most companies today hire a PR agency or have a corporate affairs department in place. These departments or agencies

are responsible for building and honing the reputation and image of the company.

But Nestlé's corporate affairs team somewhere failed to do so by not immediately responding to customers on Facebook and by tweeting a general template to brand loyalists and detractors alike. During such times, "not only is there nowhere to hide in this small world, there is also no time to even think about hiding," writesGriffin (2008).Sandman (2006) rightly explains, "One of three quite separate risk communication traditions: 'precaution advocacy', when people are insufficiently concerned about serious hazard and the mission is to warn them, 'outrage management', when people are exceptionally concerned about a small hazard and the task is to reassure them, and last is when people are appropriately concerned about a serious hazard and you need to help them bear it and guide them through it."

One of the learnings for Nestlé is "when a company is viewed as proactive and engages in two-way communication with its public, it can minimize the risk of being perceived as guilty" (Herrero & Pratt, 1996). The brand could have sustained the debacle better, if it would have engaged with its customers on social media sites.Nestlé has also implemented certain impactful strategies after the ban was lifted. They started with the #WeMissYouToo campaign on social media to target young consumers. Later, a campaign was run showcasing mothers declaring Maggi safe for consumption. Griffin (2008) found that consumers trust people who think like them and have the same outlook and concerns as them and that is what Nestlé smartly targeted on via roping in mothers for this campaign.

Crisis communication can play a pivotal role in protecting reputational assets during a crisis (Coombs, et al., 2010). Oliver (2007) borrowed from the strategic management literature to describe the four generic models of strategy formation as delineated by the four approaches: Classical, Evolutionary, Processual, and Systemic.These four approaches have shadowed the history of PR. Irrespective of the structure of the organization, the strategic process should be followed. A lack of strategic decisions has been observed in various organizations. Hence, the role of a PR expert is to ensure consistency in decision making (Oliver, 2007).

According to the Center for Crisis Management at the University of Southern California, only 5 to 25% of the Fortune 500 companies are prepared to face crises while the remaining 75% are unprepared. Managers, even in well managed organizations, work under the assumption that they can successfully manage a crisis without having a prior plan (Mitroff& Alpaslan, 2004).

Contingency Theory

CT is an approach to the study of organizational behavior in which explanations are given as to how contingent factors such as technology, culture and the external environment influence the design and function of organizations (Islam, 2012). CT suggests a wide range of possible stances along a continuum that an organization can take toward its public. The continuum ranges from pure advocacy to pure accommodation. Advocacy refers to the degree to which organizations maintain standpoints favorable to themselves, rather than to the public. Accommodation refers to the degree to which organizations accept the public's standpoint or argument (Jeong, 2015).

In Jeong's (2015) study, the 86 contingent variables that CT offered were divided into 11 categories on two dimensions of external and internal variables. While the external variables include threats, industry-specific environment, general political / social / cultural environment, external public, and the issue under question, the internal variables include an organization's characteristics, PR department characteristics, dominant coalition characteristics, internal threats, individual characteristics, and relationship characteristics.Similarly, Nestlé was affected by both, external as well internal factors. The major threat Nestlé faced as a brand was the external public that demanded answers and fast. Whereas the internal variables such as PR department were responsible for consistent communication from the organization in this scenario.

Crisis Communication Strategies

Communication during a crisis needs to be aligned across the organization. Every commercial, print advertisement, YouTube video, tweet, post on Facebook needs to convey the same message. This is only possible if an effective crisis communication strategy is thought of in advance because, crisis response strategies seek to protect an organization by

eliminating or reducing reputational damage (Allen &Caillouet, 1994).Every crisis situation would not have the same consequence. Hence, strategies would also vary during different crises. As rightly argued by Darling, et al. (2005) what a crisis communication should not be mixed with is a quick-fix or universal solution that is applied whenever an uneasy situation arises.

The medium chosen to convey a particular message is important. According to Lochridge (2011), "it is important to address the crisis initially in the same channel where it arose." Clearly if a customer tweets his complaint to an organization, the response should be tweeted back to him / her instantly. The brand may also take the conversation to Direct Message on Twitter in this case.Research shows that different degrees of advocacy and accommodation result in different crisis communication strategies. According to Jeong (2015) Coombs argues that advocative strategies are more appropriate in situations of low responsibility for the crisis, whereas accommodative strategies are more appropriate under conditions of high responsibility for the crisis. This emphasizes the fact that Nestlé could have been more advocative considering the magnitude of the crisis and their stand on the situation where they believed they were not at fault.

The most widely used crisis communication strategy approaches in conflict management have been Benoit's image repair theory and Coombs' situational crisis communication theory. Coombs asserts that crisis communication strategies should be arrayed along a continuum (with defensive and accommodative as the end points) and that different stages on the continuum require different crisis repair strategies. The term defensive that Coombs used is synonymous with the CT's stance of advocacy (Jeong, 2015).Similarly, different Facebook posts, Twitter tweets demand / require a unique response tailored exclusively for the customer. In this case, Nestlé fell short. The responses drafted by Nestlé were repetitive and curt. This study worked – in part – with Benoit's theory and viewed the results from the lens of CT.

