

# Writer Identification using Neural Network

Dr. Santosh Deshpande<sup>1</sup>, Mukul Kulkarni<sup>2</sup>

<sup>1</sup>Director, Institute of Management and Career Courses, Pune, India

<sup>2</sup>Assistant Professor, Savitribai Phule Pune University, Pune, India

## Article Info

Volume 83

Page Number: 10529 - 10533

Publication Issue:

March - April 2020

## Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 13 April 2020

## Abstract

Computer Vision has been evolving everyday with advancement in the Deep Learning. Residual Neural Networks is one of such image classification techniques. This paper is an application of ResNet 50 for the purpose of writer identification using handwriting biometric – signature. Different signature verification competitions had used many approaches. Here SigComp2009 dataset is used and experimental results are discussed. ResNet 50 is able to achieved 92% accuracy for 780 signatures used randomly from ICDAR 2009 dataset of genuine signatures.

**Keywords:** Handwriting Signature Recognition, Image processing, Neural Network, ICDAR 2009, RES-NET.

## I. INTRODUCTION

Writer identification using handwriting biometrics like signature is commonly used over decades. Even in today's world, most advanced banking system or legal firms also still rely on the offline signatures for transactions. New development in technology helped in the verification of online signatures but still demand for offline writer identification still exist in variety of scenarios like banking transactions, legal documents, commercial and non-commercial application. In all of these cases, writer identification and verification is very important. Compare to online writer identification, offline writer identification is more used and newer aspects of writer identification are still emerging. [1]

Over the periodic development in the computer vision, image processing and pattern recognition has given new approaches for writer identification. Since any writer is unable to replicate exactly same own signature, it's very difficult for any method to classify writer based

on their different set of signatures with natural variations. In past, there have been competitions to solve this problem using different approaches. Following is the list of competitions

1. Signature Verification Competition (SigComp2009) – 1953 Signatures[2]
2. Forensic Signature Verification Competition (4NSigComp2010) – 334 Signatures[3]
3. Signature Verification Competition (SigComp2011) - 1932(Dutch) and 1177(Chinese)[4]
4. Forensic Signature Verification Competition (4NSigComp2012) – 501[5]
5. Signature Verification and Writer Identification Competitions (SigWiComp2013) - 2340 (Japanese)[6]
6. Signature verification and Writer identification Competition (SigWlcomp2015) – 1268 Signatures [7]

Table 1 Signature Verification Competition

Sr. No.	Competition	signatures	Accuracy (Offline)	Dataset
---------	-------------	------------	--------------------	---------

1	ICDAR 2009 Signature Verification Competition	1953	90.85	Offline& Online
2	SigComp2011	1932(Dutch) 1177(Chinese)	97.67(Dutch) 80.04(Chinese)	Offline & Online
3	4NSigComp2012	501	80.84 (Chinese) 93.17 (Dutch)	Offline & Online
4	SigWiComp2013	2340	99.16 (Japanese)	Offline & Online
5	SigWComp2015	1268	99.34 (Italian) 98.02 (Bengali)	Offline & Online

In this paper, we have implemented RESNET 50 for writer identification on ICDAR 2009 dataset and reported the results.

## II. DEEP LEARNING MODEL – RES-NET50

Deep learning is used to identify the features of each image to classify them using neural networks. Neural networks create model like feature extraction which is built on extracting distinct features learn from training dataset. In this identified learning is been transferred from upper layer to lower using transfer mechanism.[8] In some cases, higher layer model faced problems like diminishing of the data due to larger Neural network layer transfer making distinct features absolute. To overcome these problems an intuitive model of residual network is proposed in which learning from previous node can be passed to next node in the form of residuals.

RESNET is such deep neural network used for image segmentation. It has been majorly used for the process of analyzing images, classification of images from different sets. The major property of residual network is its connection and specification of node where previous residuals are passed on to next block as it is for deeper layers making it more effective than similar other traditional convocational neural networks[9].

For the process of writer image segmentation and identification RESNET50 has been firstly

attempted in the paper. Handwritten signatures identification has been addressing problems like variation in the writers’ style, language dependency and multi lingual signatures. In the signature competition mentioned above, researchers have tried to solve such problems using custom made architectures, multi-model approaches and language specific methods. Due to advancement into image processing and considering newer computer vision problem we are focusing on start of art techniques like RESNET50.

## III. METHODOLOGY

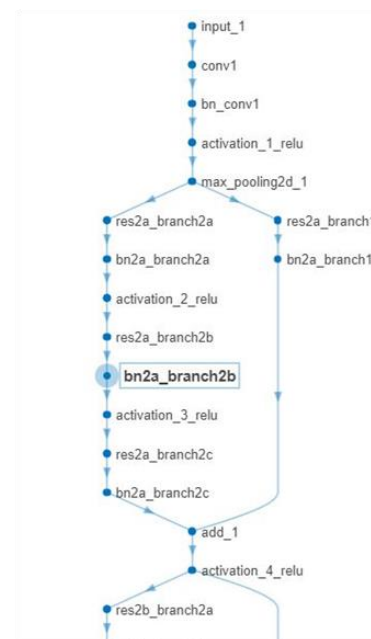


Figure 1. ResNet50 Architecture

## Design of ResNet 50

Fig. 1 Shows ResNet50 architecture. In the methodology, input is passed on to first conventional neural network to create first convolutional layer weights. Network model goes layers wise to deeper network to update weights till max weight polling weight assigned. This process continues till last layer convolutional layers' weights are calculated and store as shown in Fig.2. Once learning model complete this process, testing set of images are being classify

using learned weights and results are compared with saved writer values and confusion matrix is calculates.

Initially each writers' 10 signatures are randomly taken out of those 7 set of signatures were used as input to ResNet 50. Weights were calculated based on these images. Remaining 3 signatures were passed to learn model to classify them as per learned weight results were compared. Supervised learning model used to check accuracy of each user and overall accuracy was reported.

add_10 Element-wise addition of 2 inputs	Addition	14×14×1024	-
activation_31_relu ReLU	ReLU	14×14×1024	-
res4d_branch2a 256 1x1x1024 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×256	Weigh... 1x1x1024x2... Bias 1x1x256
bn4d_branch2a Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_32_relu ReLU	ReLU	14×14×256	-
res4d_branch2b 256 3x3x256 convolutions with stride [1 1] and padding 'same'	Convolution	14×14×256	Weights 3x3x256x256 Bias 1x1x256
bn4d_branch2b Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_33_relu ReLU	ReLU	14×14×256	-
res4d_branch2c 1024 1x1x256 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×1024	Weigh... 1x1x256x10... Bias 1x1x1024
bn4d_branch2c Batch normalization with 1024 channels	Batch Normalization	14×14×1024	Offset 1x1x1024 Scale 1x1x1024
add_11 Element-wise addition of 2 inputs	Addition	14×14×1024	-
activation_34_relu ReLU	ReLU	14×14×1024	-
res4e_branch2a 256 1x1x1024 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×256	Weigh... 1x1x1024x2... Bias 1x1x256
bn4e_branch2a Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_35_relu ReLU	ReLU	14×14×256	-
res4e_branch2b 256 3x3x256 convolutions with stride [1 1] and padding 'same'	Convolution	14×14×256	Weights 3x3x256x256 Bias 1x1x256
bn4e_branch2b Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_36_relu ReLU	ReLU	14×14×256	-

Figure 2 ResNet50 Layered Detail

## IV. EXPERIMENTAL RESULTS

In this paper, we are proposing RESNET 50 model for writer identification using signatures. First section of Res-Net50 was displayed as shown in Fig. 3. First convolution layer weights are displayed to view the process of classification as shown in fig.4. Each writers' accuracy being calculated and displayed writer-wise as shown in fig. 5. Our objective is to contribute to the area

making effective simple model for everyday use. This method consists of RESENT 50 model used for training and testing of signatures from ICDAR 2009 dataset. All the images used are from ICDAR 2009 signature competition. We have used 78 writers' 12 signature each making dataset of 936 genuine signatures. In the model we have used 546 random signatures for training set and 234 random signatures for testing set.

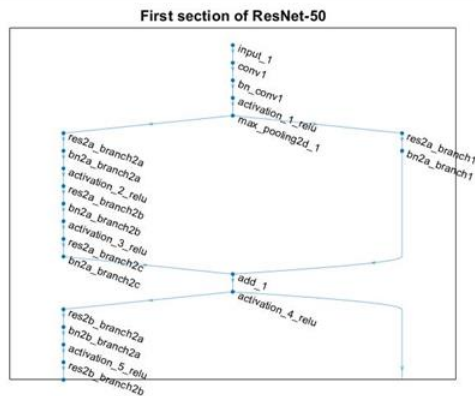


Figure 3 First Section of Res-Net 50

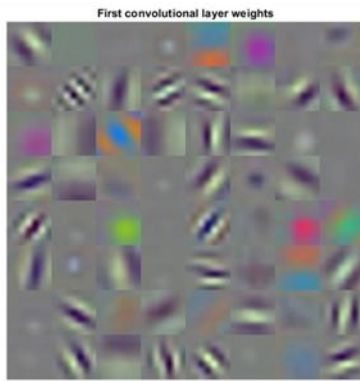


Figure 4 First convolution layer weights

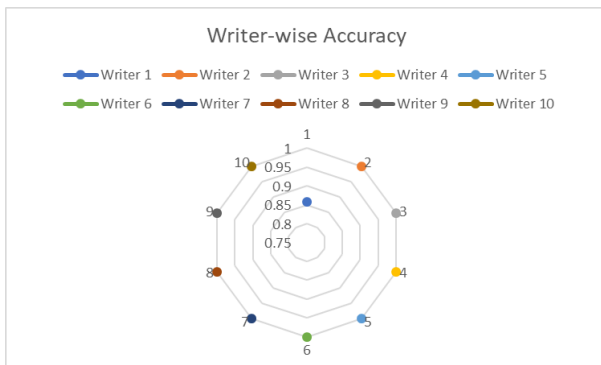


Figure 5 Writer-wise Accuracy

In the preprocessing phase we have randomly selected 78 writers with randomly taken 10 signatures. These signatures are used by ResNet 50 for training and testing further. Each writer-wise and image-wise accuracy was reported. Confusion matrix was stored and overall the model reported accuracy of **92.12%**.

## V.CONCLUSION

In this paper we have discussed about different competitions related to writer identification taken place over the years. We have explored the techniques used in for signature classification and provided with alternative approach using deep neural network. In our experimental results we have used ResNet 50 with ICDAR 2009 signature dataset to identify writer. The result of 92.12 accuracy gives us boost to work further. Our future work is to build more robust NN with training transfer engine to use it more effectively.

## REFERENCES

- [1] S. A. Daramola, M. A. Adefuminyi, and T. M. John, "Online signature for attendance verification system using Levenberg-Marquardt Neural Network," Lect. Notes Eng. Comput. Sci., vol. 2223, pp. 444–449, 2016.
- [2] V. L. Blankers, C. E. Van Den Heuvel, K. Y. Franke, and L. G. Vuurpijl, "The ICDAR 2009 signature verification competition," Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, pp. 1403–1407, 2009.
- [3] M. Blumenstein, M. A. Ferrer, and J. F. Vargas, "The 4NSigComp2010 off-line signature verification competition: Scenario 2," Proc. - 12th Int. Conf. Front. Handwrit. Recognition, ICFHR 2010, pp. 721–726, 2010.
- [4] M. Liwicki et al., "Signature verification competition for online and offline skilled forgeries (SigComp2011)," Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, pp. 1480–1484, 2011.
- [5] M. Liwicki, M. I. Malik, L. Alewijnse, E. Van Den Heuvel, and B. Found, "ICFHR2012 Competition on Automatic Forensic Signature Verification (4NsigComp 2012)," Proc. - Int. Work. Front. Handwrit. Recognition, IWFHR, no. 4NsigComp, pp. 823–828, 2012.
- [6] M. I. Malik, M. Liwicki, L. Alewijnse, W. Ohyama, M. Blumenstein, and B. Found, "ICDAR 2013 competitions on signature verification and writer identification for on- and offline skilled forgeries (SigWiComp 2013),"

- Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, pp. 1477–1483, 2013.
- [7] M. I. Malik et al., “ICDAR2015 competition on signature verification and writer identification for on- and off-line skilled forgeries (SigWIcomp2015),” Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, vol. 2015-Novem, pp. 1186–1190, 2015.
- [8] L. G. Hafemann, R. Sabourin, and L. S. Oliveira, “Analyzing features learned for Offline Signature Verification using Deep CNNs,” Proc. - Int. Conf. Pattern Recognit., vol. 0, pp. 2989–2994, 2016.
- [9] W. M. K. S. Ilmini and T. G. I. Fernando, “Computational personality traits assessment: A review,” 2017 IEEE Int. Conf. Ind. Inf. Syst. ICIIS 2017 - Proc., vol. 2018-Janua, pp. 1–6, 2018.
- [10][https://en.wikipedia.org/wiki/Residual\\_neural\\_network](https://en.wikipedia.org/wiki/Residual_neural_network)

Paper Title- Writer Identification using Neural Network

Paper Link- <http://testmagazine.biz/index.php/testmagazine/article/view/5504/4437>

Journal Name- Test Engineering & Management, Volume 83 Page Number: 10529 - 10533,  
Publication Issue: March - April 2020

Journal Link- <http://www.testmagazine.biz/index.php>

Journal Source-



Scopus Preview

Author Search

Sources



## Source details

Feedback

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)  
[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 2019  
0.1

SJR 2019  
0.101

SNIP 2021  
0.117

## Ad-hoc wireless network optimization through OPNET simulation model

Dr. Ravikant Zirmite, Dr. Ravindra Vaidya

*Associate Professor, MES'S IMCC (M.C.A Department)  
Savitribai Phule Pune University  
rsz.imcc@mespune.in  
Professor (H.O.D), MES'S IMCC (M.C.A Department)  
Savitribai Phule Pune University  
rpv.imcc@mespune.in*

### **Abstract**

*The paper presents the results of a detailed packet-level simulation comparing three multi-hop wireless ad hoc network routing protocols under the load of different probability distributions, that cover a range of design choices having different protocol viz. AODV, OLSR and TORA. We have extended the OPNET network simulator to accurately model the MAC and physical-layer behavior of the IEEE 802.11 wireless LAN standard, including a realistic wireless transmission channel model. Simulation of 100 mobile nodes has been carried out and the performance optimization is determined.*

**Keywords** – Simulation, Opnet, Wireless, Statistical probability distribution, IEEE802.11, throughput, delay, retransmission attempt, load, protocol, MAC, LAN

### **I. INTRODUCTION**

Ad-hoc wireless network is that network where no communication is present, in such network; each mobile node operates not only as a host but also as router. Mobile nodes in the network may not be within range of each other, communication of these nodes perform by discovering “multi-hop” paths through the network to other nodes. This type of network is some time called infrastructure less network [1]. Some examples of the possible uses of ad hoc networking are students using laptop computers to participate in an interactive lecture, business associates sharing information during a meeting, soldiers relaying information for situational awareness on the battlefield [2, 3]. Many different protocols have been proposed to solve the multi hop routing problem in ad hoc networks, each based on different assumptions and intuitions.

Mobile Ad hoc Networks (MANETs)[1] are an emerging technology that allows establishing an instant communication network for civilian and military applications, without relying on pre-existing fixed network infrastructure. The nodes in a MANET can dynamically join and leave the network, frequently, often without warning, and possibly without disruption to other nodes' communication. Each node in the network also acts as router, forwarding data packet for other nodes. A central challenge in design of Ad hoc network is the development of dynamic routing protocols that can effectively find the route between two communicating nodes. The routing protocol must be able to keep up with the high degree of node mobility that often changes the topology drastically and unpredictably.

The current Mobile Ad Hoc Network (MANET) [2] paradigm as described by the Internet Engineering Task Force (IETF) MANET work group. Routing algorithms are often difficult to formalize into mathematics; they are instead tested using extensive simulation. A large amount of work has been done in the area of energy efficient routing. This approach attempts to maximize network lifetime by routing through paths, which use the least amount of energy relative to each node. Now a day, more attention has been given to use specific network parameters while specifying routing matrixes. Routing matrixes includes delay of network, link capacity, link stability or identifying low mobility nodes. These schemes are generally based on previous work, which is then enhanced with the new matrix.

The paper is providing a realistic, quantitative analysis comparing the performance of a variety of multi-hop wireless ad hoc network routing protocols. We present results of detailed simulations showing the relative performance of three recently proposed ad hoc routing protocols: AODV [4], OLSR [6] and TORA [7].

Our results in this paper are based on simulations of an ad hoc network of 100 wireless mobile nodes moving about and communicating with each other. We analyze the performance of each protocol and explain the design choices that account for their performance.

The section 2 of the paper describes the different types of protocols used in the simulation. The section 3 has given description of design of simulation model. The performance analysis is describes in section 4 and the section 5 has summaries with conclusion of the paper.

## 2. Description of Protocols

### 2.1 Ad Hoc on demand Vector (AODV) [4]

AODV discovers routes on demand basis. It uses routing table to maintain routing information, one entry per destination. RREP packet is used to replies back to the source and, subsequently, to route data packets to the destination. AODV uses sequence numbers to maintain at each destination to determine routing information and to prevent routing loops [4]. AODV working on timer- based states in each node. A routing table entry is expired if not used recently. If node link is broken, the all predecessor nodes forward the RERR packets, to effectively erasing all routes using broken link. AODV uses expanding ring search technique initially to discover routes to an unknown destination. AODV algorithm has the ability to quickly adapt to dynamic link conditions with low processing and memory overhead. AODV offers low network utilization and uses destination sequence number to ensure loop freedom AODV keeps the following information with each route table entry.

- (i) Destination IP address (IP address for the destination node),
- (ii) Destination sequence number,
- (iii) Valid destination sequence number flag,
- (iv) Network interface,
- (v) Hop count, that is, number of hops required to reach the destination,
- (vi) Next hop (the next valid node that did not re broadcast the RREQ message),
- (vii) List of precursor,
- (viii) Life time, that is, expiration or deletion time of a route.

### 2.2 Optimized Link State Routing (OLSR) [6]

The OLSR model implements the MPR (Multi Point Relay) flooding mechanism to broadcast and flood Topology Control (TC) messages in the network. The algorithm is implemented as suggested in OLSR RFC 3626. This mechanism takes advantage of controlled flooding by allowing only selected nodes (MPR nodes) to flood the TC message. Each node selects an MPR to reach its two-hop neighbors The OLSR model implements the neighbor sensing mechanism through periodic broadcast of Hello messages. These Hello messages are one-hop broadcasts (never forwarded) that carry neighbor type and neighbor quality information. The neighbor sensing mechanism provides information on up to two-hop neighbors. Generation and processing of the Hello messages are implemented as suggested in the OLSR RFC.

Periodic and triggered Topology Control (TC) messages implement the topology discovery/diffusion mechanism in the OLSR model. TC messages are generated by MPR nodes and carry information about MPR selector nodes. These messages are diffused throughout the network using controlled flooding, thus helping to form a topology of reachable nodes, previous hop on each node.

### 2.3 Temporally Ordered Routing Algorithm (TORA) [7]



The Temporally-Ordered Routing Algorithm (TORA) is an adaptive routing protocol for multi hop networks. It possesses the following attributes:

- (i) Distributed execution,
- (ii) Loop-free routing,
- (iii) Multipath routing,
- (iv) Reactive or proactive route establishment and maintenance
- (v) Minimization of communication overhead via localization of algorithmic reaction to topological changes when possible.

Its operation can be biased towards high reactivity (i.e. low time complexity) and bandwidth conservation (i.e. low communication complexity) rather than routing optimality (i.e. continuous shortest-path computation). Its design and flexibility make it potentially well-suited for use of mobile ad hoc networks (MANETs).

A key concept in the protocol's design is an attempt to de-couple (to the greatest extent possible) the generation of far-reaching control message propagation from the dynamics of the network topology. The scope of TORA's control messaging is typically localized to a very small set of nodes near a topological change. TORA includes a secondary mechanism that is independent of network topology dynamics. It allows far-reaching control message propagation as a means of route optimization or soft-state route verification

### 3. Mobile Ad Hoc Network Model

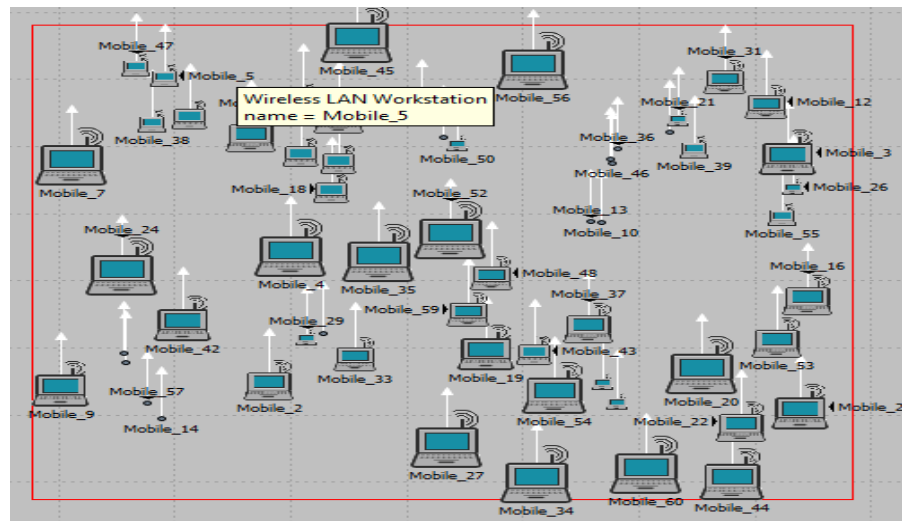


Figure 3.1 Ad hoc Wireless Network

We have design three Mobile Ad-hoc networks scenarios which consist of 100 mobile wireless nodes. Every scenario is following one routing protocol. Scenario one is based on AODV routing protocol, scenario two is following OLSR routing protocol and TORA routing protocol is used in scenario three. In order to enable direct, fair comparisons between Ad-hoc routing protocols, each protocol ran with identical load and environment conditions. Total simulation time was 3600 seconds with 128kbps speed.

As shown in the figure 3.1, wireless network consist of Wireless LAN workstations and supported by random mobility model. Wireless LAN workstation the "wlan\_wkstn" model can be configured to run any MANET routing protocol. It is able to generate application traffic (FTP, E-mail, HTTP, etc.) and route the traffic using the MANET routing protocol configured.

#### 4.0 Performance Analysis of Protocol

We have conducted relative performance study of Ad hoc routing protocols through simulation model using Optimize Network Engineering Tool (OPNET 14.5) simulator to carry out simulation. Performance of simulation has analysis based on following matrix.

- a) Wireless LAN Throughput
- b) End to End delay
- c) Wireless LAN Data Dropped

#### 4. (a) Wireless LAN Throughput

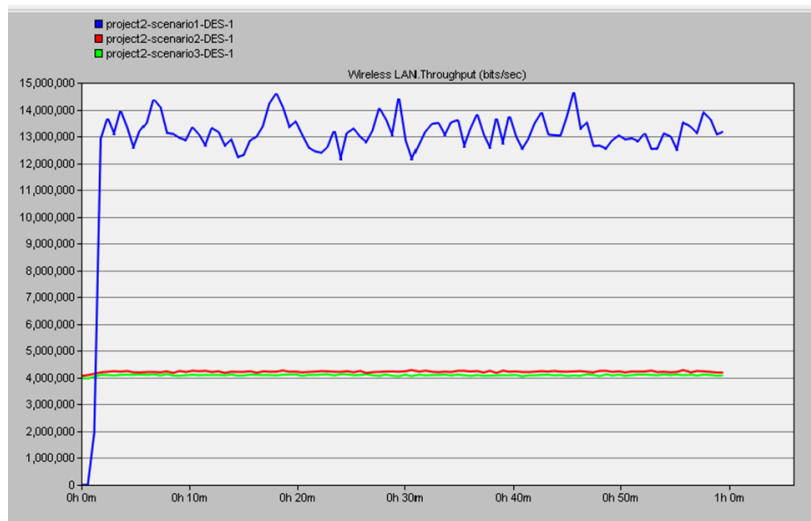


Figure 4.1 Wireless LAN Throughputs

As shown in the figure 4.1 throughput of Scenario one is far better than scenario two and three. Scenario one Mobile Ad hoc Network is based on AODV routing protocol and scenario two and three is based on OLSR and TORA routing protocol respectively. AODV is reactive protocol, its shows better throughput as compare to OLSR and TORA. OLSR and TORA are proactive protocols which shows stable throughput throughout the network simulation.

#### 4.(b) End to End delay

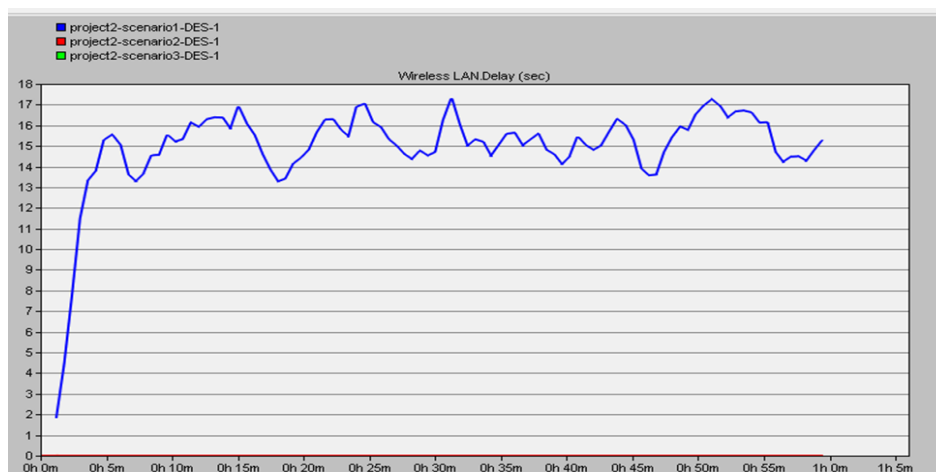
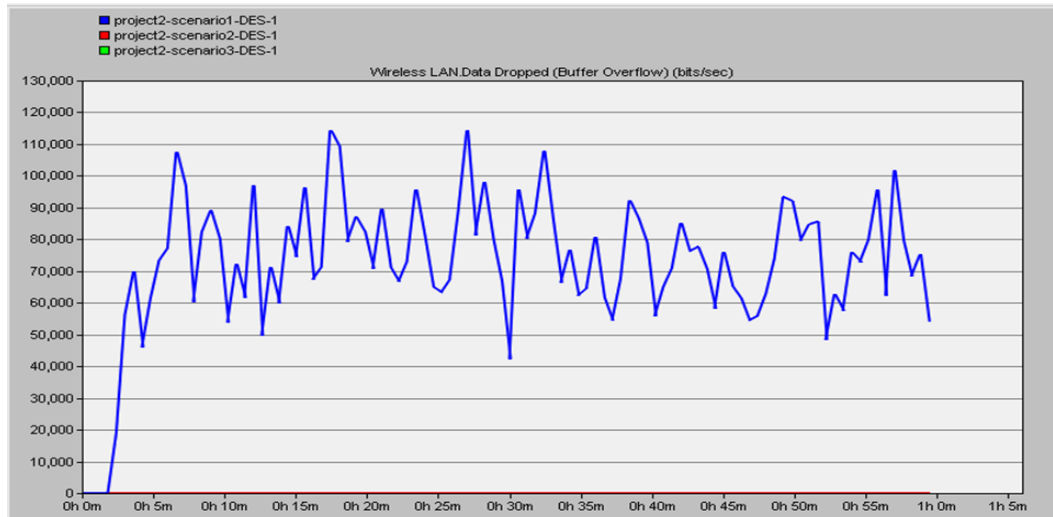


Figure 4.2 Wireless LAN Delay (Sec)

Scenario two and three shows no delay while transmitting the packets from one place to another as shown in the figure 4.2. These two scenarios are based on OLSR and TORA protocol. Scenario one shows fluctuating delay from 13 to 17 sec throughout the simulation time. Scenario one is based on AODV protocol. AODV is dynamic in nature as well as reactive. AODV find the new path on every moment of the wireless mobile node.

#### 4.(c) Wireless LAN Data Dropped (Buffer Overflow)



**Figure 4.3 Wireless LAN Data Dropped (Bits/sec)**

As shown in the figure 4.3 scenario one was shown data dropped due to the buffer overflow and scenario two and three shown no data dropped. On an average data dropped 70,000 bits/sec are reported after simulation of the model is completed. It was observed in the scenario one data dropped fluctuating from 45000 bits/sec to 115000 bits/sec throughout the simulation. When bits are reaching to the destination node, memory of the node was full and hence data was dropped by the node.

#### 5. SUMMARY AND CONCLUSIONS

A MANET simulation models were developed for different Wireless routing protocols i.e. AODV, OLSR and TORA. The performance of simulation models was observed and discussed in above sections. Based on the performance of routing protocols following are the by and large observations.

1. The AODV performance is best in terms of throughput as compared to the OLSR and TORA.
2. OLSR and TORA have shown zero data dropped and zero delay,
3. It is observed that AODV has shown maximum delay and data dropped as compared to other routing protocols.

#### REFERENCES:

1. National Science Foundation. Research priorities in wireless and mobile communications and networking: Report of a workshop held March 24–26, 1997, Airlie House, Virginia. Available at <http://www.cise.nsf.gov/anir/ww.html>.E. Balaguruswamy, “engineering reliability” Tata mc. Graw Hill, New Delhi.
2. Barry M. Leiner, Robert J. Ruth, and Ambatipudi R. Sastry. Goals and challenges of the DARPA GloMo program. IEEE Personal Communications, 3(6):34–43.
3. David B. Johnson. Routing in ad hoc networks of mobile hosts. In Proceedings of the IEEE Workshop on

- Mobile Computing Systems and Applications, pages 158–163,.
4. C. Perkins, E. Belding-Royer, and S. Das. RCF 3561 Ad Hoc On-demand Distance Vector Protocol (AODV). Network Working group, July 2003.
  5. OPNET Manual “ [www.OPNET/14.5A/doc/modeler10](http://www.OPNET/14.5A/doc/modeler10)
  6. T. Clausner, ed.and P.Jacquet, ed. Optimized Link State Routing Protocol
  7. (OLSR). Network Working group, October 2003.
  8. V. Park and S. Corson. Temporally Ordered Routing Algorithm (TORA),
  9. IETF MANET working group, October 1999.
  10. Narendra Mohan Mittal1 and Savita Choudhary. Comparative Study of Simulators for Vehicular Ad-hoc Networks (VANETs), IJETAE Volume 4, Issue 4, April 2014.
  11. Saad Talib Hasson And Sura Jasim . Simulation Study to Observe the Effects of
  12. Increasing Each of The Network Size and the Network Area Size on MANET’s Routing Protocols. computerscijournal ISSN: 0974-6471 April 2014, Vol. 7, No. (1): Pgs. 67-73.
  13. Jean-Daniel Medjo Me Biomo , Thomas Kunz , Marc St-Hilaire and Yifeng Zhou. Unmanned Aerial ad Hoc Networks: Simulation-Based Evaluation of Entity Mobility Models’ Impact on Routing Performance. Aerospace 2015, 2, 392-422; doi:10.3390/aerospace2030392.
  14. Mustafa Almahdi Algaet, Zul Azri Bin Muhamad Noh, Abd Samad Bin Hasan Basari, Abdul Samad Shibghatullah, Ali Ahmad Milad and Aouache Mustapha. A Review of Service Quality in Integrated Networking System at the Hospital Scenarios. JTECE ISSN: 2180 - 1843 Vol. 7 No. 2 July - December 2015 . MohdRazeef and MohsinNazir, “Reliability of Software Development using Open Source Technology”, in IJARCS, vol2, No. 5, pp. 479-485, Sept-Oct 2011

Paper Title- "Ad-hoc wireless network optimization through OPNET simulation model (2019)"

Paper Link- <http://serisc.org/journals/index.php/IJAST/article/view/820>

Journal Name- International Journal of Advanced Science and Technology 2005-4238

Journal Link <http://serisc.org>

Journal Source-



Scopus Preview

Author Search

Sources



## Source details

Fee

### International Journal of Advanced Science and Technology

Scopus coverage years: from 2016 to 2020

(coverage discontinued in Scopus)

Publisher: Science and Engineering Research Support Society

ISSN: 2005-4238 E-ISSN: 2207-6360

Subject area: [Energy: General Energy](#) [Computer Science: General Computer Science](#) [Engineering: General Engineering](#)

Source type: Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 20  
0.0

SJR 2019  
0.108

SNIP 2021  
0.250

---

# Does ICT really help in Rural Development in India?

**Ravindra Vaidya**

*Professor and Head, Department of MCA,  
MES' Institute of Management and Career Courses, Pune*

**Abstract:** *First IT and now Information Communication Technology (ICT) has become most widely used and pronounced buzzword of the computer industry. One hears about it every where from stock markets to Government corridors across the country. The whole world is moving from analog to digital, specialization to multidisciplinary, local and stand-alone to world-wide, face-to-face communication to satellite communication. But, does this craze for ICT have any meaning for silent majority of country; for those living in rural areas? How can computers be of any use for illiterates? Even if they can read write can they read write English? Which is the predominant language in ICT arena today? In such a scenario, it may be rather difficult task to answer. What can be the role of ICT in rural development? Critics of ICT often said that "computers can only provide information and communication at instant. But can not supply people the drinking water, health services, employment. True; a computer is not a magic stick that can solve all problems in rural areas. But critics forget that villagers are also needing to know about their village, district natural resources around them seasons and monsoons, about market rates of goods and about government schemes. Obviously, a connected PC is Fabulous Tree, fruitful for all this and much more. Fortunately, India took to ICT early as compared to other developing countries. The internet has now fascinated us to take the PC to every village. It must play master role in rural education, health and agriculture. It should be Community Computer Centre (CCC) than Personal Computer in India. This paper not only focuses on the different problems in rural areas but also gives some thrust areas for use of ICT in Rural Development.*

---

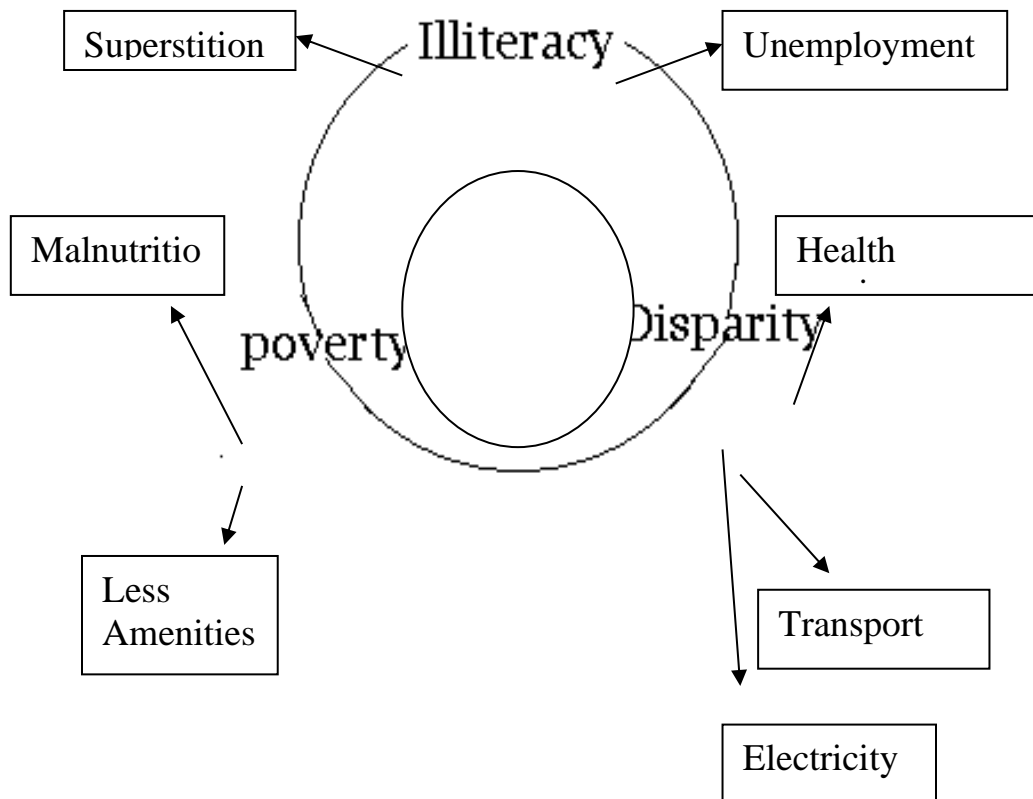
## Introduction

It is a science which deals with explores of information and its communication t to all. Information Communication Technology deals with exchange of information about everything through various communication cannels such as Radio, TV, and now Internet. World is coming closer due to ICT. Internet is a continues source where one can have all types of information about

business, courses etc. It's the FABOULUS Tree. It is an exchequer to complete dreams. Now days ICT is flicker for prosperous future. ICT will be the best solution for each problem may be rural, urban or national. Really it has fulfilled the concept "VASUDHAIVA KUTUM-BAKAM"(Whole world is a family).There arise many questions while considering ICT for rural development. What should be the role of ICT in rural development? How much depth will it reach? How much area will accept ICT? Do we overcome the problems of different languages, electricity, and poverty? Will it be more beneficial than today's life? Can ICT be used for the last man in society? There are some difficulties in implementation of ICT for rural.

### Rural Problems

This is the area where there is always problem, because it is distinct from urban areas. The Villagers are trapped in this worst cycle, where it is difficult task to solve this puzzle. The example will explain what the fact is in rural[1]. Villagers have God gifted lot of natural wealth. The products as Cumin, Raisins, and Honey etc are available at rate Rs.5-10 per Kg in villages. But same product worth Rs.90-100 per Kg in urban. The difference lies here. Though we have considered all octroi duties the situation does not balance.The major problems in their developments are. -



Due to illiteracy they think that the returns they have got are more than enough. Even though they are pointed out, they can't have any objection due to poverty. Disparity keeps them away from all these facilities, Modernization, New techniques. Hence the concept "Go to Villages" changed to "Go from Villages". Migration leading to population. Saturation increases in urban while isolation in villages. Both cause problems.

### **Some Thirst Areas in ICT**

ICT has proved its intentions for urban development. It has the skills to bring bright tomorrow in rural. Till there are many fields waiting for Golden touch of ICT.

#### **1. Agriculture**

As India is Agriculture based country, most of the peoples are collinear with this field. It is capital source of income in rural. This field can be divided in farming, animal husbandry, poultry and biological fertilizers. Due to incomplete information about weather, technologies, markets, fertilizers, types of soil, transport facilities, cattle purchasing. It is not possible to have desired quality and quantity products with giving more efforts. Due to unavailability of transport vehicles at time of harvesting, goods remain unsold and bad timing depreciates cost of goods. They must depend on the agents.

ICT will provide them a platform to get proper output. The right information about good deals of the actual cost of product, must be communicated by using communication technology, they will be aware of the new, fertilizers, pesticides technologies like "Tushar Sinchan" and "Thibak Sinchan"

#### **2. Health Services**

There are many diseases, which are born due to laziness, bad cooked food, and incomplete knowledge about treatments. We also know the how Primary Health Centers (PHC) will work? No one is interested to work in PHC hence the unqualified staff works as doctor in villages. Can he able to treat a patient? How long his treatment will work? Villagers must go miles for treatment. Though it is not possible to cure patient through information, but precaution is better than cure. This technology makes doctors to contact about case with his seniors from cities He can diagnosis as per guidance. This can be achieved through Telemedicine, an application of ICT.



---

### 3. Business and Banking

Generally, on line Business & banking are depending on credit cards and good bank balance. It is not possible for villagers to have credit cards. Till their financial supports through Land-lords. Land-lords misuse this opportunity. It is necessary to solve this twist. E-Commerce is the way to have on line transaction. Now a day e-Banking is leading on. Electronics commerce it is very difficult to give simple definition of this phrase. It means the nature of economic activity is going to change for people every where in the world electronic information services will be necessary for consumers & producers to buy or sell products at the most efficient prices. Economic change in turn will bring many other changes in social & cultural life. Though it is well dressed and having good response but in most cases be adequately described on line they are not like cloths that the customer might wish to try on or bananas, customer may want to check the size and ripeness. Types of E-commerce are inter-organisational, Intraorganizational & Retail. Functions of e-commerce are communication, process management, service management and Dealing or transactions capabilities.

### 4. Education

Any country's social and economic well being depends on how well we educate people. Till there are many villages which have not seen schools. Though there are schools one teacher must handle many subjects and classes also. Insufficient Equipments, staff system remains undeveloped. The school timing should be as per their leisure hours. Education has been undergoing a lot of changes over the last few decades. This is true globally The Night-School concept will help more. Virtual teaching process is fast emerging as new concept for distance education in India distance mode become operative in some form such as train on job or learning during leisure hours. The major break through in imparting education using radio & television, drop outs can be kept low in education systems[4]. The convergence of computers is bringing about amazing changes in teaching & learning process. There are 600 educational programs running on TV as Countrywide Classroom by UGC. It is observed that 88% responses for teleconferencing wireless company of India has introduced a new concept LEARN NET for distance education via VSAT network. Technology Based Training (TBT) -Earlier it was started with video followed by television and then CD-ROMs. TBT could be Multimedia or could use single Media. TBT includes computer base training (CBT), Web Base training (WBT).

**E-Learning** provides following facilities to students. The student learns a lot if he is guided through right sites. E-mail, chat, discussion rooms ensures a healthy exchange of information. The student can also post questions to his teacher or submits assignments through the Net. Internet can

---

also be used to deliver complete courses on net. Everyone need not to have programming skills, but computer literacy is the ability to understand and utilizes the computer in one's day to day life.

### Steps Taken by various State Government[6]

The **GOA Govt.** scheme Local Area Development Scheme (LADS) includes Government or members of parliaments to fund for own computer labs in schools. School management were found to have” encouraging” attitudes towards computers. Parent -teachers association was also "supportive". This scheme is providing good financial backup to take ICT in education.

**Tamilnadu** have also put a step forth to reach ICT in rural area. They have developed a scheme in which parents from poorer rural areas are willing to pay Rs.30/- per month for their children to be ICT literate. The scheme was good on paper but Limited practical aspects

**Gujarat** also have a forward step for this new concept "DHAWAL KRANTI-2001", "FLOOD OPERTION", "GOKUL GRAM YOJANA". These are some schemes which empowered the villagers to increase their confidence. The result says, in milk production India is in first four countries in world. We raised our limit to 79 million tons. It is the great improvement.

It was the 1st time when **Andhra Pradesh Govt.** tried to be more transparent & bring ICT closer to people. They proved the effectiveness of e-Governance by giving them knowledge to get their required documents as - domiciles, land records, birth certificates and billing. It is less time consuming, cheaper and transeparent. Now people are more conscious about use of ICT.

**West Bengal Govt.** started "GRAM"(Gio Reffered Area Management) developing scheme in BANKURA district which makes villagers to know about farming, water management, Power-energy sources, water levels. This system has formed a govt. offices Atlas district wise. Mr. Asit Pal, The President of Panchayat Samittee of Veguhori replied "We are luckier to have such schemes for water management which increased our products".

### Problems in Implementation of ICT for Rural Development

#### 1. Infrastructure

Due to lack of good infrastructure we are unable to penetrate ICT in rural development. We are lagging to provide electricity, telephones, computers and teachers. We failed to create

financial support to take ICT in rural. It should be developed such that same structure can useful for Education, Agriculture, Health and Transport, etc.

## **2. Technical Education**

The education does not contain complete logic of new devices, faculties are not skilled enough to handle technical parts. Hence the technical education should be taught[5].

## **3. Localization of Content**

This is one of the major problems in the ICT implementation for rural development. As there are different many local languages at different rural areas, it is very difficult to create content the specific language. Hence it is difficult to train villagers in English. They think that it's not their field.

## **4. Maintenance**

Though it is Information Communication Technology, it needs a device to communicate between two objects. Obviously, the repairing comes, and maintenance required

## **5. Major Constraints in developing technical Man-power**

- Out dated Equipment.
- Shortage of components.
- Lack of motivation on the part of teachers and shortage.
- Lack of funds for regular perdition and maintenance of H/W compatible with S/W[3].
- Shortage of space for Labs/Class rooms and Infrastructure.
- Absent of R&D culture.

## **Challenges and To Do**

### **1. Government to Do**

- ✓ Government should have a fixed budget for rural development.
- ✓ New techniques being used by other countries must be absorbed and making modify to use in rural.
- ✓ Subsidies must be provided.

- ✓ Must ready to work with private institutes and companies.
- ✓ Compulsory education should content computer handling and short courses.
- ✓ The literators from urban should be sent to rural through programs.
- ✓ The Information tools such as Simputer, istation, touch screen, via-voice, TV shall be provided to villages under schemes as One Village One Computer.

## 2. PRIVATE SECTORS TO DO

- ✓ They should have good, personal interest to involve in this program.
- ✓ They can lift some students and faculties from rural for this purpose.
- ✓ They should start some subsidiary firms or branches to this area.
- ✓ Their aim should not be earning money at all, but the knowledge should be perfect.
- ✓ They should adopt some villages to make them ICT Enable.

## NEW IDEAS AND CONCEPTS: -

### 1. AAA CONNECTIVITY

This means Anytime, Anywhere, Anyhow. This concept will provide all necessary information about any field. It needs Wireless communication to be developed and having Broadband technology for all areas. It serves the object "Empowerment through Connectivity" and "Economical, Employment, Education and Efficiency" can be implemented[2].

### 2. COMMUNITY COMPUTER

In Indian situation a PC need not be a Personal Computer. It can be a Community Computer. It shall be Panorama Computer. The program should be community driven. In a day time, it can be used to educate children at primary and middle level schools. In the evening the community computer can be turned into a "**cyber dhaba**" for villagers where they can access websites of their choice and get information of their use.

### 3. COMPUTER THEATRE

In villages there are weekly bazaars where the villagers gather for selling and purchasing goods. In such places if we form computer theaters it will be easy to educate them by showing effective clips and slides related to their routine life.

#### 4. ONE VILLAGE ONE COMPUTER

It can possible to provide a system by funding through Government and Panchayat's investment. The Panchayat must relate to tahasil, district so that villagers can contact without spending time and money. They can get required documents, landpapers, and domiciles from respective Tahsils.

#### CONCLUSION

Currently, several experiments are being attempted to take the PC and Internet to the villages. There has been a great amount of enthusiasm among people. Development of relevant content in local languages, availability of computers that can run on low power and sensitization of local Govt. officials towards ICT can go a long way in using ICT for rural development in near future. Computerized interface between common people and Govt. by way of Bulletin Boards and public teleinfo centers will ensure that people instant information about govt. programs, policies and procedures. Only over 100 developing countries India have been the first for access the Internet in Asia. India has the largest Internet community of over 1, 00, 00,000 net users. We are saying that Govt. should do, Private sector to do; but we educated are keeping ourselves away from this compaign. This is not the work that one may do .it needs all of us to work together. We must play our role with responsibility.

Not only for India but for all developing countries World Bank had already set up a group for ICT in Rural Development called Global Information and Communication Technology Department (GICT) and another one is Infodev. In India "India Country Gateway Prototype Portal" a joint initiative of the Department of Information Technology and the Development Gateway Foundation has also been launched. The gateway is aimed at involvement and collaboration of Government, Private and Civil society and International organizations sharing information on various aspects on development in India and use of ICTs for leveraging socio-economic development. The prototype portal launched has been funded by the World Bank under its Infodev Program.

Though the schemes are good on paper, it comes true when get public response. Community driven projects are proved more appreciable than managed by Govt. or institutes. Hence it is necessary to select talents from villages and train them. The most important thing to come the dream true is Public Involvement.

#### References

1. CSI Communications January-1999, April-1999, December1998
2. DNYANSHAKTI" Supplement: 18 Oct. 2001, 25 Oct. 2001, and 10 Jan 2002

3. Koen Salemink, Dirk Strijker, Gary Bosworth, Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas, *Journal of Rural Studies*, Volume 54, 2017, Pages 360-371
4. Srivastava Suhasini: Role of ICT in E-governance and Rural Development: An Indian Scenario in *Journal of Rural Studies in Learning Community-An International Journal of Educational and Social Development*, , Volume 8, Issue 1, Year : 2017 Pages 11-15
5. Jayita Pramanik, Bijan Sarkar, Shyamalendu Kandar: Impact of ICT in Rural Development: Perspective of Developing Countries in *American Journal of Rural Development*, 2017, Vol. 5, No. 4, 117-120
6. Sharmila Kayal and Ruma Saha, Role of ICTs in Attaining Sustainable Development Goal in Digital Age: Challenges and Risks in *Proceedings of Second International Conference on Global Initiatives for Sustainable Development: Issues and Strategies* Bangkok, Thailand, June 23-27, 2019
7. Sudha S.: Does ICT Influences Rural Government School Teachers Beliefs?-Exploring Teachers Opinion on Usage of ICT as Teaching and Learning Tool in *Indian Journal of Public Health Research & Development*, Volume : 10, Issue : 2,2019, Pages: 163-167
8. Rajeev Singh, Ashutosh Priya, Pratima Singh : ROLE OF ICT IN RURAL EMPOWERMENT in *Research Journal of Social Science & Management*, Volume:01, Number:05, Sep-2011, Pages: 52-65
9. [www.goidirectory.nic.in](http://www.goidirectory.nic.in)
10. [www.csimumbai.org](http://www.csimumbai.org).
11. [www.dgfoundation.org/](http://www.dgfoundation.org/)

Paper Title- "Does ICT really help in Rural Development in India? (2019)"

Paper Link- <http://gujaratresearchsociety.in/index.php/JGRS/article/view/2763>

Journal Name- Journal of the Gujrat Research Society 0374-8588

Journal Link <http://gujaratresearchsociety.in>

Journal Source-

The screenshot shows a web browser window with the URL <https://ugccare.unipune.ac.in/Apps1/User/WebA/SearchList>. The page title is "UGC-CARE List". On the left, there is a dark sidebar with the logo of Savitribai Phule Pune University and navigation options: Home, UGC, and Search. The main content area displays the search results for "0374-8588". It shows a search bar with the text "Search:" and a search button. Below the search bar, there is a table with the following data:

Sr.No.	Journal Title	Publisher	ISSN	E-ISSN	Action
1	Journal of the Gujarat Research Society	Gujarat Research Society	0374-8588	NA	Discontinued from Jan. 2020

Below the table, it says "Showing 1 to 1 of 1 entries". There are navigation buttons for "Previous", "1", and "Next".

## Ad-hoc wireless network optimization through OPNET simulation model

Dr. Ravikant Zirmite, Dr. Ravindra Vaidya

*Associate Professor, MES'S IMCC (M.C.A Department)  
Savitribai Phule Pune University  
rsz.imcc@mespune.in  
Professor (H.O.D), MES'S IMCC (M.C.A Department)  
Savitribai Phule Pune University  
rpv.imcc@mespune.in*

### **Abstract**

*The paper presents the results of a detailed packet-level simulation comparing three multi-hop wireless ad hoc network routing protocols under the load of different probability distributions, that cover a range of design choices having different protocol viz. AODV, OLSR and TORA. We have extended the OPNET network simulator to accurately model the MAC and physical-layer behavior of the IEEE 802.11 wireless LAN standard, including a realistic wireless transmission channel model. Simulation of 100 mobile nodes has been carried out and the performance optimization is determined.*

**Keywords** – Simulation, Opnet, Wireless, Statistical probability distribution, IEEE802.11, throughput, delay, retransmission attempt, load, protocol, MAC, LAN

### **I. INTRODUCTION**

Ad-hoc wireless network is that network where no communication is present, in such network; each mobile node operates not only as a host but also as router. Mobile nodes in the network may not be within range of each other, communication of these nodes perform by discovering “multi-hop” paths through the network to other nodes. This type of network is some time called infrastructure less network [1]. Some examples of the possible uses of ad hoc networking are students using laptop computers to participate in an interactive lecture, business associates sharing information during a meeting, soldiers relaying information for situational awareness on the battlefield [2, 3]. Many different protocols have been proposed to solve the multi hop routing problem in ad hoc networks, each based on different assumptions and intuitions.

Mobile Ad hoc Networks (MANETs)[1] are an emerging technology that allows establishing an instant communication network for civilian and military applications, without relying on pre-existing fixed network infrastructure. The nodes in a MANET can dynamically join and leave the network, frequently, often without warning, and possibly without disruption to other nodes' communication. Each node in the network also acts as router, forwarding data packet for other nodes. A central challenge in design of Ad hoc network is the development of dynamic routing protocols that can effectively find the route between two communicating nodes. The routing protocol must be able to keep up with the high degree of node mobility that often changes the topology drastically and unpredictably.

The current Mobile Ad Hoc Network (MANET) [2] paradigm as described by the Internet Engineering Task Force (IETF) MANET work group. Routing algorithms are often difficult to formalize into mathematics; they are instead tested using extensive simulation. A large amount of work has been done in the area of energy efficient routing. This approach attempts to maximize network lifetime by routing through paths, which use the least amount of energy relative to each node. Now a day, more attention has been given to use specific network parameters while specifying routing matrixes. Routing matrixes includes delay of network, link capacity, link stability or identifying low mobility nodes. These schemes are generally based on previous work, which is then enhanced with the new matrix.



The paper is providing a realistic, quantitative analysis comparing the performance of a variety of multi-hop wireless ad hoc network routing protocols. We present results of detailed simulations showing the relative performance of three recently proposed ad hoc routing protocols: AODV [4], OLSR [6] and TORA [7].

Our results in this paper are based on simulations of an ad hoc network of 100 wireless mobile nodes moving about and communicating with each other. We analyze the performance of each protocol and explain the design choices that account for their performance.

The section 2 of the paper describes the different types of protocols used in the simulation. The section 3 has given description of design of simulation model. The performance analysis is describes in section 4 and the section 5 has summaries with conclusion of the paper.

## 2. Description of Protocols

### 2.1 Ad Hoc on demand Vector (AODV) [4]

AODV discovers routes on demand basis. It uses routing table to maintain routing information, one entry per destination. RREP packet is used to replies back to the source and, subsequently, to route data packets to the destination. AODV uses sequence numbers to maintain at each destination to determine routing information and to prevent routing loops [4]. AODV working on timer- based states in each node. A routing table entry is expired if not used recently. If node link is broken, the all predecessor nodes forward the RERR packets, to effectively erasing all routes using broken link. AODV uses expanding ring search technique initially to discover routes to an unknown destination. AODV algorithm has the ability to quickly adapt to dynamic link conditions with low processing and memory overhead. AODV offers low network utilization and uses destination sequence number to ensure loop freedom AODV keeps the following information with each route table entry.

- (i) Destination IP address (IP address for the destination node),
- (ii) Destination sequence number,
- (iii) Valid destination sequence number flag,
- (iv) Network interface,
- (v) Hop count, that is, number of hops required to reach the destination,
- (vi) Next hop (the next valid node that did not re broadcast the RREQ message),
- (vii) List of precursor,
- (viii) Life time, that is, expiration or deletion time of a route.

### 2.2 Optimized Link State Routing (OLSR) [6]

The OLSR model implements the MPR (Multi Point Relay) flooding mechanism to broadcast and flood Topology Control (TC) messages in the network. The algorithm is implemented as suggested in OLSR RFC 3626. This mechanism takes advantage of controlled flooding by allowing only selected nodes (MPR nodes) to flood the TC message. Each node selects an MPR to reach its two-hop neighbors The OLSR model implements the neighbor sensing mechanism through periodic broadcast of Hello messages. These Hello messages are one-hop broadcasts (never forwarded) that carry neighbor type and neighbor quality information. The neighbor sensing mechanism provides information on up to two-hop neighbors. Generation and processing of the Hello messages are implemented as suggested in the OLSR RFC.

Periodic and triggered Topology Control (TC) messages implement the topology discovery/diffusion mechanism in the OLSR model. TC messages are generated by MPR nodes and carry information about MPR selector nodes. These messages are diffused throughout the network using controlled flooding, thus helping to form a topology of reachable nodes, previous hop on each node.

### 2.3 Temporally Ordered Routing Algorithm (TORA) [7]

The Temporally-Ordered Routing Algorithm (TORA) is an adaptive routing protocol for multi hop networks. It possesses the following attributes:

- (i) Distributed execution,
- (ii) Loop-free routing,
- (iii) Multipath routing,
- (iv) Reactive or proactive route establishment and maintenance
- (v) Minimization of communication overhead via localization of algorithmic reaction to topological changes when possible.

Its operation can be biased towards high reactivity (i.e. low time complexity) and bandwidth conservation (i.e. low communication complexity) rather than routing optimality (i.e. continuous shortest-path computation). Its design and flexibility make it potentially well-suited for use of mobile ad hoc networks (MANETs).

A key concept in the protocol's design is an attempt to de-couple (to the greatest extent possible) the generation of far-reaching control message propagation from the dynamics of the network topology. The scope of TORA's control messaging is typically localized to a very small set of nodes near a topological change. TORA includes a secondary mechanism that is independent of network topology dynamics. It allows far-reaching control message propagation as a means of route optimization or soft-state route verification

### 3. Mobile Ad Hoc Network Model

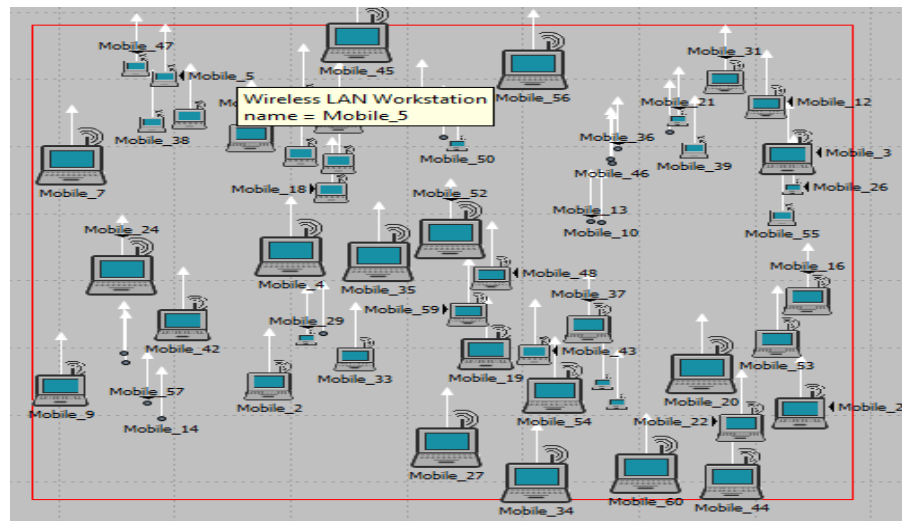


Figure 3.1 Ad hoc Wireless Network

We have design three Mobile Ad-hoc networks scenarios which consist of 100 mobile wireless nodes. Every scenario is following one routing protocol. Scenario one is based on AODV routing protocol, scenario two is following OLSR routing protocol and TORA routing protocol is used in scenario three. In order to enable direct, fair comparisons between Ad-hoc routing protocols, each protocol ran with identical load and environment conditions. Total simulation time was 3600 seconds with 128kbps speed.

As shown in the figure 3.1, wireless network consist of Wireless LAN workstations and supported by random mobility model. Wireless LAN workstation the "wlan\_wkstn" model can be configured to run any MANET routing protocol. It is able to generate application traffic (FTP, E-mail, HTTP, etc.) and route the traffic using the MANET routing protocol configured.

#### 4.0 Performance Analysis of Protocol

We have conducted relative performance study of Ad hoc routing protocols through simulation model using Optimize Network Engineering Tool (OPNET 14.5) simulator to carry out simulation. Performance of simulation has analysis based on following matrix.

- a) Wireless LAN Throughput
- b) End to End delay
- c) Wireless LAN Data Dropped

#### 4. (a) Wireless LAN Throughput

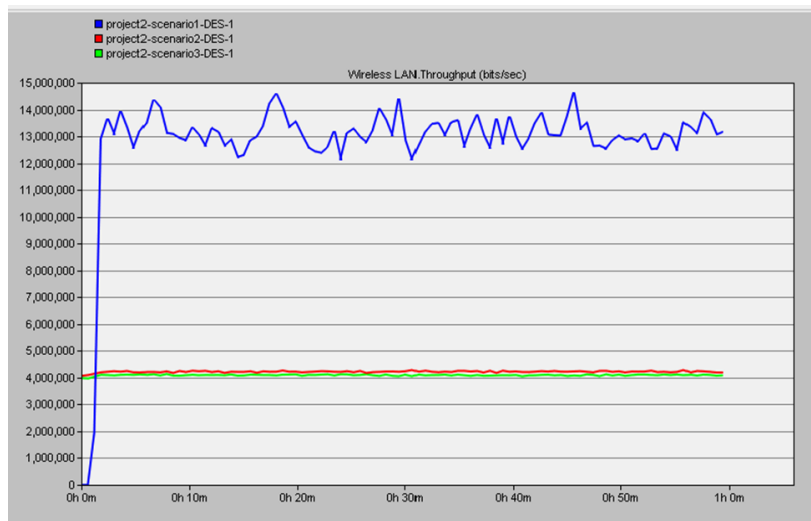


Figure 4.1 Wireless LAN Throughputs

As shown in the figure 4.1 throughput of Scenario one is far better than scenario two and three. Scenario one Mobile Ad hoc Network is based on AODV routing protocol and scenario two and three is based on OLSR and TORA routing protocol respectively. AODV is reactive protocol, its shows better throughput as compare to OLSR and TORA. OLSR and TORA are proactive protocols which shows stable throughput throughout the network simulation.

#### 4.(b) End to End delay

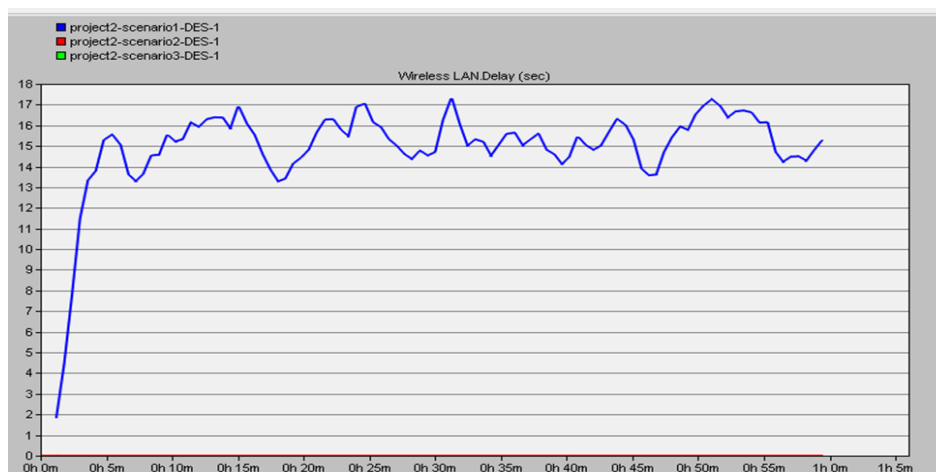
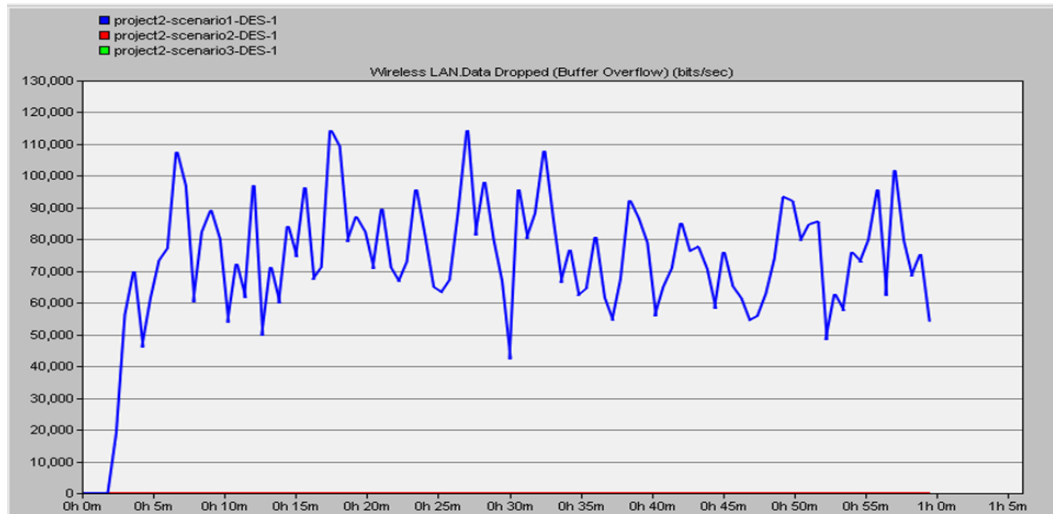


Figure 4.2 Wireless LAN Delay (Sec)

Scenario two and three shows no delay while transmitting the packets from one place to another as shown in the figure 4.2. These two scenarios are based on OLSR and TORA protocol. Scenario one shows fluctuating delay from 13 to 17 sec throughout the simulation time. Scenario one is based on AODV protocol. AODV is dynamic in nature as well as reactive. AODV find the new path on every moment of the wireless mobile node.

#### 4.(c) Wireless LAN Data Dropped (Buffer Overflow)



**Figure 4.3 Wireless LAN Data Dropped (Bits/sec)**

As shown in the figure 4.3 scenario one was shown data dropped due to the buffer overflow and scenario two and three shown no data dropped. On an average data dropped 70,000 bits/sec are reported after simulation of the model is completed. It was observed in the scenario one data dropped fluctuating from 45000 bits/sec to 115000 bits/sec throughout the simulation. When bits are reaching to the destination node, memory of the node was full and hence data was dropped by the node.

#### 5. SUMMARY AND CONCLUSIONS

A MANET simulation models were developed for different Wireless routing protocols i.e. AODV, OLSR and TORA. The performance of simulation models was observed and discussed in above sections. Based on the performance of routing protocols following are the by and large observations.

1. The AODV performance is best in terms of throughput as compared to the OLSR and TORA.
2. OLSR and TORA have shown zero data dropped and zero delay,
3. It is observed that AODV has shown maximum delay and data dropped as compared to other routing protocols.

#### REFERENCES:

1. National Science Foundation. Research priorities in wireless and mobile communications and networking: Report of a workshop held March 24–26, 1997, Airlie House, Virginia. Available at <http://www.cise.nsf.gov/anir/ww.html>.E. Balaguruswamy, “engineering reliability” Tata mc. Graw Hill, New Delhi.
2. Barry M. Leiner, Robert J. Ruth, and Ambatipudi R. Sastry. Goals and challenges of the DARPA GloMo program. IEEE Personal Communications, 3(6):34–43.
3. David B. Johnson. Routing in ad hoc networks of mobile hosts. In Proceedings of the IEEE Workshop on

- Mobile Computing Systems and Applications, pages 158–163,.
4. C. Perkins, E. Belding-Royer, and S. Das. RCF 3561 Ad Hoc On-demand Distance Vector Protocol (AODV). Network Working group, July 2003.
  5. OPNET Manual “ www.OPNET/14.5A/doc/modeler10
  6. T. Clausner, ed.and P.Jacquet, ed. Optimized Link State Routing Protocol
  7. (OLSR). Network Working group, October 2003.
  8. V. Park and S. Corson. Temporally Ordered Routing Algorithm (TORA),
  9. IETF MANET working group, October 1999.
  10. Narendra Mohan Mittal1 and Savita Choudhary. Comparative Study of Simulators for Vehicular Ad-hoc Networks (VANETs), IJETAE Volume 4, Issue 4, April 2014.
  11. Saad Talib Hasson And Sura Jasim . