

JAGRAN JOURNAL OF MANAGEMENT AND TECHNOLOGY

ANNUAL PEER REVIEWED JOURNAL

VOLUME 1

NO. 1

AUGUST 2019

ISSN



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• Volume 1 • No. 1 August 2019 ISSN :

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Printed & Published by

Dr. Nandita Verma on behalf of Jagran Institute of Management

Printed at

Solar Press

96/2, Chunniganj, Kanpur (U.P.) - 208 001

Published from

Jagran Institute of Management

W-620, Juhi Saket Nagar, Kanpur (U.P.) - 208 014

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A Study on Enterprise Risk Management and Business Performance

Dr. Amit Kumar Jain*

Abstract

The value proposition of enterprise risk management (ERM) has continuously been known as into question as firms struggle to justify the time and energy associate ERM needs. The worldwide slump in 2018 associated 2019 provides an excellent chance to look at the consequences of ERM. During this study, we'll analyze the skills of the twelve sample firms to preserve and make worth within the face of myriad uncertainties. Our analysis principally focuses on money indicators that were collected from annual reports and online disclosures. Whereas wanting into the risk committee (RC) and audit committee (AC)'s existence, components, and operative pointers, we have a tendency to 1st notice that among the 12 firms, five firms have separate Board RCs, four exercise ERM oversight merely through AC, and three don't have any Board ERM oversight in the least. In general, our analysis of gain, liquidity, and share value shows that Board oversight of ERM is related to superior performance. We have a tendency to try to explain the few exceptions found within the study and notice that these are associated with general business performance and techniques adopted by the respective firms. Through a qualitative exploration of RC characteristics, fascinating options relating to RC composition, committee meeting frequency pattern, range of board positions associated Board's oversight on committee provide some suggestions on what really makes an RC tick. Nearer examination of those components discovered plausible connections between the qualitative aspects of the RC and also the performance of the outliers within the quantitative study. Next we have a tendency to explore why firms organize their ERM within the method they did so found associate association between ERM oversight by Board and company size and operation structure. We have a tendency to expect that as a business expands in complexity, a additional refined risk management framework is required particularly at the very best level of the organization. But this study itself doesn't give enough proof to attain any absolute conclusion that ERM indeed diode to a company's performance. In part, our little sampling size is in-ample to represent the broader community. Business results will vary heavily referring to business model complexities, business and ERM operative effectiveness. Future studies could produce additional worth if business bench marking and longer periods are taken into issues.

Keywords

Enterprise Risk Management, Risk Committee, Financial Performance

1. Introduction

The North American nation subprime mortgage debacle came to a spectacular head in 2018 with the collapse of well-known establishments like Bear Sterns in March 2018 and Lehman Brothers later in Gregorian calendar month. The open economy of Singapore failed to pop out

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uninjured within the succeeding international monetary crisis. To feature to the woes, international fossil fuel worth touched its nominal peak at over USD147 per barrel in July 2018 between the collapse of the 2 Wall Street giants.

Figure one shows the wild gyrations within the Straits Times Index (STI), a measuring instrument of Singapore's economy, between January 2018 and Gregorian calendar month 2019. However, since March 2019, economic outlook for Singapore gave the impression to have circled even as quickly because it had tanked from 2018. This vast volatility over the biennial amount so presents an acceptable backcloth for the current investigation into the results of enterprise risk management (ERM), specifically, its ability in conserving and making worth for corporations within the face of myriad uncertainties.

In a shell, risk management within the company context may be a set of coordinated activities to direct and management a company with reference to the impact of uncertainty on the objectives of the corporate. Boards unremarkably insist they see the worth of ERM however it's troublesome to create a solid business case for ERM (McCuaig, 2019). this could result to the difficulties of fleshing out ERM prices and advantages. A 2017 Deloitte survey of over a hundred thirty companies disclosed that whereas over 3 quarters of the executives from companies with ERM initiatives same that the advantages of their programmes exceeded prices, solely thirteenth same that their companies had truly quantified ERM prices and a paltry four said that they quantified ERM advantages (Deloitte & Touche LLP, 2017).

Therefore, we have a tendency to believe that the findings from this study on the advantages of ERM initiatives will boost existing body of information on ERM.

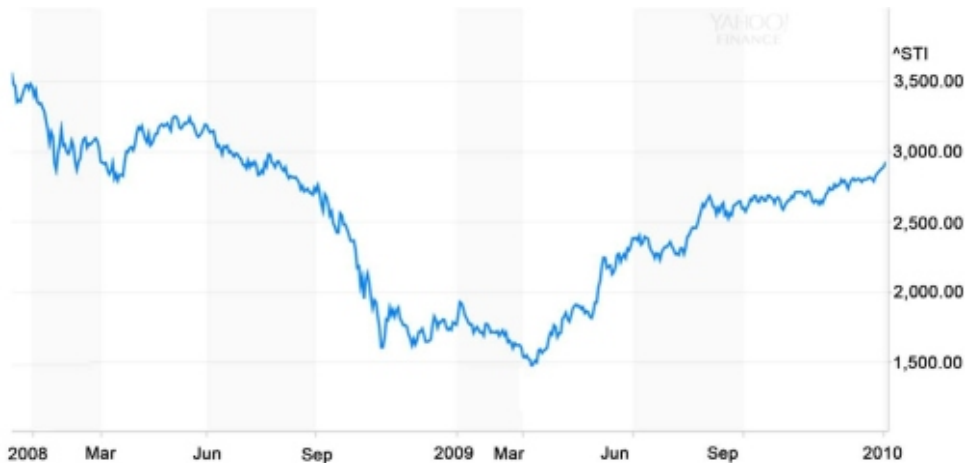


Figure 1. Straits Times Index (STI), 2 Jan 2018 - 31 Dec 2018 (Source: Yahoo Finance)

2. Methodology

This study collected info relating to the ERM programme and many performance indicators over 2018 and 2019 for a sample of twelve firms to allow analysis of ERM options with firm performance.

2.1. Data Collection

The ERM programme in every of the corporations was investigated by the three high-level parts of any risk management efforts—structure, folks and processes. Supported solely publically on the market info, structure was the foremost simply discernible element. it absolutely was 1st determined however every company structured its Board's risk oversight responsibilities, through an infatuated risk committee (RC) at Board level, through the audit committee (AC), or not the least bit. Then for the RC and also the AC, knowledge was collected on parameters like the committee size and meeting frequency. The composition of the committees—whether members were freelance, govt or non-executive—was conjointly determined and any mention of the workplace of the Chief Risk Officer was punctually noted (Committee of Sponsoring Organizations of the Treadway Commission, 2017).

It was harder to work out the folks element from publically available info. Still, this study gathered info that provided clues to the ability and commitment of the RC and AC members. To it finish, knowledge was collected on range of consultants in every committee, what number different committees on the average every member Sat in (to give a proxy for a way a lot of time the committee members were able to attempt to their ERM responsibilities), average board tenure and average shareholdings (as a proxy for a way unconditional they were).

ERM method was the foremost troublesome element to understand concerning from publically on the market info as management discussions in annual reports usually don't come in discussions of business processes. Still, this study unbroken track of corporations that mentioned their ERM and associated processes (Deloitte & Touche LLP, 2017). To it finish, we have a tendency to looked out for any mentions of ERM and any stress tests conducted within the company.

Other relevant info like possession structure, existence of different risk connected specialised committee and quality and remoteness of operations (with range of native and overseas subsidiaries and associates as proxy) were conjointly noted.

Several high level performance indicators collected to facilitate the analysis included revenue growth, profits growth, and key magnitude relations like liquidity (current ratio was used), liability (defined by current collectable and debt as a proportion of common equity), returns on equity (ROE) and changes in share value within the annual amount between thirty one Dec 2008 and also the same date in 2019.

While indicators of nonfinancial performance like citations for regulative breaches, awards won or components of name equity were conjointly noted, this analysis can concentrate on money indicators. This can be as a result of nonfinancial performance indicators could not contain vital further info price on the far side money indicators. As an example, we have a tendency to note that a lot of the businesses within the sample

have garnered awards for capitalist relations. However, think about the case of China Aviation Oil (CAO), once the retail investor's darling on SGX, that won the Securities Investors Association of Singapore's award for being the “Most clear Company” in 2003. Within the same year, its then-CEO, Chen Juilin, was named one amongst forty “New Asian Leaders” by the cogent World Economic Forum. Nevertheless only 1 year later, CAO blew up stunningly during a complete break-down of company governance.

Financial knowledge and business performance info of the twelve sample companies enclosed and processed during this report are all collected from public information, like annual reports and social responsibility report, through the respective websites of the twelve enterprises

2.2. Analysis Approach

Based on the knowledge gathered on the ERM structure, the businesses were categorized into 3 groups: Those with dedicated RC, those who enforced ERM through the AC and people whose Board failed to exercise risk oversight. The overall performance of the businesses in every class was compared to it of companies within the different classes to get high level conclusions on the advantages of ERM structures.

We then zoomed on the 5 firms with dedicated RCs to qualitatively explore whether or not characteristics of the RC, like its structure and composition, bore relations to performance. Within the method, we tend to distilled key characteristics that emerged as necessary in Associate in Nursing RC. The analysis then took a step back to look at doable relationships between company characteristics and therefore the alternative of ERM structure.

Following the on top of analysis directions, this paper performs each qualitative and qualitative analysis. Within the elaborate analysis half, varied ways like horizontal analysis, vertical analysis, trend analysis, quantitative relation analysis, and correlational analysis are all meted out to create the ultimate conclusion.

2.3. Company Overview

A sample of 12 companies listed in the SGX was used in the study. Table 1 shows the classification the sample companies according to their ERM structure.

3. ERM Structure and Performance

3.1. Financial Performance

Financial performance, during this study, is examined through half dozen measures—Revenue, internet financial gain, Liquidity, obligation, come back on Equity and Share value for the years of 2018 and 2019. Against a scenery of a volatile state of world economy, the study finds that generally, firms with formal ERM framework registered higher top-line and bottom-line performance for the year in re-read.

Dedicated risk committee	ERM Oversight Through AC	No Board ERM Oversight
Cosco	Chip Eng Seng	China Zaino
Sembcorp Marine	Comfort Delgro	Hi-P
Thai Beverage	Hwa Hong	Ho Bee
United Engineers	Straits Trading	
Wilmar		

Table 1. Sample companies according to ERM structure.

3.1.1. Net Income and Revenue

4 out of five of the businesses with RCs registered positive growth in income whereas three out of four companies with AC oversight of ERM registered the identical. The exceptions were Cosco within the former cluster and Hwa Hong in the latter.

Cosco, together with several of its peers within the shipping trade, was severely hit by the downswing in world trade. Shipping volumes and ocean freight rates to and from the United States and Europe plummeted throughout the recession of 2018-19. As carriers ill ships so as to ease the glut in provide, consequently demand for ship repair and ship building services receded so impacting Cosco's order books. It's noted, however, that Cosco remains within the black not like several of its shipping peers. this might be part because of its distributed portfolio of companies. Sadly, the extent to that active ERM has contributed to the present performance is unknown and can't be conjectured with obtainable information.

Hwa Hong, the opposite exception, registered a tiny low two drop by income after tax, presumably thanks to its strategy of keeping a coffee profile in difficult times. Throughout the year, Hwa Hong had contend a conservative hand and failed to invest in any new property developments. Instead, it focused on rising the pct of its rental properties and realizing gains from its investment securities portfolio once the stock exchange turned for the higher.

Of the businesses in these 2 teams with risk management oversight at the Board-level, 0.5 really showed a discount in their top lines, nevertheless solely Cosco and Hwa Hong showed a discount in income. It is hypothesized at this time that some type of price optimisation had occurred in these corporations that allowed them to weather the depression and emerge in good condition. As most risk management activities specialise in reducing the draw back during a risk event, it's going to be that having a risk management framework at the very best level of the organization contributes to the strength of the organization.

Conversely, within the class of corporations while not Board-level risk management oversight, 2 out of 3 corporations registered substantial drops in income and revenue. The exception is metallic element Bee that reportable the very best increases in income

and revenue amongst the sample corporations. metallic element Bee's case is also a motivating demonstration that Associate in Nursing owner-managed company might not profit the maximum amount from formal oversight offered at the Board level. Corporations helmed by house owners tend to be target-hunting by the business intuition and judgment of those people World Health Organization typically exert vital influence as shareholders, members of the Board (often as Chairman) and key executives. There are suggestions that a high level of watching by the Board might not be optimum in family-owned corporations for some reasons (Office of analysis at Singapore Management University, 2019). Higher data imbalance between the family and outsiders could render outside watching less effective. In any case, the dominance of the owner and his family could mean that even administrators World Health Organization are freelance on paper might not be really therefore.

3.1.2. Liquidity and Indebtedness

The study found that corporations with a proper Board risk structure usually were less liquid and had a lot of debt. For FY2019, as you'll see in Figure a pair of, those with a Board RC had current ratios of between one.00 and 1.85; corporations that performed ERM oversight through the AC showed a rather higher liquidity vary of one. 01-5.18 with most at the lower end; and apparently, corporations with no formal Board risk oversight were even a lot of liquid with a current quantitative relation vary of two.73-4.92. In terms of financial obligation, that is displayed in Figure three, three out of five corporations within the initial class had debt quantitative relation of over zero.5. For corporations with AC oversight over ERM, three out of four corporations were over the zero. 5 threshold, whereas just one out of the three corporations with no Board oversight of ERM had a debt quantitative relation over 0.5.

3.1.3. Return on Equity

The cluster was unable to spot clear patterns at a general level between ERM practices and therefore the ROE performance parameter. The five corporations with Board RC registered a mean ROE of zero.18 (range: zero.06 - 0.37) whereas the four corporations that ERM oversight through the AC had a mean ROE of zero.21 (0.13 - 0.29), almost like those while not Board ERM oversight, that conjointly had average ROE of zero.21 (0.09-0.34). Given the association of ERM practices with higher monetary performance and additional economical capital structure, one would have expected associate association with higher ROE. The absence of a transparent pattern may well be as a result of ROE is extremely dependent on business and should need associate intra-industry bench marking exercise to raised isolate the impact of ERM on ROE.

3.1.4. Share Price

This study obtained the closing costs of the several counters in SGX as at 31-Dec-2018 and 31-Dec-2019 to calculate the amendment in share worth of every company. Whereas the share worth is indicative of the worth of the corporate to investors, it's

subject to promote sentiments and capitalist perceptions at a specific purpose in time. Therefore, this study comments on general observations on the movement of share costs within the amount of 2018-2019 in relevance the three classes of ERM oversight structure however cautions against the hasty reading of a cause-effect relationship.

Generally, eleven out of the twelve corporations older an increase in share costs from 2018 to 2019. The exception was Straits commercialism that showed a tenth drop among this point amount.

Amongst the three classes, corporations with RCs showed a mean increase of seventy one in share costs with rock bottom increment at twenty five and also the highest at one hundred thirty. Corporations with ERM oversight within the AC showed a a lot of modest amendment in share worth with a mean of thirty eight upswing with a lowest of -1% and a highest of eighty two. Within the last class, the common share worth upswing was a hundred seventy five (lowest twenty eight and highest 355%).

This looks to recommend that corporations with no risk management framework at the Board level expertise a lot of volatile share worth movements. This can be maybe, in part, thanks to the possession and management structure. All three corporations within the last class are owner-managed, and as advised antecedently, risk management during this sort of corporations are for the most part obsessed on the risk-reward appetites and philosophies of the owner-managers. There's no kind of aggregation or reconciliation out of risk-taking that exists in corporations with formal risk management structures. As such, share costs could swing upward once risk-taking on the a part of the owner pans out and so downward sharply when the risk-taking turns bitter.

3.2. Non-Financial Performance

In general, the study notes that corporations with Board RC won several a lot of awards than those while not. Out of the five of our stable of corporations during this category, four have won awards on company governance and transparency. As mentioned earlier through the instance of CAO, company governance awards aren't entirely indicative of actually smart corporate governance practices. The evidence of the study, however, will counsel that corporations with dedicated RCs promote higher governance and enhances the effectuality of the Board as a full, or a minimum of seem to try.

4. Focus on Risk Committees

Corporations of all sizes are progressively that specialize in the general risks that threaten their health and gain. The advantages of a undefeated RC are obvious: Improved board oversight of management and of company operations; and a capability to anticipate and react to events and trends which may preferably be cryptic. (Ware, 2009) we've seen within the previous section that formal Board oversight of ERM is mostly related to higher performance however the question remains however completely different options of Associate in Nursing RC really impact performance. Therefore this section examines the individual performances of the five corporations with Board RCs in relevancy these committees' composition, meeting frequency

and different in operation effectiveness attributes.

4.1. Sembcorp Marine Ltd

Sembcorp Marine turned within the best performance amongst the five, with a thirteenth increase in revenue and a sixty three bottom-line enlargement from 2018 to 2019. Associate degree ROE of thirty seven additionally shows it's the best potency among the 5 corporations in generating earnings growth from each unit of shareholders' investment funds. The stellar performance could also be attributed to Sembcorp Marine's ERM practices. All four members of the committees are non-executives however expertly within the money, legal and engineering fields. In addition, Sembcorp Marine has associate degree ERM committee at the management level overseeing the chance management of operations and also the internal setting of the business. The mixture of external experience (the Board RC) and internal insights (the Management RC) could also be a crucial issue within the results shown by Sembcorp Marine.

4.2. Wilmar International Ltd

It was noted that Wilmar's profit rose twenty seven between 2018 and 2019 despite a sixteenth decline in revenue. It had been equally determined that this might be as a result of ERM ready the corporate against draw back risks. Aside from the CEO for the corporate, the opposite 2 members of risk committee are each freelance and non-executive consultants with accounting and finance experience. The RC met quarterly to debate the potential risk areas, review risk assessment and risk management processes with each internal and external viewpoints. Wilmar's RC contains a terribly high possession of the corporate (deemed interest is over thirtieth of common shares) nearly entirely attributed to the CEO member within the RC.

4.3. United Engineers Ltd

In United Engineers, the long tenure of the RC is notable. All three members of the RC have served on the Board for a few time with average board tenure of ten.7 years. Two of the three RC members were thought-about experts: One with quite forty years of banking expertise whereas another's company experience in numerous public listed and personal corporations were thought to be ready to profit the company. Though the committee solely command two formal conferences in 2019, the duties of every meeting were clearly nominal and dead. The assessment and monitoring of all risks related to the investments and operations were in real time reported and counseled to the Board. The expertise of United Engineers suggests that the RC will get pleasure from members World Health Organization can mix broad understanding of the complicated business atmosphere with intimate familiarity of the company's operative vogue.

4.4. Thai Beverage Public Company Ltd

At fourteen members, Thai Bev has the most important RC in our sample. Curiously,

the RC not solely includes administrators from the Board, however has conjointly coopted management executives. However, its annual report doesn't offer additional data on the RC such as its meeting frequency and RC formalities. Thai Bev's performance, whereas large, wasn't sterling either. Therefore we would suppose Thai Beverage's RC is just founded there while not taking any actual actions. This could indicate that, once it involves the RC, additional doesn't essentially mean higher. Rather, a committee with the proper mixture of experience and with sound risk management practices would deliver additional fascinating results.

4.5. Cosco Corporation (Singapore) Ltd

Cosco looks to own a wonderful committee structure, four freelance administrators, 1 executive (the company President) and one non-Board worker, all with robust background in finance or accounting areas. The RC met five times in 2009 and benefitted from the skilled recommendation of Deloitte & Touche. It additionally dedicated four full pages in its annual report—the most amongst firms in our sample—to the discussion of ERM. The efforts of the RC at Board level is cascaded right down to the chance management committees in every in operation subsidiary.

Closer examination, however, reveals some issues. The Board members in its RC hold a mean of three. 8 alternative board positions, as well as the AC, that command nine conferences in 2009. The stress of multiple committees and also the high frequency of conferences may dilute the directors' attention and target their responsibilities in every committee. In fact, we tend to noted that Cosco's RC is just AN swollen version of the AC. All four members of the AC sit in it. The corporate President and worker form up the remaining two of the 6-member RC. Such a composition features a flavor of a risk management oversight by AC structure (International Organization for Standardization, 2009a, 2009b, 2009c).

We additionally noted from the annual report that the RC's agenda looks to require a comparatively short term read of risks. A pattern RC like this will itself produce risk, as a result of the results of responsibility confusion can be overlapping efforts and ambiguous answerability distributions among the AC members.

Despite components of a comprehensive ERM structure, the discovered shortcomings could have contributed to Cosco's comparatively dismal performance in 2009; as seen earlier, Cosco's profits performance was the poorest inside the cluster of firms with Board RCs.

4.6. Key Considerations for an Efficient and Effective Risk Committee

Based on the examination of the 5 companies with a dedicated RC, we surmised that an efficient and effective RC ought to have the following characteristics:

4.6.1. Committee Composition

From the study, a perfect RC ought to have least three members. Larger

committees might not essentially be higher as proven in Thai Bev's case, however a minimum size of three would enhance the combo of skills and experience.

The proportion of government and non-executive administrators may be versatile however the RC should have a combination of external also as internal experience so as to realize a fairly holistic read of enterprise risks. If the RC members are all created of non-executive administrators, it may be supplemented with a management level risk management team.

Preferably, a minimum of one person ought to be a risk professional. Whereas the definition of a risk professional may be variably taken, one or a lot of specialists ought to own some familiarity with the business during which the corporate is working. International expertise would be helpful significantly during a trendy connected world.

4.6.2. Committee Meetings

The RC ought to meet on a daily basis to review any changes to the chance assessment. Meeting frequency ought to increase throughout crisis periods once volatility within the business surroundings will cause a amendment to the consequence and chance of risks. By adapting the frequency of reviews to the case, applicable and timely risk responses are often developed and acted upon.

The example of Cosco indicates that in committee conferences, AC (or RC?) ought to take actions probatively instead of rummage around for solutions only issues have already appeared apparently. Correct follow-up would then be needed to effectively monitor implementation of risk responses. This will be achieved by establishing a transparent news and feedback channel to the RC.

4.6.3. Number of Board Positions

It may be a mirrored image of however the Board views ERM that determines how members of AN RC are hand-picked. We tend to see within the case of Cosco that poor and inadequate staffing of the RC could cause a distinct variety of risk. Because the advantages of true ERM becomes a lot of evident, it might conjointly become clear that the RC has responsibilities distinctive from the opposite committees of the Board and, to operate effectively, members should have correct concentrate on the tasks of the RC. Hence, the amount of board positions that AN RC member assumes ought to even be taken into consideration once forming the RC.

5. ERM Oversight Structure and Company Characteristics

The alternative approach of getting board oversight in ERM is to possess the AC at the same time perform the RC perform. After all it's forever associate choice to not have any ERM oversight at Board level in the least. We tend to next attempt to rationalize the alternatives of

corporations in their ERM structures with regard to numerous firm characteristics.

5.1. Company Complexity

The implication of assignment the AC a twin role of overseeing ERM on high of its primary audit perform is that there is dilution of focus within the 2 domains. But if the firm includes a less complicated business model and operations, there could be natural process to be controlled by having the AC supervise risk management.

One proxy to estimate the complexness of the firm is that the variety of subsidiaries and associate corporations below the firm. Exploitation the proxy shown on Figure four, the team found that, on AN aggregate level, corporations that have risk management through the AC have concerning sixty two lesser subsidiaries and associate companies compared to firms with dedicated RCs. This appears to point that corporations that are less complicated in nature prefer to perform their risk management oversight through the AC.

This discovery additionally prompted the team to more deliberate on the role of risk management on the amount of complexness business environments and operations. To it finish, we have a tendency to extend the analogy, introduced earlier, of risk management to the enterprise being like the braking system of a automotive.

The case of AN ERM oversight through the AC are often thought of as having a “moderate” braking system for a moderate growth engine. However, because the growth engine becomes a lot of complicated, the braking device can have to evolve in cycle.

On the flip facet, having a top-of-the-line braking system could be overkill for a comparatively tiny and less complicated firm because the resources needed to appoint further administrators can be higher endowed in different components of the firm. Thus a fragile balance has to be maintained to confirm optimum growth, whereas having an inexpensive board oversight within the ERM.

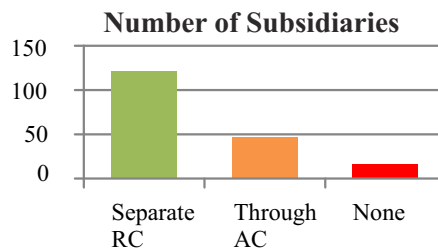


Figure 4. Level of complexity. Numbers are counted from the 12 companies' 2019 annual reports.

5.2. Company Size

Our knowledge conjointly showed that on Associate in Nursing aggregate level, corporations that haven't any RC had the bottom combination revenue. As shown in Figure five, we tend to found that usually, the larger a firm was, as measured by revenue,

the additional elaborate and resourced its Board level ERM oversight was. This observation may even be suggesting that corporations must achieve a better level of sophistication in terms of risk management so as to attain and sustain larger scale businesses, additional therefore within the rapidly dynamical business setting of nowadays.

5.3. Company Ownership Structure

We next explore if the corporate possession structure influences the approach risk management is handled. From Figure vi, there's no conclusive association between possession structure and the approach ERM oversight is structured either through RC or AC.

However the information clearly indicated that firms with none type of Board level oversight over ERM were all owner-managed. As hypothesized earlier, this might be as a result of a high level of Board watching might not be best for owner managed corporations. However, the association of Board oversight of ERM with firm size and complexness might imply that while not subjecting themselves to greater Board oversight, in ERM and alternative matters of governance, these own- er-managed firms might not be able to grow on the far side their current state.

5.4. Challenges of AC with ERM Oversight Responsibilities

Conducting Board oversight of ERM through the AC might gift a pair of areas of concern. Firstly, one would expect associate AC with ERM oversight responsibility to fulfill additional of times. However, knowledge from the corporate sample failed to support this. Generally, the ACs of the businesses in our sample met quarterly whether or not or not that they had ERM oversight responsibilities. It might imply that these ACs weren't disbursement as a lot of time on ERM as those with dedicated RCs either thanks to time or resource constraints. It's going to be that ACs with responsibilities for ERM adopt a manage-by-exception approach, solely concentrating on obvious issues and effort the formulation and execution of the chance management conceive to the chief management.

A second space of concern is that the best AC and RC have maybe rather difference necessities in terms of composition and such completely different requirements would clearly not be met if the RC and AC are combined. The dominant principle of the AC composition is that the independence of members with accounting or connected money management experience or expertise, whereas RC was seen earlier to profit from domain experience and govt or business executive participation to totally appreciate the relevant risk and formulate optimum responses. It appears to be a undertaking to expect associate AC to satisfy each necessities while not compromise.

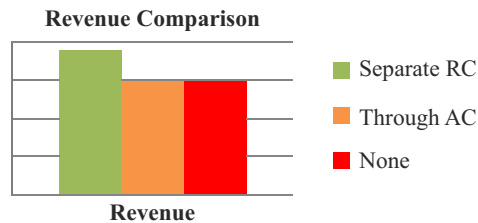
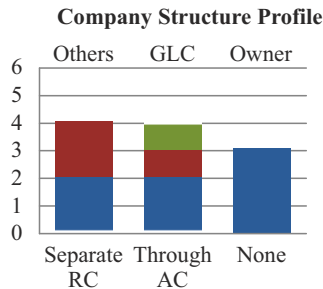


Figure 6. Company Ownership Structure Profile. Numbers of companies in different structure are collected and counted from the 12 companies' 2009 annual reports.



6. Conclusion

6.1. Implication of the Study Results

In examining the ERM practices of the twelve sample firms and their performance within the extremely volatile amount between 2018 and 2019, we have a tendency to found that generally, Board oversight of ERM was related to superior performance in value preservation and creation. By that specialize in the characteristics of the five firms with dedicated RCs, we have a tendency to found that there are sure fascinating RC options like in RC composition and commitment of members that might contribute to raised performance. It absolutely was conjointly found that there was associate association between ERM oversight by Board and company size and complexness. On the entire there's most likely spare proof to mention that formal oversight of ERM at the Board enhances performance and is critical to sustain a corporation operative on the far side a particular scale and complexness (Mensah & Gottwald, 2016).

6.2. Limitations

There were many limitations with this study. The reluctance of corporations to disclose data regarding their risk management ways makes it tough to find organizations implementing enterprise risk management. As a result, despite the range of parameters that knowledge were collected, there are solely restricted sample sizes of twelve corporations, clear associations between ERM and performance parameters couldn't be established in with a good degree of confidence.

And also, it should be noted that the present study has solely gone as way because the identification of correlation between ERM options and firm performance without distinguishing relation. For instance, whereas Board level oversight of ERM was

related to smart performance, it absolutely was impractical with this study to conclude if it was so ERM that junction rectifier to performance or that superior monetary performance provided resources that allowed ERM implementation.

Similarly, this study wasn't able to confirm if it absolutely was of course ERM that sustained giant scale, advanced businesses, or that the massive scale and quality of corporations necessitated ERM; or maybe there was relation in each directions. Therefore, this paper reports solely those that the author discovered plausible relationships.

6.3. Recommendations for Further Research

I would wish to create some suggestions for future studies. Future efforts at investigating the result of ERM on performance may benefit from intra-industry benchmarking to higher isolate the impact of ERM by dominant for distinctive industry factors. It had been conjointly thought that grouping knowledge over an extended amount, in- place of over only 1 year, can offer for an additional in-depth insight to the event of ERM and company performance.

It would be enlightening for future studies to be conducted with the express purpose of distinguishing causative relations between ERM practices, performance and firm characteristics. An experimental analysis approach may well be accustomed establish an on the spot qualitative relationship between variables. Whereas this might be easier same than done, we tend to believe this presents fertile analysis grounds for the current generation of risk management practitioners and students.

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Perspectives on Religious Tourism in Rural India

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Abstract

Religious tourism in India is considered a mechanism for finding inner peace. This paper aims to study religious tourism in rural India through a study of the rural pilgrim center of Naimisharanya in Uttar Pradesh, a name that finds place in ancient Hindu scriptures. It is a descriptive case study. Information has been collected from stake holders including pilgrims, the local community and agencies involved with the pilgrimage including government officials and tour operators and rest house managers through in depth face to face interviews. It analyses the conditions prevailing through PESTLE analysis and suggests steps that can be taken by stakeholders to transform a rural pilgrim centre into a developed religious tourist locale. It is found that this place has potential for development as a center for Vedic Literature Education. The research findings augmented with further research can be used to develop and design a conceptual model that represents the important elements of a rural pilgrimage development project.

Key words : pilgrimage, rural tourism, spiritual tourism, Naimisharanya

1. INTRODUCTION

In India, religious places are preferred destinations for domestic as well as international tourists. The most primitive forms of tourism include visits to religious sites. (Rinschede, 1992). Classically, such locales in India had been small and remote locations situated in pristine geographies. Currently, many pilgrim centers have shown rapid urbanization. The temple town of Shirdi is one such vivid example. There are several others that have been under the administration of government owned trusts and the results of development in terms of facilities for pilgrims is evident and visible.

The development of pilgrim centers particularly in rural areas and the impact of this initiative on the social system of the world civilizations has been established by historians. Nowadays, pilgrimage is a part of international tourism because it contributes to the development of economy, like any other type of tourism. Through this study the researcher is looking at understanding the mechanism for tourism development in religious tourism centers in rural India through a case study of Naimisharanya, a name that finds place in ancient Hindu scriptures.

The researcher also addressed functions and limitations in traditional pilgrim centre management at this site and the lack of standardization when developing a rural pilgrim centre as a tourist destination.

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2. THEORETICAL FRAMEWORK

Indian economy has benefitted by the emergence of the tourism sector as an important sector for growth. By 2027, international tourist arrivals are forecast to total 17,284,000, generating INR 2,901.7bn, an increase of 6.1% pa. (World Travel and Tourism Council Report, 2018)

The Incredible India Campaign has added immense value to the attractiveness of India as a tourist destination. By supposition tourism is slated to be a source of pleasure, but of late tourism avenues have grown by leaps and bounds. The list includes Recreational tourism, Environmental tourism, Historical tourism, Ethnic tourism, Cultural tourism, Adventure tourism, Health tourism, Religious tourism, Music tourism, Village tourism, and Wild life tourism. The latest variety that adds to this list is Election tourism (Bennur, 2018)

A tourist motivated by faith and religious fulfillment, is labeled a pilgrim (Niemenin, 2012). It is a worldwide phenomena that the number of pilgrims and religious tourists has increased significantly (Blackwell 2007). The local community in any region with religious tourism potential can be benefitted in economic terms if it develops to attract more tourists. There can also be socio-cultural, political and environmental implications (Collins-Kreiner, 2016).

Rural area by nomenclature is any area which is not categorized as Urban area. An Urban Unit or Town is defined as a place with a municipality, corporation, cantonment board or notified town area committee, etc. known as Statutory Town. All other places which satisfy the following criteria that is a minimum population of 5,000; at least 75 per cent of the male main workers engaged in non-agricultural pursuits; and a density of population of at least 400 per sq. km. is known as Census Town. The remaining areas are considered as Rural Area.

Conceptually, rural tourism may be regarded as tourism in the countryside that embraces the rural environment as pivotal to the product offered (Clarke, Denman, Hickman, & Slovak, 2001).

The state of Uttar Pradesh, in India, offers a rich assortment of attractions, to the avid voyager in the form of monuments, mountain peaks, a wealth of ancient temples and viharas, rich natural forests with huge biodiversity, enthralling rivers and enchanting valleys. Agra, Ayodhya, Sarnath, Varanasi, Lucknow, Mathura and Prayag combine sacred and architectural wonders.

Year	Indian	Foreigner	Total
2014	18,42,77,423	29,09,735	18,71,87,158
2015	20,65,15,617	31,04,062	20,96,19,679
2016	21,35,44,204	31,56,812	21,67,01,016
2017	23,39,77,619	35,56,204	23,75,33,823
2018	28,50,79,848	37,80,752	28,88,60,600

Table1 : The Indian and Foreign tourist visits in important tourist places of Uttar Pradesh during years 2014 - 2018

Source : UP Tourism website accessed on 1/3/2019

A pilgrimage is a journey to a sacred place as an act of religious devotion (Sykes, 1982). Naimisharanya (popularly known as Neemsar) is derived from two Sanskrit words Naimi meaning



Fig 1 : India on World Map

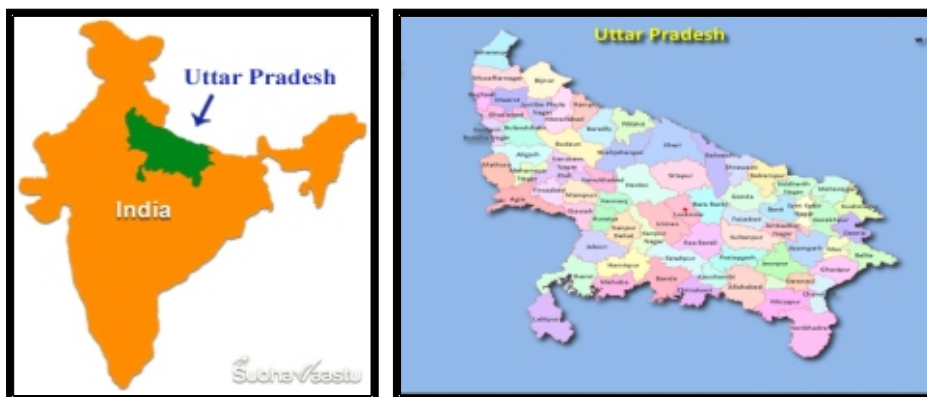


Fig 2, 3 : The State of Uttar Pradesh



Fig 4: Naimisharanya, district Sitapur (Uttar Pradesh)

the surface of a disc and Aranya meaning forest, therefore the name signifies Naimish forest. As all ancient sites, this too lies on the banks of a river, Gomti in Sitapur district which lies 94 Km away from Lucknow in Uttar Pradesh. As per mythology, Naimisha forest is the site for the narration of the epic Mahabharata. The place also finds mention in the *Satya Narayan Katha*, a reading of which is organized by *Hindus* on full moon day as a means to wash away their sins. It ranks highest amongst all pilgrim centres for *Hindus*. The Hindu month of Phalgun is the time for the famous *Chaurasi Kosi Parikrama* (around the festival of Holi) to honour Maharshi Dadhichi. The places of tourist and pilgrim interest at Naimisharanya include Chakra Tirth, Vyas Gaddi, Rudravart Mahadev, Dashashwamedha Ghat, Misrikh Teerth or Dadhichi Kund, Pandav Kila, Puram Mandir and Ashram of Ma Anandmayi and Soot Gaddi.

3. REVIEW OF LITERATURE

The status of Naimisharanya as a tourist destination is quite low. There exist several studies on developing tourist destinations and its economic impact on the region. There also are several researches that have been done on rural tourism. However a detailed search has resulted in only a few researches on development of underdeveloped pilgrim center sites but none on rural underdeveloped sites like Naimisharanya.

Rural Tourism is a form of tourism that is made to be responsive to the environment and holds in reverence the social and cultural values of the communities and that allow both guests and host to enjoy positive and worthwhile interaction and shared experiences (**Wearing & Neil, 1999**)

The complicated constructs of civilization, history, and nature can be effectively used to produce and market a unique picture of a tourist destination (**Poimiroo 2000; Ooi 2001**).

(**Balaguer and Contavella-Jorda, 2002**) examined the role of tourism sector in the extended economic development of the country. The hypothesis of tourism led economic growth was confirmed by applying co-integration and causality tests

Most of the tourism is destination specific, therefore the destination itself forms a pillar of any modeling that is done for the tourism system (**Pike & Page, 2014**).

Shinde, Kiran. (2015) in their paper on Religious tourism with insights from pilgrimage sites in India claim that each religious tourism site provides different sets of opportunities for the “others” to get exposed to religious and cultural aspects. They have also found that engagement with cultural performances and participation in the religious tourism economy in a pilgrimage site is a direct contributor to religious tolerance.

In a study by (**Aukland, 2018**), the author has demonstrated the variety of ways in which Hindu pilgrimage becomes ever more entangled with domestic tourism, and the potential for new research angles this entanglement generates. The study provides a bird's-eye perspective of the various points of connection, confluence and overlap between Hindu pilgrimage and domestic tourism in contemporary India.

4. METHODOLOGY

The protocol was designed to collect information as to how Naimisharanya pilgrim center features

on the macro economic parameters through the scientific research study of the stakeholders in this ancient pilgrim centre. Collection of data for this study has been a mix of several methods. The population for this study includes pilgrims and other stake holders including big land holders and parties that acquire annual contracts for local temple area management. Primary data has been collected using quantitative research, from tourists at the location and the stake holders involved in the pilgrim center. Pilgrims were contacted through an instrument comprising of structured questions that were completed by the respondents according to their convenience. The study used random probability sampling for the tourists at the location. In depth face to face interviews were held with local community and agencies involved with the pilgrimage including government officials and tour operators and hotel managers during the month of June, 2018. A special mention for Mr. Vinay Mishra, a local at Naimisharanya who has held the annual contract for the year 2017-18 for the management of all religious and spiritual services provided at the *shaktipeeth* Lalita Devi temple, Naimisharanya. The secondary data are collected from various books, journals, periodicals and government sources including tourism department.

Every country desires to increase revenue through invisible exports pertaining to the tourism industry. PESTLE analysis is therefore applied to the pilgrim tourist destination of Naimisharanya. (Johnson and Scholes, 2000). This analysis has been applied to the destination with the intention of focusing on the crucial elements on the environment of Naimisharanya such that they influence the development of the rural tourist destination.

5. OBSERVATIONS AND FINDINGS IN FORM OF PESTLE ANALYSIS

Naimisharanya finds mention as a dense forest in several ancient scriptures, including the Mahabharata.

5.1 Political Scenario of Naimisharanya

Indian governance follows a federal structure. The political scene at Naimisharanya is affected not only by the government policies but also the ideology of the political party at the helm of affairs. Tourism neither figures separately in the Centre list nor the state list. However for all practical purposes, tourism is looked after by the respective states. This Vidhan Sabha seat was held by the Samajwadi party from 1996-2017. The Bhartiya Janta Party came to power in the 2017 state elections. With BJP at the national level and the BJP government's agenda to promote cultural and spiritual tourism, Naimisharanya has benefitted in terms of fund allocation. In order to improve and strengthen tourism in this ancient tourism destination, the Yogi Adityanath government in Uttar Pradesh in 2018 approved a proposal to fund fairs held by three Shakti-peeths during Navaratri including Ma Lalita Devi Shakti-peeth Amavasya Mela, Naimisharanya in Sitapur. A special grant of Rs.60 lakhs was given by the government to the destination. These funds were allocated for extending proper facilities during the Navratri fairs on account the destination's huge popularity. The decision was taken with the view of providing proper facilities and flourishing arrangement of the local congregations keeping in mind their inter-district, inter-State and international appeal. The local municipal corporation had the responsibility of managing the Navratri fairs earlier. Now, post the additional allocation of Rs. 60 lakhs,

the district magistrate was given the additional responsibility of managing the location fairs. A major issue is the lack of cooperation between the government mechanism and the private service sources on the development of tourism related communications, road and rail network and other facilities.

There is also continuous power struggle between the temple contract holders and the local shopkeepers and businessmen.

5.2 Economic Scenario Of Destination Naimisharanya

As regards the economic factors related to Sitapur district, the main source of income in the district is from the agriculture sector. The level of industrialization is low. Certain pockets are better off like Bhadohi which is a hub for carpet and *durrie* manufacturing. The per capita income of the district is Rs. 36152. Total cropped area is 6,58,798 in hectares and the forest area is 209 in sq km as per 2017 published data. The average size of households in the district is 5.6 persons.

Naimisharanya in itself is a vibrant religious and spiritual destination in the state. It is also been home for traditional craft like basket weaving which is now on the decline due to lack of marketing avenues. In terms of employment opportunities apart from agriculture in Naimisharanya there is only one opportunity of providing services in terms of offerings that are used by the pilgrims at the location. Several parties, not belonging to Naimisharanya, have invested in large land holdings. Some have even got land allotted in the name of educational institutions, but these are lying vacant. Major economic activity is characterized by seasonality and peaks twice during the year. Sale of trinkets and goods offered to the Goddess Durga spike during the *Chaitra Navratri* and *Sharad Navratri*. There is local crowd every no moon day popularly called as *amavasya*. Tourists that visit Naimisharanya have spending potential but the avenues for spending are extremely limited. Infrastructure is also an area of concern, Quality accommodation is nonexistent as there are no hotels of 3 star or above category. Dharamshalas/ budget hotels and rest rooms are also insufficient in number. The place requires investment in several areas

1. Construction of quality hotels
2. Construction of Dharamshalas/budget hotels
3. Construction of fair center and ground with adequate parking and wash room facilities
4. Brand positioning as a destination for quality tourism and religious observance.

5.3 Social Credentials

This pilgrim center has phenomenal credentials as it finds mention in “Satyanarayana” Puja katha written in Reva volume of the Skanda Purana a palm leaf written version of the same dating back to 8th century CE. It is talked about in every ancient composition including the Bahgwat Gita and the Tulsidas composed Shri ram Charita Manas. Infact the Bhagwat Gita proclaims that there is no place more pious than this. India is witness to an increase in the life span as well as higher levels of disposable income. This social change has resulted in an increase in both domestic and outbound tourism. Naimisharanya is

located at a distance of 94 kilometers from the state capital, Lucknow. The location is well connected with nearby towns and cities by four lane highway till Sitapur and further a metalled double road. Train connectivity is also there as Naimisharanya is located on the railway line connecting Balaanaur (district Hardoi) to Sitapur. It is also connected with Kanpur by rail enroute Kanpur- Balaanaur. All the primary shrines at the location are well connected with a paved street. This facilitates the coverage of the pilgrim center in a short time. The site is underdeveloped in term of tourist facilities. Very few crude options for accommodation are available. There is a dormitory facility provided by Sri Balaji temple. Local transportation facilities are inappropriate for middle class pilgrims. Three wheelers ply. Most tourists have to be on their own in terms of transportation. Proximity to Lucknow is also a major weakness because this takes away the very reason why Naimisharanya should be developed in terms of infra structural facilities for tourist. Because of its proximity to Lucknow, most tourists make it a day trip from Lucknow and return by evening.

Naimisharanya has huge potential to be developed as a major tourist center not only for the spiritually inclined but also for regular tourist. The *parikrama* (circumambulation) is a ritual performed by Hindus on a path 16 kms long. This stretch can be developed to attract tourists. Marketing of souvenirs along the path with neatly constructed small stalls would be an added attraction. Being located on the banks of the river Gomti, the place has potential for river front development with water body based entertainment options. For the spiritually inclined, there is a major attraction, '*Rudravart*.' This is a naturally occurring phenomenon at the river where anything offered goes down in a unique manner. The location is also a site for the prayers *Shraddh (Pind Daan)* offered by Hindus for their departed ancestors. Very few people know about this fact. Gaya in Bihar is famous for this ritual performed by most Hindus. Naimisharanya can be promoted for the same.

The place is also site for a Shakti-peeth namely Lalita Devi. Lalita Devi is one of the 51 Shakti Peeth's located in the Indian sub continent. This ancient temple is beautifully structured and is a major attraction throughout the year but tourist traffic peaks twice during the year on the occasion of Navratri.

At this location several sellers throng haphazardly seeking the pilgrims attention with the objective of making a sale. This can be prevented by assigning proper shops for marketing of goodies and goods for offering in the temples.

The land mafia is also very active in and around Naimisharanya. The damage to the social fabric on this account is phenomenal.

5.4 Technological Ascendants

India is an ICT superpower. This factor can be used more constructively to upgrade all services related to tourism. Naimisharanya figures prominently on the UP Tourism website. The places worth visiting at the location are also well covered in terms of description. However the site itself suggests that tourists can take a taxi from Lucknow and complete the Naimisharanya circumvention in a day and return by evening. Also since good

accommodation is not available in Naimisharanya, integrated tourism can not be developed and offered to the national/ international tourist. Innovation in the brand building of Naimisharanya must be taken up by the government coupled with e-governance. A tourist information center must be set up at the location near the highly popular Chakra Tirth. Traffic management during both the Chaitra and Sharad Navratri and the Amawas Mela must be managed by an intelligent traffic management system. This needs to be accompanied with proper parking facilities. ICT tools should be used to offer package solutions to every spirited traveler.

Naimisharanya is also the location for *Vyas Gaddi*. It is here that the Vedas were divided into 4 main parts and formed Puranas by the saint Ved Vyas. Here, he also preached Shrimad Bhagvathgita and Puranas to saints like Jaimini, Vaishampaayam, Shuk Dev, Suth, Angeera and Pail. A Banyan tree that is ancient is located very close to the Vyas gaddi and is believed to be special as Ved Vyas had his gurukul here.

This place has potential for development as a center for Vedic Literature Education. This can have a major magnetic attraction for the international spirited learner. The concept can be marketed through digital marketing.

5.5 Legal aspects

The present government at the centre has initiated a number of legal changes that are directly affecting the tourism potential on a macro level. Swachh Bharat Abhiyaan, waste management, basic facilities for the differently-abled, pollution and noise control regulations and health and safety facilities. These efforts have resulted in a rise in the number of International tourist arrivals (15.5 million 2017 published reports *"UNWTO Tourism Highlights: 2018 Edition | World Tourism Organization"*. The ranking of India according to the *TTCI (travel and tourism Competitiveness Index 2017* has shown a twelve places jump from 2015.

5.6 Environmental factors

Maintaining the excellence of the environment both natural and man made is essential. Naimisharanya lies on the banks of the river Gomti, and has natural forest in the north west. There is lack of a unified approach to solid waste management. The river Gomti that meanders beside Naimisharanya is under tremendous pressure due to pollution. Low lying areas are prone to flooding. Cattle grazing in the open is not restricted leading to large scale erosion. To stop the damage several actions must be taken. Specialized waste management should be done to prevent dumping of solid waste in the open followed by proper treatment and disposal.

6. CONCLUSION AND SUGGESTIONS

The recent success story of Ardh Kumbh at Prayagraj is no wonder. The concept of marketing and branding of a religious tradition is not taken into serious consideration in the promotional activities of Naimisharanya. On the basis of PESTLE analysis of the destination, the researcher concludes that Naimisharanya has vast opportunity for emerging as a favoured destination but

at the same time reiterate that each segment of the PESTLE analysis of the region must be developed to cash this prospect. Irrespective of the political scenario of the country and the state, tourism should be promoted and basic quality infrastructure must be put in place as tourism is an important source of revenue generation. The state of Uttar Pradesh should improve the infrastructure and start the promotion of the not so popular destinations to offer a better package to the spirited traveler. The image of Naimisharanya needs to be created with unique attributes to further improve its popularity in terms of physical amenities of international standards and at the same time protection of its natural heritage must be ensured. There is always an option of the Government constituting a trust and taking up the management of the pilgrim centre. Then accountability increases as funds are utilized for the betterment of the location and in improving the facilities for the pilgrims. But it is easier said than done. Being located on the banks of the river Gomti, the place has potential for river front development with water body based entertainment options.

The governments one time grant of Rs 60 lakhs in 2018 is not a solution. Whole hearted attempts and efforts will have to be made to provide better infrastructure and facilities to develop such rural centers of pilgrimage tourism. Local administration can provide avenues for spending by tourists through marketing outlets. ICT tools and the digital marketing platform should be used to offer package tourism solutions. Specialized waste management is a must for every tourist destination including Naimisharanya to prevent any kind of environmental degradation. All of this well augmented with the participation of the local community can help in bringing about a significant positive contribution to the locale.

7. LIMITATIONS

As data was collected during the peak summer month in Northern part of India, it was both a blessing in terms of large number of pilgrims and a limitation that patience in answering the questionnaire by the tourist pilgrim was low. Questionnaire had to be administered to some respondents in local language through an enumerator.

8. SCOPE FOR FUTURE RESEARCH

An environmental impact analysis of infrastructure development for tourism purpose at Naimisharanya. Marketing Communication plan for Naimisharanya targeting the modern traveler.

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Need for Resolution of Degeneracy in Transportation Problems

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Abstract

In a transportation problem degeneracy may occur either at initial stage while getting the initial BFS of any problem or at any subsequent stage. Degeneracy occurs when the total number of positive allocations in any transportation problem, are less than $m+n-1$ for any $m \times n$ matrix. Degeneracy must be resolved on its appearance because a problem can not be solved for the optimal solution if it is degenerate. An effective way to resolve degeneracy is to allocate some small positive allocation to any vacant cell, so that the solution of the problem could not affect.

Keywords: Transportation Cost, degeneracy, optimal solution, BFS.

Introduction

For the resolution of degeneracy in any transportation problem, we need to assume an extremely small positive amount say ϵ , to an unoccupied cell to get exactly $m+n-1$ allocations. If the number is large to get $m+n-1$ allocations then we may consider ϵ_1, ϵ_2 etc. for the vacant cells. This small amount should follow the following properties:

- (i) $0 < \epsilon < x_{ij}$
- (ii) $0 + \epsilon = \epsilon$
- (iii) $x_{ij} + \epsilon = x_{ij}$ = i.e. $\epsilon \rightarrow 0$.

Let us take an example to solve the occurrence of degeneracy

				Supply
	2	4	1	40
	6	3	2	50
	4	5	6	20
	3	2	1	30
	5	2	5	10
Demand	50	60	40	

(Fig-1)

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Now we apply Lowest- cost entry method to find an initial basic feasible solution to the given transportation problem and we get the solution table as

30			10
2	4	1	
	50		
6	3	2	
20			
4	5	6	
		30	
3	2	1	
	10		
5	2	5	

(Fig-2)

Total Transportation Cost = $30 \times 2 + 10 \times 1 + 50 \times 3 + 20 \times 4 + 30 \times 1 + 10 \times 2 = 350$

Now in the solution table the total number of positive allocations are 6 which is less than $m + n - 1$ i.e. $(5 + 3 - 1 = 7)$, since $(6 < 7)$. So the above solution is degenerate and this solution is not applicable for the optimality test to get an optimal solution.

Now we need to allocate an extremely small positive amount ε to any unallocated cell having minimum cost to get exactly $m + n - 1$ i.e. 7 positive allocations such as :-

30			10
2	4	1	
	50	ε	
6	3	2	
20			
4	5	6	
		30	
3	2	1	
	10		
5	2	5	

(Fig- 3)

Allocating ε to the cell C23 having minimum cost. Once we get exactly $m + n - 1$ positive allocations. We may move further for the optimality test. For this, we need to calculate the net evolution $d_{ij} = c_{ij} - (v_i + v_j)$ for every unallocated cell and check whether any $d_{ij} = 0$ then we need to form a loop starting with an allocated cell and travelling equal distances either horizontally or

				v_i
	30	(2)	10	
	2	4	1	1
	(3)	50	ϵ	
	6	3	2	2
	20	(1)	(3)	
	4	5	6	3
	(1)	(0)	30	
	3	2	1	1
	(3)	10	(4)	
	5	2	5	1
v_j	1	1	0	

(Fig- 4)

vertically and return back to its origin vertex.

For calculating $(d_{ij}=)$ net evolution, we need to calculate some values of v_i and v_j such that for any allocated cell $c_{ij} = v_i + v_j$.

In the above transportation table we observe that all $d_{ij} > 0$ with $d_{42} > 0$ which states that the current solution is optimal and alternate and the total transportation cost is

$$= 30 \times 2 + 10 \times 1 + 50 \times 3 + 20 \times 4 + 30 \times 1 + 10 \times 2$$

$$= 350 \text{ Since } \epsilon \rightarrow 0.$$

Conclusion

This has been observed from the above calculation that degeneracy is an important issue, when occurs initially or any subsequent stage. If it is not resolved, it causes cycle, as a result the linear programming problems can not be solved for the optimal solution. However, degeneracy does not affect on the solution of the transportation problem. Another important aspect is that if Least Cost Method is used to find out the initial BFS then there may be less chances of the occurrence of degeneracy at the initial stage. This analysis may be useful for various applications of information technology and management.

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An empirical review with major impact of cloud computing architecture: Securities issue, Benefits & Opportunities

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Abstract

Cloud computing is a new concept for hosting and delivering services over the Internet under one roof. Cloud computing is online-based computing services, where each one deliver/shared data , resources, software, hardware and portable devices on-demand based using visualization among the clients. Cloud computing is a combination of distributed computing, grid computing and parallel computing. The small to medium business companies are now adopting cloud computing in much more higher rate than large size of companies. The main thing of cloud computing is reducing the processing cost on the users. User use a various type of online services offered by cloud computing providers such as hardware, software, storage area and application development platform and to access multiple type of utility program, application and storage devices over the internet. The Main benefit of the cloud computing includes cost saving, energy saving, high availability and support to green computing technology.

In this paper, we provide a empirical study about the background and service models of cloud computing and also presents the existing research factor and implications in cloud technology such as security issues, reliability, drawback and benefits.

Keywords: Cloud Computing, Utility, SaaS, PaaS, IaaS, Layers, RaaS, Service model, Deployment model.

1. Introduction

Cloud computing is a pool where we can access all services under one roof though internet. Cloud computing has the most powerful architecture of computation. According to Evgeny Morozov, "Cloud computing is a great euphemism for centralization of computer services under one server."

NIST definition, "cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources where we can use collection networks, multiple servers, storage devices and applications development platform with online services that can be rapidly provisioned and released with minimal cost & minimal management effort or service provider interaction."

According to NIST definition lists five essential characteristics of cloud computing:

On-Demand Self-Service, Broad Network Access, Resource Pooling, Rapid Elasticity or Expansion, Measured Service.

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Cloud computing technology is a new era computing technology where collection of software and hardware devices placed over a network to access as per requirement or on demand basis through internet instead of having them locally within the enterprise. Cloud computing service provider company holds the responsibility to control and deliver all the software and hardware using virtualization among the various types of clients.

The main benefit of the cloud computing technology includes cost savings, high availability, and easy accessibility. However, still there exist many problems in cloud computing today, the main problem to pointing those data security and privacy risks have become the primary concern for people to deliver or switch to one service provider to another service provider.

2. Cloud Computing Network Model

Cloud computing is a network model that creates a network connection to the pool where services available on-demand and easily-accessible, ready-to-use, and configurable machine.

Basically there are three types of services provided by cloud computing technique that are –platform as a service (PaaS), infrastructure as a service (IaaS) and software as a service (SaaS). The basic examples of few names of cloud computing services Provider Company which are used by general purpose in daily life are Amazon web services (AWS), Face book, Rack space, YouTube, Drop box, and Gmail etc. It offers scalability, flexibility and simplicity that are why its use is rapidly increasing in the enterprises.

Many more major cloud service providers company include, IBM, Oracle, Cisco, Citrix, Google, Microsoft and SAP, Rack space, and Verizon. Sales force and Apple are also big players in cloud computing service provider companies.



Figure -1.Cloud Computing Network Model

List of some of the major Cloud computing Service provider and their approaches

Cloud computing service provider	SAAS	PAAS	IAAS
IBM	X	X	X
Microsoft	X	X	X
Rack space		X	X
Google	X	X	X
Century Link		X	X
Amazon Web Services		X	X
SAP	X	X	X

3. Evolution or Revolution/History of cloud computing (Development Process)

1950	1960	1980	1990	2000	Beyond 2010
Mainframe Technology	Use Of Personal Computer(Mini computer)	Grid Computing	Utility Computer & Client server	Software As a Services (Hosted environment)- Mobile Devices	Cloud Computing
* Local Infrastructure & Start of automation Phase	* Startup of IT Services company * Decentralized Computer & rise a demand of personal computer	* Large problem solved by parallel computing structure	*Demand for High bandwidth *Dot Com revolution *Working start based on VPN Technology	* Application as a subscription * Increase use of virtualization * Outsourcing of IT infrastructure	* Emergence of 'as a services' * Delivery of IaaS, PaaS, SaaS. * Collaborate computing
IBM	DEC	Intel	Microsoft/Cisco	Nokia	Cloud Computing

The evolution of Cloud computing is a combination of that accessing of services including storage, applications development and servers through the Internet, making use of another company's online services for a free. This enables a company to store and access information and programs virtually, in other term a cloud technology, rather than on local hard drives or computing machine.

The concepts of the cloud computing have existed for many years, and can be traced as far back as the 1950s with mainframe computing, when mainframe computers were huge machines and very expensive machine too expensive to buy and maintain one for every single person. At that time, multiple people accessed the central computer via local terminals.

In during period of 1970s, International Business Machine came out with an operating system named Virtual Machine. This virtual machine allowed for simultaneous operation of more than one Operating System. Operating Systems could be run on every Virtual Machine with their own memory structure and information access & share to these resources. The concept of virtualization is very popular for that time.

The 1990s, Many Telecom operators starts virtualized private network connections (VPN) technology whose service was as very good as those of dedicated services at a low cost.

In the duration of 2000s, Amazon Web Services (AWS) emerged and Amazon launched Elastic

Compute Cloud (EC2) technology in 2006 and allowing various companies and individuals to subscribe virtual machine through use their own programs and applications. In the same year, Google launched its Google Docs services allowing users to save, modify and deliver information in the cloud world.

In period of 2007, Google, IMB, Universities and research centers joined forces to develop a cloud based research projects. The Netflix launched its video streaming service using the cloud technology to stream video and other content into the home computer of subscribers worldwide.

4. Core component of cloud computing architecture- Cloud computing have three basic components as follows-

4-1. Client Machine- End User: The hardware, software and everything else developed for cloud computing will be used in the client. We cannot make cloud architecture without the client machine, nothing will be possible. The user can communicate with the cloud computer using the client machine.

4-2. Distributed Servers: The distributed servers can defined as sharing of information by different computer which may be different machine.

4-3. Data Centers: A data centers is a warehouse of computing facility & data center refers a server house where store and access the data through internet.

5. Layers and Types of Cloud Models:

There are four types of service model in cloud computing:-

Figure-2. Relation between layers & deployments of cloud computing

5-1. Software-as-a-Service (SaaS): This type of service of cloud computing model where a third-party provider hosts applications and makes them available to client over the high-speed internet connection. Software-as-a-Service providers provide fully web-based applications on demand to client. The applications are design for business users and can include web conferencing, Enterprise Resource Planning, Customer Relationship Management, email, project tracking & others services related to client.

Advantage of SaaS:-

- Rapid Scalability
- Access information from any location with Internet
- Eliminates infrastructure concerns
- Custom levels of service offerings
- Maintenance and Support

5-2. Platform-as-a-Service (PaaS): This types of service model more advance to IaaS and also called middle layer service model which gives the companies, organizations and institutions a freedom and framework for software developers to develop their own software and deploy cloud solution for particular application.

Advantage of PaaS:

- Lower cost
- Simplified deployment
- Community based Service
- No more upgrades

5-3. Infrastructure-as-a-Service (IaaS): Infrastructure-as-a-Service is the bottom level of cloud computing services and refers to cloud-based computing infrastructure based on - outsourced service. An Infrastructure-as-a-Service provider will deliver pre-installed and configured hardware through a virtualized machine. A customer accessing the cloud based services do with the service is up to them. IaaS is most useful the service models because it is the basic requirement to setup the organization's services over the internet in a cloud based platform and applications to run them properly in mannered form.

Advantage of IaaS:-

- Customer pay for the service that they want use.
- Easily access to all services related to IT resources and infrastructure.
- Users can use their services up and down based on their requirements at any time.
- Reduces total cost of ownership and capital expenditures.

5-4. Recovery as a Service (RaaS): Recovery as a Service helps organization to upgrade their configuration, archiving files with disaster recovery and business continuity solutions in a separate platform. RaaS providers companies can help companies recover their data centers, operating system, software, configuration, files and databases. This type of service is very effective use of cloud services by improving efficiency and minimizing costs. Customer can take cloud services based on their priorities areas of interest and business processes.

RaaS helps businesses to minimize the impact of downtime when disasters occurred. RaaS is also known as Disaster Recovery as a Service (DRaaS).

Advantage of RaaS :

- Hold temporary or permanent loss of critical company information.
- Is a cost-effective way of recovering documents (files & database?)
- Very faster way of recovery while maintains of system.
- Hold permanent loss of physical data, including Information Technology infrastructure.

6. Deployment model of cloud computing services

6-1. Public Cloud: The public cloud services are easily to install and less expensive or free of cost. The software, hardware and bandwidth are provided by the service provider and the

user available can only those services that they are interested. This is type of resources provided by cloud services used by different companies through internet on a pay for what you use.

6-2. Private Cloud: As the name indicates, its services, infrastructure is totally operated and maintained by a particular organization and can be located on site and off site. These types of services are available on proper authentication and priority basis is being given the client's data security.

6-3. Community Cloud: A cloud computing model that include a combination of on premises private cloud and third party cloud between two platforms. This type of services controlled and used by a group of entities, organization or individual that have shared on interest or common goals for every participant which is being part of a community, whose requirements are similar.

6-4. Hybrid Cloud: Hybrid cloud is a combination of two or more than two cloud deployment models like public, private and community. This type of cloud will operate behind a firewall and treated as private cloud network. Hybrid cloud includes storage, networking, deployment of application, security and various types of management tools.

			
*Works best for own enterprise with their own in house IT support with own data center	* Higher cost compare than public cloud *Fixes amount of bandwidth & storage limit.	*More useful for small & midsize business *Lower cost & more feasible * Mostly data to be store hosted desktop machine (online) *All information accessed via web & pay for what you use	*Combination of public & private cloud network *Allowing some data to be store internally & other to be store off site
Amazon, IBM, Cisco, Dell and Red Hat	Google, Red Hat, IBM, Microsoft	SAP HANA	Dell EMC

7. Beneficial point of cloud computing: This is due to the fact that information storage & retrieval process is cheaper and easier to get from the cloud computing technology. The cloud technology enables its customer to select how they will get and transfer IT services. Cloud computing means you can store and access data from the internet rather than the computer hard disk storage. The cloud technology will help you access the data, servers, databases and multiple application services all in one place via internet.

The benefits of cloud computing are-

7-1. Cost effective: The cloud technology gives a facility you pay for the services they require and Maintenance cost is low as user does not required to hire the infrastructure. When user cannot afford for building, servers and databases, which are extremely expensive to build and maintain the infrastructure, the cloud technology helps you minimize that cost since you will pay for only what you are required.

7-2. Economies of Scale: The economies of scale have reduced the cost of IT services such as email, video conferencing, telephonic call and many more or Web hosting of website.

7-3. Flexibility: The most important thing about cloud computing is that it is highly flexible. The works can be completed using computers in different-different location via web.

7-4. Reliability: Reliability & availability is an important issue of cloud computing for maintaining client's confidence and satisfaction and preventing revenue loss. Reliability & high availability in cloud computing services are some of the big challenges in IT industry.

7-4. improved performance: A Single machine can only perform to their best functionality but with cloud computing, you get the best from the whole system. Cloud computing use the same thing but individually they are two distinct things. As a businessman you can use both to improve your business and low investment in return yields higher profits.

7-5. Upgraded Security Model: Cloud computing technology provides high security model with advanced firewall by using the data encryption & decryption technique, security intelligence, strong access controls and key management.

7-6. Data Encryption: The process of conversion of data into a secret code. Encryption technique is the very important path to achieve data security. When read an encrypted file, you can access to a secret code or password that enables you to decrypt it. Original code or unencrypted code is called plain text and encrypted code is considered to as cipher text. The encryption technique find on the servers machine that host the Virtual Machines. The Virtual Machines provide encryption of data-in-transfer– Virtual Machines to Volumes.

8. Customer Views based on Cost, Reliability and Security: Cloud computing, the long-held scenario of cloud computing technology as a utility computing, the ease of use and outsourced IT services of such an approach is appealing and making software even more attractive as a service and create the path of IT industry. Software developers with ideas for new web services no longer require the capital and hardware to deployment their services or the human expense to operate it. Many companies with large batch-oriented tasks can get results as quickly as per their requirement, since using 100 servers for one hour costs no more than using one server for 100 hours. This elasticity of resources, without paying a premium for large setup work is done.

Many small & midsize industries move their applications and infrastructure to the cloud world and CSP (Cloud service provider) companies they also give up full control to the industry. Reliability and security are major concerns for cloud computing technology and many more cloud service providers are focusing on providing high levels of service and security based cloud computing platform.

Conclusion:- In this paper we described in short the introduction, evolution, service model with deployment, types and components of cloud computing and also different approaches of cloud computing and some of its advantages. The application area of cloud computing will continuously is increasing. Today approximately all small and big industries are using cloud computing to manage storage, traffic and hardware requirements. So, it is clear that there is major impact of cloud computing on society and business industry.

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Analysis On Internet Of Things: It's Industrial Applications And Challenges

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ABSTRACT

The expression Internet of Things (IoT) messengers a dream without bounds Internet where interfacing physical things, from banknotes to bikes, through a system will give them a chance to take a functioning part in the Internet, trading data about themselves and their environment. This will give quick access to data about the physical world and the items in it prompting creative administrations and increment in proficiency and profitability. As an Emerging innovation, the Internet of Things (IoT) is relied upon to offer promising answers for change the task and part of numerous current modern frameworks, for example, transportation frameworks and assembling frameworks. For instance, when IoT is utilized for making astute transportation frameworks, the transportation specialist will have the capacity to track every vehicle's current area, screen its development, and foresee its future area and conceivable street movement. The term IoT was at first proposed to allude to extraordinarily identifiable interoperable associated objects with radio-recurrence recognizable proof (RFID) innovation. This paper considers the cutting edge of IoT and presents the key innovative drivers, potential applications, difficulties and future research regions in the space of IoT. IoT definitions from alternate point of view in scholastic and industry networks are likewise talked about and thought about. At long last some significant issues of future research in IoT are recognized and examined quickly.

KEYWORDS: Big data, Wireless sensor networks, Service-oriented architecture, Wireless communication

1. INTRODUCTION

Amid the previous couple of years, in the territory of remote correspondences and net-working, a novel worldview named the Internet of Things (IoT) which was first presented by Kevin Ashton in the year 1998, has picked up progressively more consideration in the scholarly community and industry [1]. By installing short-extend versatile handsets into a wide cluster of extra devices and ordinary things, enabling new types of correspondence amongst individuals and things, and between things themselves, IoT would add another measurement to the universe of data and correspondence.

Certainly, the primary quality of the IoT vision is the high effect it will have on a few parts of consistently life and conduct of potential clients. From the perspective of a private client, the clearest impacts of the IoT will be unmistakable in both working and local fields. In this unique situation, helped living, brilliant homes and workplaces, e-wellbeing, improved learning is just a couple of cases of conceivable application situations in which the new worldview will assume a main part soon [2]. Likewise, from the point of view of business clients, the most obvious

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results will be similarly unmistakable in fields for example, Robotization and mechanical assembling, coordination, business process administration, smart transportation of individuals and products.

Be that as it may, numerous testing issues still should be tended to and both technological and also social bunches should be joined before the vision of IoT turns into a reality. The focal issues are the manner by which to accomplish full interoperability between interconnected gadgets, and how to give them a high level of adroitness by empowering their adjustment and self-ruling conduct, while ensuring trust, security, and protection of the clients and their information [3]. More-finished, IoT will represent a few new issues concerning issues identified with effective usage of assets in low-controlled asset compelled objects.

A few mechanical, institutionalization and research bodies are as of now involved in the movement of advancement of answers for satisfy the innovative prerequisites of IoT. The goal of this paper is to give the per user a comprehensive discourse on the ebb and flow cutting edge of IoT, with specific spotlight on what have been done in the regions of convention, calculation and sys-tem plan and improvement, and what are the future research and innovation patterns.

2. REVIEW OF LITERATURE

Modern contamination is one of the fundamental supporters of ecological corruption in creating nations. High vitality utilization, and waste from creation are the fundamental driver of modern contamination. The expanding development in of fabricated items to meet society's requests result to the synchronous development of mechanical waste and vitality utilization (Yuan, Zhai, and Dornfeld, 2012). The extensive measure of mechanical squanders influences all types of conditions by sullyng the air and close-by waterways with risky outflows or releases (Despeisse, Oates, and Ball, 2013). Alongside this, it is vital to screen the utilization of vitality assets in assembling as it has an awesome effect to the utilization of accessible petroleum products given the vitality serious procedures utilized as a part of the business (Garetti and Taisch, 2012).

Lately, the effects of these issues have developed more noteworthy that it has energized the activity in performing extensive investigations to expand attention to the general public's duty to the earth. Governments and specific associations upheld strict laws and conveyed activities to force a standard on the measure of waste and discharges each organization can deliver (Haapala, Camelio, Sutherland, Skerlos, and Dornfeld, 2013). The persevering development and mindfulness towards green assembling affected organizations to consider manageability to be an upper hand. The objective towards supportability pushes advancement to build viability prompting creating exchange vitality supplies and diminishing the sum vitality, assets, and space for generation (Bunse, Vodicka, Schönsleben, Brühlhart, and Ernst, 2011; Chiou, Kai, Lettice, and Ho, 2011; Dornfeld, 2014; Garetti and Taisch, 2012).

With these, studies and research on feasible assembling, administration ideas and mechanical headways to enhance producing practices, for example, the utilization of lean assembling and natural administration hones. These have been emphatically connected with ecological and showcase execution (Yang, Hong, and Modi, 2011). An investigation on an approach towards

reasonable assembling is the thing that they call the three-dimensional approach which means to enhance general manageability with a contamination aversion viewpoint. This examination displays a versatile system on executing this point of view to three fundamental segments which are the innovation, vitality, and material (Yuan et al., 2012).

Shrewd sensors can be utilized for this application to assemble information towards building up a self-learning calculation or a man-made reasoning system to prescient assembling capacities (Lee et al., 2013). This information gathering process isn't appropriate for quality precision yet in addition for creating item plan and material through an existence cycle appraisal to lessen the measure of waste delivered and build up the organization's reuse abilities (Kaebernick, Kara, and Sun, 2003). This innovation will permit more exact and productive approaches to anticipate unscheduled machine downtime to decrease vitality utilization (Lade, Ghosh, and Srinivasan, 2017).

This will mean having the capacity to effortlessly screen and break down the misfortune factor and proficiency of creation with coordinate association and conceivable utilization of information association with sensors and controlled techniques in a plant. This can build up the emphasis on the arranging and execution for maintainability and coordination. This is the utilization of sensor hubs and keen gadgets with RFID or remote web association. Plant gadgets, sensors, and ongoing records can be remotely associated and gotten to through a cloud server, which can enable gadgets to be gotten to utilizing an interface or virtual show (Bandyopadhyay and Sen, 2011; Wang, Wang, Sun, Guo, and Wu, 2016).

3. VISIONS OF INTERENT OF THINGS

In the exploration networks, IoT has been characterized from different distinctive perspectives and consequently various definitions for IoT exist in the writing. The purpose behind clear fluffiness of the definition comes from the way that it is strategically made out of two terms - Internet and things. The first pushes towards a system arranged vision of IoT, while the second tends to move the emphasis on non specific items. to be coordinated into a typical system [2].

Be that as it may, the terms 'Web' and 'things', when assembled expect a meaning which presents a troublesome level of development into the ICT world. Actually, IoT semantically implies an "overall system of interconnected questions exceptionally addressable, in light of standard correspondence conventions" [4]. This suggests countless heterogeneous items engaged with the master. In IoT, special ID of items and the portrayal and putting away of traded data is the most difficult issue. This brings the third point of view of IoT - semantic viewpoint. In Fig. 1, the fundamental ideas, technologies and benchmarks are featured and ordered with reference to the three dreams of IoT [2]. The chart plainly delineates that IoT worldview will prompt the joining of the three dreams of IoT.

From the perspective of things, the focal point of IoT is on the best way to incorporate bland items into a typical structure and the things under scrutiny are radio recurrence distinguishing proof (RFID) tags. The term IoT, truth be told, is attributed to the Auto-ID labs [5], an overall system of scholastic research labs in the field of arranged RFID and developing detecting technologies. These foundations, since their foundation, have focused their endeavors to

outline the engineering of IoT coordinated with EPC worldwide [6]. There effortlessness have been essentially towards improvement of the electronic item code (EPC) to help the utilization of RFID in the overall present day exchanging net-works, and to make the business driven worldwide principles for the EPC worldwide Network. These gauges are for the most part intended to enhance protest deceivability (i.e. the traceability of a protest and the attention to its status, current location and so on.). While, this is a vital advance towards the arrangement of IoT, it makes the extent of IoT much smaller. In a more extensive sense, IoT can't be only a worldwide EPC framework in which the main articles are RFIDs. Thus, one of a kind/widespread/universal identifier (UID) engineering characterized in [7] which endeavors to create middleware-based answers for worldwide deceivability of articles additionally limits the extent of IoT. An IoT vision proclamation, which goes well past a simple RFID-driven approach, is proposed by CASAGARAS consortium [8]. The CASAGARAS consortium (I) proposes a dream of IoT as a worldwide foundation which associates both virtual and physical non specific items and (ii) features the significance of including existing and evolving Internet and system advancements in this vision. From this viewpoint, IoT turns into the characteristic empowering design for the organization of free united administrations and applications, described by a high level of self-governing information catch, occasion exchange, arrange network and interoperability.

While the point of view of things centers on incorporating non specific articles into a typical structure, the viewpoint of 'Web' pushes towards a system arranged definition. As indicated by IPSO (IP for Smart Objects) organization together [8], a discussion framed in the year 2008, the IP stack is a light-weight convention that al-prepared associates an extensive number of imparting gadgets and keeps running on battery-worked gadgets. This ensures IP has every one of the characteristics to make IoT a reality. It is likely that through a wise adjustment of IP and by incorporating IEEE 802.15.4 convention into the IP design, and by appropriation of 6LoWPAN [9], a vast scale sending of IoT will be reality.

As specified before in this area, semantic arranged IoT dreams have likewise been proposed in the writing [10], [11], [12], [13]. The thought behind this suggestion is that the quantity of things engaged with the future Internet is des-tined to end up to a great degree high. Along these lines, issues relating how to speak to, store, interconnect, look, and sort out data created by the IoT will turn out to be exceptionally testing. In this unique circumstance, semantic advances will assume a key part. indeed, these innovations can misuse fitting displaying answers for things portrayal, thinking over information created by IoT, semantic execution conditions and models that accommodate IoT prerequisites and scalable putting away and correspondence foundation [10].

A further vision associated with the IoT is the alleged web of things [14]. According to this vision of IoT, web benchmarks are reused to interface and integrand into the web each day-life protests that contain an implanted gadget or PC.

4. APPLICATIONS OF IOT

The possibilities offered by the IoT make it conceivable to build up various applications in light

of it, of which just a couple of utilizations are as of now deployed. In future, there will be insightful applications for more quick witted homes and workplaces, more intelligent transportation frameworks, more intelligent doctor's facilities, more intelligent ventures and industrial facilities. In the accompanying subsections, a portion of the vital illustration uses of IoT are quickly talked about.

4.1 Aerospace and flying industry

IoT can enhance wellbeing and security of items and administrations by capably recognizing fake items and components. The flight business, for instance, is defenseless against the issue of suspected unapproved parts (SUP). A SUP is an air ship part that isn't ensured to meet the necessities of an affirmed air ship part (e.g., fakes, which don't comply with the strict quality requirements of the avionics business). Accordingly, SUPs genuinely violate the security guidelines of an airplane. Aeronautics specialists report that no less than 28 mishaps or episodes in the United States have been caused by fakes [14]. Aside from tedious material investigations, assessing the going with records, which can be effortlessly manufactured, can perform checking the legitimacy of flying machine parts. It is conceivable to take care of this issue by presenting electronic families for specific classifications of flying machine parts, which report their birthplace and security basic occasions amid their lifecycle (e.g., changes). By putting away these families inside a decentralized database and in addition on RFID labels, which are safely joined to flying machine parts, an authentication (check of computerized marks, examination of the family on RFID labels and inside the database) of these parts can be performed preceding introducing them in an air ship. Along these lines, security and operational unwavering quality of air ships can be essentially made strides.

4.2 Automotive industry

Propelled autos, trains, transports and also bikes are getting to be furnished with cutting edge sensors, actuators with expanded handling powers. Applications in the car business incorporate the utilization of keen things to screen and report different parameters from weight in tires to vicinity of different vehicles. RFID innovation has just been utilized to streamline vehicle creation, enhance coordination, increment quality control and enhance client administrations. The gadgets joined to the parts contain data identified with the name of the manufacturer and when and where the item was made, its serial number, type, item code, and in a few applications the exact area in the office right then and there. RFID innovation gives constant information in the assembling forms, support activities and offers better approaches for overseeing reviews all the more viably. Devoted Short Range Communication (DSRC) innovation will potentially help in accomplishing higher piece rates and lessening impedance with other hardware. Vehicle-to vehicle (V2V) and vehicle-to-foundation (V2I) correspondences will essentially progress Intelligent Transportation Systems (ITS) applications, for example, vehicle wellbeing administrations and movement administration and will be completely coordinated in the IoT framework.

4.3 Telecommunications industry

IoT will make the likelihood of converging of differing media transmission technologies and make new administrations. An illustrative case is the utilization of GSM, NFC (Near Field Communication), low power Bluetooth, WLAN, multi-jump systems, GPS and sensor organizes together with SIM-card innovation. In these sorts of utilizations per user (i.e. tag) is a piece of the cell phone, and diverse applications share the SIM-card. NFC empowers interchanges among objects in a basic and secure route just by having them near each other. The cell phone can hence be utilized as a NFC-per user and transmit the read information to a focal server. At the point when utilized as a part of a cell phone, the SIM-card assumes a vital part as capacity for the NFC information and confirmation credentials (like ticket numbers, Visa accounts, ID data and so forth). Things can join arranges and encourage distributed correspondence for specific purposes or to expand vigor of interchanges channels and systems. Things can frame impromptu distributed systems in a fiasco circumstances to keep the stream of imperative data going in the event of media transmission framework disappointments.

4.4 Medical and medicinal services industry

IoT will have numerous applications in the medicinal services division, with the likelihood of utilizing the PDA with RFID-sensor capacities as a stage for monitoring of therapeutic parameters and medication conveyance. The favorable position picked up is in counteractive action and simple checking of infections, specially appointed analysis and giving brief therapeutic consideration in instances of mishaps. Implantable and addressable remote gadgets can be utilized to store wellbeing records that can spare a patient's life in crisis circumstances, particularly for individuals with diabetes, growth, coronary illness, stroke, perpetual obstructive pneumonic infection, intellectual hinder means, seizure issue and Alzheimer's malady. Palatable, biodegradable chips can be brought into human body for guided activities. Paraplegic people can have solid boosts conveyed by means of an embedded brilliant thing-controlled electrical reproduction framework keeping in mind the end goal to reestablish development capacities.

4.5 Pharmaceutical industry

For pharmaceutical items, security and wellbeing is of most extreme significance. In IoT worldview, appending brilliant marks to drugs, following them through the sup-utilize chain and checking their status with sensors has numerous potential advantages. For instance, things requiring particular stockpiling conditions, e.g. support of a cool chain, can be constantly observed and disposed of if conditions were abused amid transport. Medication following and e-families consider the detection of fake items and keep the production network free of fraudsters. Falsifying is a typical practice around there as outlined in [15], and it especially influences the creating nations. The brilliant marks on the medications can likewise straightforwardly advantage patients, e.g. by empowering putting away of the bundle embed, educating shoppers of measurements and termination dates, and guaranteeing the authenticity of the prescription. In conjunction with a savvy prescription

bureau that peruses data transmitted by the medication names, patients can be reminded to take their drug at proper interims and patient consistence can be observed.

4.6 Manufacturing industry

By connecting things with data innovation, either through inserted savvy gadgets or using one of a kind identifiers and information bearers that can interact with an insightful supporting system framework and data frameworks, generation procedures can be improved and the whole lifecycle of objects, from creation to transfer can be observed. By labeling things and holders, more noteworthy straightforwardness can be increased about the status of the shop floor, the area and air of parts, and the status of generation mama Chinese. The fine grained data fills in as information for refined creation plans and enhanced coordination. Self-sorting out and canny assembling arrangements can be outlined around identifiable things.

4.7 Media, entertainment industry

Organization of IoT advancements will empower specially appointed news gathering in view of areas of the clients. The news social affair could occur by questioning IoT, to see which multi-media-able gadgets are available at a specific area, and sending them a (money related) offer to gather mixed media film about a specific occasion. Close field correspondence labels can be appended to blurbs for giving more data by interfacing per user to a URI address that contains nitty-gritty data identified with the notice.

4.8 Insurance industry

Frequently the presentation of IoT innovation is seen as a grave intrusion on protection of people. In any case, at times individuals will exchange protection for a superior administration or a financial advantage. One case is auto protection. On the off chance that protection customers will acknowledge electronic recorders in their auto, which can record increasing speed, speed, and different parameters, and impart this data to their back up plan, they are probably going to get a less expensive rate or premium [19]. The backup plan can spare cash by being engaged with a beginning period of an approaching mischance and can trigger the most financial activities. A piece of the investment funds can be given to the clients through rebates on protection premiums. The same applies for different resources, for example, structures, apparatus, and so on, that are outfitted with IoT innovation. In these cases the innovation for the most part helps in anticipating vast scale upkeep tasks or takes into account significantly less expensive prescient support before an occurrence happens.

4.9 Agriculture and reproducing

The controls for traceability of rural creatures and their developments require the utilization of innovations like IoT, making conceivable the continuous detection of creatures, for instance amid flare-ups of infectious illness. In addition, as a rule, nations give appropriations relying upon the quantity of creatures in a crowd and different prerequisites, to ranches with dairy cattle, sheep, and goats. As the assurance of the number is troublesome, there is dependably the likelihood of cheats. Great recognizable proof

frameworks can help limit this extortion. Consequently, with the use of ID frameworks, creature illnesses can be controlled, overviewed, and anticipated. Official ID of creatures in national, intra network, and worldwide trade is now set up, while in the meantime, distinguishing proof of domesticated animals that are immunized or tried under authority sickness control or destruction is additionally conceivable. Blood and tissue specimens can be precisely recognized, and utilizing IoT can guarantee the wellbeing status of crowds, districts, and nations. With the Internet of Things, single ranchers might have the capacity to convey the yields specifically to the shoppers not just in a little district like in coordinate advertising or shops however in a more extensive territory. This will change the entire store network which is mostly in the hand of substantial organizations, now, however can change to a more straightforward, shorter chain amongst makers and customers.

5. CHALLENGES AND OPEN ISSUES

The work processes in dissected venture condition, home, office and other shrewd spaces later on will be portrayed by cross association between activity, requiring the task of exceptionally unique and promotion ho connections. At present, just an extremely restricted ICT bolster is accessible, and the accompanying key difficulties exist.

- (i) **Network Foundation** - restrictions of the present Internet design regarding versatility, accessibility, sensibility and adaptability are a portion of the real boundaries to IoT.
- (ii) **Security, Privacy and Trust** - in the space of security the challenges are: (an) anchoring the engineering of IOT - security to be guaranteed at configuration time and execution time, (b) proactive distinguishing proof and insurance of IOT from subjective assaults (e.g. DOS and DDoS assaults) and manhandle, and (c) proactive recognizable proof and assurance of IOT from pernicious programming. In the space of client security, the particular difficulties are: (a) control over individual data (information security) and control over person's physical area and development (area protection), (b) requirement for security improvement innovations and pertinent insurance laws, and (c) gauges, systems and instruments for character administration of clients and articles. In the area of trust, a portion of the particular difficulties are: (a) Need for simple and common trade of basic, ensured and delicate information - e.g. shrewd items will impart for the benefit of clients/associations with administrations they can trust, and (b) trust must be a piece of the outline of IoT and must be implicit.
- (iii) **Managing heterogeneity** - overseeing heterogeneous applications, situations and gadgets constitute a noteworthy test.

Notwithstanding the above significant difficulties, a portion of alternate difficulties are: (an) overseeing extensive measure of data and mining huge volume of information to give valuable administrations, (b) outlining a productive engineering for sensor systems administration and capacity, (iii) planning instruments for sensor information discovery, (iv) outlining sensor information correspondence conventions - sensor information question, distribute/buy in components, (v) creating sensor information stream preparing components, and (vi) sensor information mining - connection, collection separating

methods outline. At last, institutionalizing heterogeneous advancements, gadgets, application interfaces and so on will likewise be a noteworthy test.

6. CONCLUSION

When we take a gander at the present cutting edge advancements, we get an unmistakable indication of how the IoT will be executed on an all inclusive level in the coming years. We additionally get a sign of the essential viewpoints that should be hide their examined and produced for making huge scale sending of IoT a reality. It is watched that an earnest need exists for huge work in the region of administration of IoT. Without an institutionalized approach it is likely that a proliferation of models, recognizable proof plans, conventions and frequencies will happen parallel, every one targeted for a specific and particular utilize. This will definitely prompt a fracture of the IoT, which could hamper its prevalent and turn into a noteworthy impediment in its take off. Interoperability is a need, and between label correspondence is a pre-condition all together for the selection of IoT to be broad.

In the coming years, innovations important to accomplish the universal net-work society are relied upon to enter the phase of development. As the RFID applications discover greater adequacy, an immense measure of items will be addressable, and could be associated with IP-based systems, to constitute the plain first flood of the IoT. There will be two noteworthy difficulties keeping in mind the end goal to ensure consistent system get to: the primary issue identifies with the way that today unique systems exist together; the other issue is identified with the sheer size of the IoT. The present IT industry has no involvement in building up a framework in which a huge number of articles are associated with IP systems. Other current issues, for example, address limitation, programmed address setup, security capacities, for example, authentication and encryption, and multicast capacities to convey voice and video flags productively will most likely be overwhelmed by progressing mechanical create means. This paper studied the absolute most vital parts of IoT with standard center around what is being done and what are the issues that require additionally explore. While the present advances make the idea of IoT plausible, an extensive number of difficulties lie ahead for influencing a vast to scale true deployment of IoT applications. In the following couple of years, tending to these difficulties will be a ground-breaking main thrust for systems administration and correspondence examine in both mechanical and scholarly research centers.

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REFERENCES

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