Social Media

Web 2.0 is the second generation of Internet. The second edition of the Web is a platform where content and applications are no longer created and published by individuals, but instead are continuously modified by all users in a participatory and collaborative fashion (Kaplan &Haenlein, 2010). They define social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of User Generated Content." Unlike, traditional media, interaction on social media is two-way i.e. firm-generated as well as user-generated.

These new media platforms are low cost or free forums for the expression of ideas, information and opinion; they offer more opportunities to communicate and new avenues for global outreach in crisis communication (Wright & Hinson, 2009). Hence, people are now opinionated on most things that happen in the world which only makes the job of a PR practitioner difficult.

Communicators should never forget that 'word of mouth news is tremendously influential and even perceived as more trustworthy than mainstream media in some instances' (Colley & Collier, 2009). Thus, responding to every customer is important in today's era. Organizations that bring in new media tactics and engage the public in proactive discussions before, during and after a crisis exemplify an important movement from one-way communication to two-way interaction between the public and an organization (Perry, et al., 2003). Such organizations are valued immensely in this era. If used wisely, 'internet gives to every organization the potential to gain a control over its relations and reputation' (Phillips& Young, 2009).

Since, the content on these platforms is mostly user-generated, it takes only a few hours for the news to spread like wildfire and proves as an advantage for the company (if a proper response is communicated at the right time) to manage the situation as quickly as they can. Hence, unlike traditional crisis communication where the company had approximately 48 hours to think and respond to the stakeholders, the companies today have only an hour or two to formulate a crisis communication plan and implement it if they do not have a plan in place already.

Method

A qualitative approach with case study as a method was used to investigate the crisis communication of Nestlé Maggi.

Research Questions

1. How popular was Maggi before the ban?

2. How was Maggi affected because of the crisis?
3. What was the crisis communication done by Maggi during the scandal?
4. What was the crisis communication done by Maggi after the scandal?
5. What was the audience's reaction to the crisis communication done by Nestlé?

Research Design and Tools

This study sought to illuminate a particular experience and the learning from it rather than focus on generalisation. However, to come to a logical conclusion with certainty and to be in a position to comment and further recommend, data triangulation was employed to identify similarities and dissimilarities noted while analysing content, studying perception of participants via Group Discussions (GDs) and understanding opinion of experts through interviews as against the journey of Maggi's market capture pre and post ban.

Data Collection

Primary data from interviews with experts in the fields of PR, Corporate Communication, Marketing Communication and Social Media

GDs with mothers, who buy, make and consume Maggi within the age group of 35-55 years and teenagers who make and consume Maggi within the age group of 15-18 years

Secondary Data from websites, books, research papers, articles, market figures, YouTube, Facebook and Twitter

Data Analysis

Content analyses of Facebook posts, Twitter tweets and YouTube videos were done using data collected through secondary research. Expert interviews and GDs (mothers and teenagers who bought, made and consumed Maggi) were conducted and analysed using thematic analysis. Findings were collated to existing theories of crisis communication,reputation management and contingency theory to look for patterns in data collected and how they sat within existing frameworks.

The following theories were referred to analyze the communication strategies of Nestlé:

Arthur W. Page society's principles are designed to guide PR practitioners' actions and behaviours and exemplify Page's philosophy of PR management: He has seven principles which are 'Tell the truth', 'Prove it with action', 'Listen to the customer', 'Manage for tomorrow', 'Conduct PR as if the whole company depends on it', 'Realize a company's true character is expressed by its people' and 'Remain calm, patient and good-humoured'.The principles would help understand and assess the strategies employed by Nestlé to communicate with its customers during the crisis.

Image repair discourse theory developed by W.L. Benoit helps practitioners design messages during crisis. Benoit has delineated a simple matrix highlighting 'Strategy', 'Key Characteristic' and 'Illustration' to give his readers a clear idea. For e.g. in the event of 'Denial" during a certain crisis, the entities involved could simply 'Deny' their involvement or 'Shift the Blame'. Similarly, when 'Reducing Offensiveness of Event' is the strategy, one could try 'Bolstering', 'Minimization', 'Differentation', 'Transcendence' and / or 'Attacking the Accuser'. Hence, assessing Nestlé on this parameter would provide detailed information on the topic in question.

Contingency Theory

Contingency theory stands to concur that the optimal course of action for every organization is dependent on internal as well as external variables. Hence, it further helps in analyzing and understanding the variables that Nestlé was dependent majorly during its crisis.

The information available through secondary data was used to analyze the impact of Nestlé's crisis communication. Following the above method of analysis helped understand Maggi's communication holistically and provided a detailed report of the events occurred during the crisis.

Results

The analyses below helpedderive differences between Nestlé's communication before, during and after the ban.

Table 1: Analysis of Content

Themes Platforms	Facebook*	Twitter**	YouTube***
Pre-ban	Contests; In detail reply to comments; Interactive	Contests; Real-time tweets; Engaging; Interactive	Mom knows best and hence, Maggi is the best choice; Maggi is as special in a household as a child is for a mother
During ban	Informative; Repetitive; Less Interactive	Repetitive; Automated replies; Less personalized replies	Maggi is missed by bachelors, kids; Maggi is a trusted brand by mothers and grand mothers
Post-ban	Informative; Engaging; Interactive; Contests; Launching new variants	Informative; Engaging; Launching new variants; Message from CMD	People (kids, bachelors, dhaba owners, mothers, hostel students) celebrating Maggi's comeback

*****Facebook: Posts by brand and comments by fans analysed

******Twitter: Tweets and retweets by brand and replies by fans analysed

*******YouTube: Videos uploaded and released by brand

It can be observed that before and after crises, their communication was much more interactive and engaging than during the crisis .The brand used to engage on Facebook by writing posts with replies like"Thanks a lot! Did you like the other ad as well?" Also, before crisis when people had apprehensions about the safety and quality of Maggi, the brand had replied in great detail mentioning all major details. Whereas, replies noted during crisis were short and too much was left for consumers to understand from the link provided leading to company's website. The post crisis replies relating to concerns of people about safety and quality of Maggi are also addressed in a similar fashion, curt and impersonal.

A similar pattern can also be observed on Twitter. Before crisis, Maggi's tweets were more engaging rather than the ones during crisis. Tweets generated during crisis by the brand were automated responses and retweets. The post crisis tweets look much better, wherein an official message from the CMD has been shared. Hence, before and after crises Maggi tweets, responses and retweets seem to be livelier, engaging, interactive, real time and personalized.

The videos created just before the crisis targeted mothers mainly. Maggi tried to establish that it is a brand chosen and picked by mothers for their children, which means it is safe and special. The videos released just as the crisis was nearing to an end had an emotional appeal.The understanding that essentially lacked in their responses on Twitter and Facebook was present in those videos wherein kids, bachelors (young adults) express how they miss Maggi in different ways.

The second video was made targeting mothers to establish the fact that Maggi was and is safe to consume. The brand efficiently covered their primary (kids, college-going students, bachelors) and secondary targets (mothers) through these 2 videos.Post crisis videos have a happy and cheerful feel, people of different age groups celebrating the comeback of Maggi.

Table 2: Analysis of Expert Interviews

Themes	Content
Maggi Crisis	Bad time for the brand; Silent; No plan B; Epic crisis; Brand seemed confused; Faltered; Quiet; Sad state of affairs for the brand
During Crisis Communication	Negative: Impersonal messages; Too late to respond; Mechanic and technical responses; Lacked emotional appeal; Disappeared; No strategy Positive: Interactive; Top most executive called; Handled well
After Crisis Communication	Positive: Wonderful; Used nostalgia appeal; Smart; Involved mothers; 360 degree approach; The brand has a legacy; Established brand Negative: Not bang on; Slow to react
Effective Communication - Before Crisis	Too good; The brand had arrived; Instant noodles is known as Maggi; Effective
Effective Communication - After Crisis	Too great; Wonderful campaigns; Using mothers; Followed rules; Owned up; Top of the game
Themes	**Content (contd.)**
Better Communication Strategies	Use social media as there was no visibility of the brand; Out of sight is out of mind; Engagement; Proactive; Release official statements; More careful
Managerial And Specific Implications	Impacts public memory; Be fast; Decision making; Strengthen media relations; Strengthen Online Reputation Management; Strengthen Social Media monitoring; Design personal messages; Plan B important; Negative publicity
Social Media (SM)	Road of fire; Be there; Use in correct way; Right proportion; Social listening1; Interact; Engage; In line with company policy product and target2; Be consistent; Be positive
SM For Brands	Brand PR; Build identity; Use technology; Right level; Big data; Data analytics; Respond fast; No silence; Be fast and immediate; Not leave it open to interpretations; Engage; Media lists updating3; Promote values

[1]*Social Listening:* Understanding what the customers are saying about the brand and industry by monitoring conversations on Social media. During the time of crisis, it becomes important for a brand to monitor and understand these conversations to be able to respond effectively to customers.

[2]*In line with company policy, product and target:* Brands presence on Social media entirely depends on its company policy, product and target. Similarly, its communication also hinges on these three factors.

[3]*Media lists updating:* With the current trend of Digital and Social media, PR managers are constantly updating their media lists with websites like Huffington Post, Firstpost, ScoopWhoop, and Buzzfeed. It is considered to be a victorious moment if a certain press release is covered on the website of a publication.

Respondents who were buyers, makers and consumers of Maggiwere chosen for the GDs to understand their consumption and impact of Maggi's pre and post crisis communication. It was observed during screening the respondents that only 1 out of the 15 mothers chosen was not a buyer and consumer of Maggi post the crisis.

Table 3: Analysis of GDs with Mothers

Themes	Content
Preference for Maggi	Easy to cook; 2 minutes; Instant hot snack; Tasty; Increased vegetable intake of children
Feelings for Maggi - Pre Ban	Happy because it's hassle free; Satisfied with quality; Kids love it
News about Ban	High content of lead; Not safe to consume; Harmful for health
Awareness of Ban	Newspaper; WhatsApp; T.V.
Maggi Ban - A justified decision?	Justified; Not safe to consume; Harmful; Needed to retest the content of lead
Feelings about the ban	Positive: Sad Negative: Confused; Worried
Kids reaction to the Ban	Don't throw Maggi; Unbelievable; Sad; Looked for Maggi at home
Feelings about Maggi's comeback	Positive: Happy; Relieved; Satisfied; Safe and secure Negative: Confused and worried
Trust for the brand	Positive: Trustworthy; Proved right; Stood strong Negative: Felt something wrong because of the sudden ban
Entry of Maggi in their life - post crisis	Positive: Easy; Forever love; Nestlé; Goodwill of the brand; Kids wanted it; Advertisements Negative: No entry
Difference in Maggi	Positive: Less tasty as compared to before ban, hence quality might have improved Negative: Unhealthy because could be a scam
Words for Maggi post ban	MeriMaggi (My Maggi) ; Healthy; Safe; A mystery because still not clear on how things changed so fast

Feelings about ban: A few mothers were sad on hearing and reading about the ban because they loved and trusted the brand. While, others were confused and worried as to what is happening. It was difficult for them to understand that the product they had trusted for so long was said to contain harmful ingredients in an alarming quantity. This created confusion about what to believe and worry as to what would happen next.

Feelings about Maggi's comeback: Most of the mothers were happy and relieved to know the ban had been lifted and their family's favorite snack was back. But, a few mothers were still confused and apprehensive if they should continue with the brand or shift to some other brand of instant noodles. They were worried if changes had actually been made in the product or were some facts still hidden from them and hence, they could not trust the brand as much as they did before.

Difference in Maggi: One school of thought says that because Maggi is less tasty now as compared to before the ban, quality might have improved and content of lead must havedecreased. Whereas, according to the other school of thought it could just be a scam and no changes have been made, it was perhaps just a psychological ploy.

During GDs it was noted that the approximately 3 packets of Maggi bought home by the gatekeeper of the house more or less remained the same pre-ban and post-ban. The rounds of consumption of Maggi also remained the same, except for a few houses where it declined to once a month.

An interesting fact noted was that Maggi was brought into the house not only for kids but also because the family loved it. During the ban, a few mothers did stock up on

Maggi under the influence of their children and others already had packets of Maggi at home. But, none of the mothers threw away the packets after news of the ban spread. Maggi was welcomed almost instantly back into their lives after the ban was lifted. Only 1 out of 15 mothers did not trust Maggi enough to bring it back.

All mothers agreed that their kids complained of the change in taste due to which they believe the quality of the brand has now improved as the content of lead and MSG has now been tweaked. It is possible mothers found taste better when MSG content was higher.

The second school of thought that was noted during GDs was that a sudden change in taste pre-ban and post-ban led a mother to believe that Maggi wasn't safe to consume.

Respondents (teenagers) who were makers and consumers of Maggi were chosen for GDs to understand their consumption and impact of Maggi's pre and post crisis communication. It was observed during screening of respondents that only 2 out of 16 teens chosen were not consumers of Maggi post the crisis.

Table 4: Analysis of GDs with Teenagers

Themes	Content
Preference for Maggi	Instant; Could cook; Brand name; Tasty; Preferable for night munching
Feelings for Maggi - Pre Ban	Fast; Tasty; Fun; Awesome; Love; Refreshing; MeriMaggi (My Maggi);Meri plate (My plate)
Words for Maggi - Pre Ban	Night Food; Time pass; Anytime; Anywhere; Instant meal
News about Ban	Had chemicals; Harmful for health; High amount of lead
Awareness about ban	Social Media; WhatsApp; Friends; Newspapers
Maggi Ban - A justified decision?	Unjustified; Controversy created by competitors; Justified
Feelings about Maggi Ban	Shocked; Confused; Heart-breaking
Words for Maggi during the ban	Not trustworthy; Confused; Mystery; Lost; Gone
Feelings about Maggi's comeback	Brave; Strong; Surprising; Happy; Heart-mended
Trust for the brand	Trustworthy; Trustworthy because of the goodwill; Visible in stores; Parents lost trust
Entry of Maggi into their lives	Advertisements; Ban lifted; Tests confirmed Maggi is safe
Difference in Maggi	Taste has changed
Words for Maggi post ban	Brave; Competitive; Surprising; Trustworthy; Much awaited; Less satisfied because feels unsafe to consume post controversy

Maggi Ban,a justified decision?: Most of the teens thought that banning Maggi was an unjustified decision because they believed that Maggi was always safe to consume. Also, some believed that it was unjustified because it could be a controversy created by the competitors.

It was observed that most teenagers that participated in the GDsate 2-3 packets of Maggi at home but consumed it from outside (hawkers) as well. Moreover, 40% of the teenagers that participated in the discussions also influenced their mothers to buy Maggi after the crisis.

As soon as news about the ban spread, teens agreed to have tried to stop mothers from throwing the packets of Maggi in the house. While 2 of the teenagers could not consume Maggi because their parents lost trust for the brand and shifted to alternate options available like Patanjali (post crisis) and Sunfeast Yippee (during crisis). The

consumption of Maggi among children has remained the same pre and post crisis.

Findings and Implications

Nestlé Maggi's brand positioning was so strong that consumers identified instant noodles with Maggi. Such was its popularity that Snyder (2016) wrote, "Maggi had become the third staple of Indian food after wheat and rice". Maggi commanded 80.2% of the market for instant noodles in the quarter to March 2015 (Mitra, 2016) and all that was needed was to keep consumers satisfied with its product and happy with new variants, offers and contests to increase its market share further.

With the advent of technology, it is becoming increasingly important for brands to not only be present, but also to interact and engage its target audience on Social media. Hence, posts on Facebook, tweets on Twitter and engaging videos on YouTube are some of the most crucial elements of social media engagement with audiences. As noted earlier, Maggi ignored detailed responses during its crisis on Facebook. Replies and comments with a personal touch would have made people feel safe and secure about choosing Maggi above any other instant noodles' brand.

During the crisis, Maggi mainly re-tweeted and used auto-tweets which created detachment between the brand and its consumers. Personalized tweets and being more interactive would have helped connect with consumers. It seemed as if the brand had forgotten that Maggi was a loved brand and a lot of emotions were attached to it. YouTube videos during all three phases –pre-crisis, during the crisis and post-crisis – have been effective in their communication compared to that on Facebook and Twitter. The message has been communicated clearly and effectively using YouTube.

While conducting interviews with experts in fields of PR, Corporate Communication, Marketing Communication and Social Media, it was observed that most of them believed Maggi's communication during the crisis was weaker than before and after crisis. It was noted that during crisis, communication from the brand's end seemed impersonal, too technical and mechanical and as if it lacked a strategy.

In contrast, before and after crisis communication where Maggi was doing wonderful, had communication which was so powerful that Maggi had become synonymous with instant noodles in India and consumers were willing to welcome it back into their lives with open arms. On the other hand, a few experts thought that Maggi did not falter at any point. They were of the opinion that the brand faced the crisis head on. It called in the top most executives to handle the situation and always followed government policies and norms.

All the experts believed that Maggi needed to be more careful while communicating, more proactive and engaging associal media is a powerful, interactive and instant tool of communication and care has to be taken while using it. Experts likened it with a double edged sword which might help cut out barriers in communication or slice through your efforts in one stroke.

GDs with mothers revealed that although they believed the ban was a justified decision, when the product was back on shelves most were sure of its quality and safety. Thus, they did not hesitate from buying it as soon as it was back. Sentiment associated with Maggi's comeback was more positive than negative as most mothers seemed happy and satisfied with its return. A few, however, who disagreed with this sentiment, had certain doubts about Maggi's safety and quality. Therefore, it was difficult for them to trust the brand and welcome it back into their lives. According to most mothers, the change in taste of Maggi proved that it was healthy now and high content of lead was reduced. On the other hand, a few thought that the change in taste was only an inducement for fooling consumers and there was no actual change in the product.

GDs with teenagers also revealed similar results. According to them, the communication done by Maggi during and after crisis through advertisements convinced them to buy the product as soon as it was back. It was difficult for the kids to accept the ban of one of their favorite brands. Hence, bringing it back into their lives after the ban was easy for them. Nonetheless, there were a few families that did not support Maggi after the ban and preferred other brands of instant noodles.

GDs with both mothers and kids revealed that though Maggi may have failed to communicate and connect efficiently with their consumers during the crisis, the legacy of the brand continues. Most families still trust Maggi and love it as much as before the crisis. However,

most experts believed theirs was a crisis communication / PR failure on part of the brand during the crisis.

Experts said Maggi's market share would certainly go back to where it was before, but brands need to be careful while communicating over social media. Online brand presence has become a necessity today. Content is king and if it is meaningful and relevant, it can build brand love and loyalty over time. Brands / personalities get trolled for a single mistake made on social media given its ruthless nature as highlighted by Comcowich (2016) who reported that Maggi has suffered substantial reputation damage as the crisis brewed. The question to ask is would the brand have survived if it did not have the legacy and credibility that it did?

One of the principles that Arthur W. Page Society (2016) follows and preaches all communication enthusiasts to follow, is to "Tell the truth". As soon as the crisis struck the first thing Nestlé should have done was to release an official statement establishing the truth. In this case, what Nestlé actually did was as per Image Restoration Strategies (Benoit, 1997) "Simple Denial." It can also be observed on Maggi's Facebook post where they deny news of any recall of Maggi Instant Noodles. Some experts also believe that "Denial" cannot and should not be the first statement released by a brand (Prabhu, 2016).

It also couldn't implement the second principle by Arthur W. Page Society i.e. "Prove it with Action." It started with a laboratory report in Uttar Pradesh that claimed Maggi contained high amount of lead. If a statement would have been issued by the brand with a tangible proof, situations would have turned out quite different than they did. But, considering the tough situations faced by the brand, there would have certainly been a policy or protocol they followed such as a lock down.

The third principle of Arthur W. Page Society states "Listen to the customer." Maggi should have listened to each and every customer before sending out a general template as a response to all agitated and concerned customers. Because every customer / fan / follower had a different tweet / post / comment which demanded different replies. Thus, Maggi could have used social media in a better manner for its advantage.

PR is to manage a company's reputation and create a lasting bond with its target audience. So, when Arthur W. Page Society's fifth principle states "Conduct PR as if the whole company depends on it" the importance of it can be understood. Unfortunately Maggi did not communicate efficiently to its public or manage its reputation effectively. As mentioned by Paul Bulcke, Nestlé CEO (in Comcowich, 2016),"We were right on factual arguments and yet so wrong on arguing. It's not a matter of being right. It's a matter of engaging the right way and finding a solution."

What Maggi did perfectly later was "Minimization" of the act as per W.L. Benoit's Image Restoration (1997) strategies. The videos released by Maggi towards the end of crisis very cleverly ignited a feeling of nostalgia within its customers and connected with them emotionally. This worked for the brand as we also observed from the GDs conducted. It made people forget all that had happened and concentrate only on the years they had spent enjoying Maggi.

The brand did face various challenges such as tough media, strict regulation and agitated customer tweets and Facebook posts. If you don't have a contingency plan when crisis hits, especially for communication in today's world of social media, things will certainly get complicated like they did for Nestlé. Fortunately for them, their branding is so strong that they have bounced back despite the serious blow.This case surely serves as a lesson for various PR and corporate communication practitioners especially in the area of crisis communication and contingency theory.

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[i] The matrix can be accessed on https://sites.google.com/view/figuresfromthepaper/home

[ii] Maggi's social media engagement on Facebook and Twitter can be accessed on https://sites.google.com/view/figuresfromthepaper/home

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Isaac's Syndrome

Rachit Shah*

Independent Researcher

I am not, just a bed number (case study):-

If you had told me a couple of years back, I would not be writing this note instead planning into the future. A part of me is surprised, as was all healthy & hearty, not on any peculiar medication & no known allergies except periodic diarrhea since a couple of months. There was no history of alcohol or any other substance abuse & completely believed that true healthcare reform always starts in one's kitchen.

As a senior executive in the Investment Banking space based out of Mumbai, my experience journey speaks in itself, from being recognized as the Employee of the Year to having the maximum number of Channel Partners to have recorded, deployment in exotic products to have bagged the maximum number of reality deals in the organization, I am a 38 year individual with parents & a sibling in the family.

One of the evenings in Feb'16 during my walking session, got trapped into a severe pain in the Lumbar region & continuous cramps in right leg. The pain could be described as some sharp object stabbed at the lumbar extending till the femoral region which started alleviating & aggravating.

Next morning was tough as the pain still persisted & was accompanied with enough stiffness which made movement toilsome. Anyhow gathering all my muscle, I presented myself to a conventional Orthopedic who after a thorough investigation put me on temporary drugs.

The post pain realization of diarrhea slowly denting the body had factored in. All of a sudden things took an evil turn & seeing my Gastroenterologist again seemed a wise decision.

My Gastroenerologist, a well known figure in Mumbai was surprised to see my CPK levels and immediately asked me to consult a Neurologist and get back to my hometown as he realized that soon a gig's world's was transforming into serious profiling.

It was inconceivable how I was bought directly to be hospitalized from the airport by my parents where my brother had got all the formalities in place. I had no guess that my encounter with time had just started. The essential first step in managing the situation began with a detailed medical evaluation. One after the other, investigations started & the doctors decided to put me on the Steroid therapy for next 5 days as they diagnosed Polymyositis.

Polymyositis?? (a condition marked by inflammation and degeneration of skeletal muscle throughout the body)

Initially I had no idea about these medical terms and was even completely out of energy to put my head. Everything was just happening so fast…….Post being in the hospital for a week I was advised to take up my further investigations in Bombay Hospital under a team of experts.

I still remember that night vividly as I was being prepared for Mumbai, prescriptions, test reports and gloomy faces. My father was the most worried being as he had to stay back due to his own health issues but somewhere deep inside had realized what's coming.

In March'16, I got under the lights with general examination, pricked everywhere in both my hands. Presence of stiffness all over was more in the upper limbs. There was excess weakness with spontaneous gross fasiculations in both the arms.

I was diagnosed with Isaac Syndrome even called Neuromyotonia in the month of March'16. Some of the other tests showed traces of Membranous Glomerulonephritis.

NOW WHAT'S THAT??

Neuromyotonia (NMT), also known as Isaacs Syndrome, is a diverse disorder. As a result of muscular hyperactivity, patients may present with muscle cramps, stiffness, myotonia-like symptoms (slow relaxation), associated walking difficulties, hyperhidrosis (excessive sweating), myokymia (quivering of a muscle), fasciculations (muscle twitching), fatigue, exercise intolerance, myoclonic jerks and other related symptoms.

Membranous Glomerulonephritis is a slowly progressive disease of the kidney. It leads to changes and inflammation

of the structures inside the kidney that helps filter wastes and fluids. The inflammation may lead to problems with the functionality.

The team of doctors decided on IVIg therapy injected intravenous, which is the use of a mixture of antibodies to treat a number of health conditions. Considering the tests (EMG, Pet-CT, MRI Lumber Spine, Sonography, Kidney biopsy etc...) & treatment, my stay at the hospital was almost for a month. Each passing day was a nightmare but my belief of no situation being hopeless and every circumstance in life can change if dealt with patience went stronger.

And finally the day arrived……. I was discharged from the hospital in April'16 with some medicines & a suggestion to consult another neurologist in Lucknow, if need be with a recommendation that there is no such thing as a fair flight & all vulnerabilities must be exploited.

I couldn't lie to myself, & started to laugh on the ambulance not realizing that feeling better was just a temporary phenomenon. Soon my health proved a tragic experience wrapped in bonkers, making me crawl through broken glass & within 3 months timeframe I was on my way to Lucknow.

As it's always said that no medicine or doctor has a strike rate of 100%, I could experience it happening in my case. The medicines denied integrating with my system. Diarrhea which was on a break for a while again took its full swing. Pain, Sugar, BP & all the other symptoms returned & my hopes of recovery showed signs of a day dream with open eyes.

Unexpectedly I was getting weaker. The situation remained the same for some time where I slept for almost 14 hrs a day due to weakness & persisting pain in-spite of being on heavy medications with pain killers, immunosuppressive agents, blood pressure, intestine related medicines, diabetes, probiotics & steroids became a part of my daily food platter. The daily intake of medicines went as high as 38 with enough food restrictions due to shooting sugar levels, fluctuating blood pressure & diarrhea. I was recommended to be on complete bed rest till things started to improve a bit when we decided to see Dr. Panagariya & his team in Jaipur @ Aug'16.

In Nov'16, I was again admitted for IVIg therapy, in Jaipur hospital which I did not respond to & had to be stopped midway.

I was asked to go to Mumbai again, this time to see a different set of specialists to know a little better, the difference between stories & realities. The trip came across as Phishing in my own backyard due to the suggestions varying rational expectations.

I was given some medicines with immunosuppressants & ask to continue it for some good two months.

In March'17 as the overall health stats didn't show favorable improvement, I was asked to take weekly shots of ACTH injection (It may work directly on the brain in addition to stimulating the adrenal glands. It may also be used in treatment of various other childhood seizures when other treatments have failed). I started to revamp though for couple of days there was a weird feeling in the brain.

When it's wise to have an alternative health, as a mainstream (May'17): - A crucial part of my treatment agenda was Naturopath as I am always on a look out for therapies which could help me from a longer term perspective without much of side effects . Came across this center in Hyderabad & decided to try it for a week. Post my visit there & meeting the doctors, the need of staying back for longer was felt which lasted for a month. Due to change in my daily diet chart, the stomach did settle to a lot extend. I realized that they added a lot of Coconut in their food curries which has anti-inflammatory qualities without making any change in my allopath medicines. Setting strict expectation with one's palate is the key & crucial step to lifestyle modification.

The Indian state of mind & nature sense (July'17): - Naturopath treatment was impressive so I decided to make a second visit @ Rishikesh, this time with a pinch of spiritual touch. My stay lasted there for almost a month with corrections in food habits, meditation & body posture corrections. We all have the capacity and strength to expand our conscious mind with interior research. An amalgamation of naturopath treatment with a spiritual touch can deliver extraordinary results if followed diligently and inculcated as a routine change.

As medicines & treatments have limitations, the health keeps showing signs of deterioration periodically. It was

time for a checkup with my monthly health stats. My doctor made some changes in the medicines & asked me to wait patiently for results to unwind. Pain killers which were on sabbatical became a daily phenomenon again. I was admitted to Medanta Medicity @ Gurgaon for Plasmaferisis in Dec'17. Though I was taking the procedure light, it proved me wrong, each passing day. The central line which was inserted around the pelvic region, created issues with its inlet & was a nightmare till the last day of completion.

Post discharge it took me good 20 days to get a bit normal as there was enough weakness & usual pain at the back & thigh area, all medications being like before. The journey continuous……. I am focusing on the journey, not the destination. Therefore if you can't go back to your mother's womb, you'd better learn to be uncomfortable & fight back. To do otherwise is to settle.

• Medical Streams (tried & tested)

Have tried the following streams of medicine: - (They that will not apply new remedies must expect new evils)

1) Allopathic (Mankind has survived all catastrophes. It will also survive modern medicine – Gerhard Kocher)
2) Naturopath (The art of medicine consists in amusing the patient while nature cures the disease)
3) Homeopath (Extreme remedies are very appropriate for extreme diseases)
4) Yoga (Yoga teaches us to cure what need not be endured and endure what cannot be cured — founder of Iyengar Yoga, and considered one of the foremost yoga teachers in the world)
5) Meditation practices (Natural forces within us are the true healers of disease)
6) Music therapies (One good thing about music, when it hits you, you feel no pain, Bob Marley)

• My Experience, the hard way (important section)

1) Disease: - Dis – Ease. Body & Mind needs to be at ease & common synergy
2) Closely monitor your blood & other body stats regularly without fail
3) Most Critical: - A good doctor and team
4) Adopting to new aspects of treatment can contribute to healing: - Yoga, Meditation, Walking, Calmness of mind & body, Being positive
5) Important: - Make proper synopsis before consulting any doctor (he needs to know it all, from medicines to various treatments to other doctors consulted to medical tests)
6) Changes in lifestyle can work wonders (eating, sleeping, drinking habits)
7) While on medicines, close monitoring of sugar & BP levels, eyes, stomach, kidney is must
8) We should keep in mind that Allopath has symptomatic drugs which are not the cure; therefore trying alternate streams of medicines can be helpful from a longer term perspective
9) One's body can stand almost anything. It's the mind that needs to be convinced: - It is the key ingredient to recovery
10) Keep involved: - for mind distraction
11) Surroundings matters: - keep it positive (The need is to do more even with less)
12) The self-management plan should be reviewed from time to time to ensure the advice remains current
13) A dose of care can cure the impossible
14) Right body postures can help reduce pain
15) Read about your own condition & keep informed
16) The holy trinity between the doctor, you & the treatment becomes a dangerous Bermuda triangle when there is communication gap
17) Avoid & try reducing dosage of pain killers from the physical longevity prerogative: - try SRP (systematic reduction plan)
18) Careful watch on any infection, body scratches, pain, and uneasiness should be discussed with doctor
19) People on steroids & suffering from high sugar levels should maintain a strict diet chart
20) Enough water in-take with medicines: - Swallowing medicines without enough water may prevent the medicine from acting properly and may even lead to undesired side effects in some cases. One example is the

class of drugs known as nonsteroidal anti-inflammatory agents

21) Eat less Sugar, you are sweet enough already: - For me the following helped in controlling my sweetness –

i) Bitter Gourd juice

ii) Indian Gooseberry juice

iii) Jamun fruit grounded seed – one spoon empty stomach

22) Gluten free food might relieve symptoms

23) Family, a nature's masterpiece: - One of my biggest strengths & support function in this tedious war field was my Family. I never realized when it became 'Our' journey from 'My' journey.

There is no such thing as a perfect family; for life time partnership each member has to become, in a special way, the servant of the other. I am blessed to have profound vital forces safeguarding me & we are still holding on to our roots. Even if I try penning down their support & be thankful to my parents & siblings, it will be a manual, even before I realize.

24) Health cover: - One of the most important aspects of my treatment as it provided me with financial security to peace of mind to coverage of specific medication & ailments to cashless hospitalization benefits.

25) Try Diving down not drowning down health care cost: - We can't shy away from the fact that world's most expensive drugs fall under the umbrella of ultra-rare diseases. However all patients like us have legitimate expectation of treatment whether the condition is common or rare.

At times, being smart, is even to know when to play dumb. Whenever, I sensed the treatment could cost a bomb, I connected with genuine distributors candidly rather than being on retailer's disposal or hinged onto the hospitals to walk me through.

- **Doctors, contributed to my journey**

1) Dr. Ashok Panagariya (Neurologist):- 7, Raj Niketan, Moti Doongri Road, Jaipur, Rajasthan 302004. Phone: - 0141 262 0585. He is my main doctor.

2) Dr. Bhawana Sharma (Neurologist):- 381, New Sanganer Road, Laxman Path, Vivek Vihar, Jaipur, Rajasthan 302019 Phone:- 0141 229 0496

3) Dr. Nirmal Pandey (Neurologist, Kanpur):- He was among the few who diagnosed & started the right treatment

4) Dr. Khadilkar (Neurologist, Bombay Hospital)

5) Dr. Saumil Shah (Gastrologist, Mumbai)

6) Dr. Sanjeev Amen (Rheumatologist, Mumbai)

7) Dr. Laxman Pillai (Naturopathy, Nature Cure Hospital, Hyderabad)

On that note would like to suggest that - Thinking of disease constantly will intensify it. Feel always 'I am healthily in body and mind'. As Charlie Chaplin once said ''to truly laugh, you must be able to take your pain, and play with it''. Easy said than done but making an initiative would help.

Rachit Shah is Master's in Business Management with 12 yrs of successful career as an Investment Banker with professional interests like managing paper- rich & family office clients. As it's said that passions are built but Interests are discovered, he is a long distance runner with leisure interests like playing table tennis, volunteering & the knack of writing for social platforms & The Health Ministry of India.

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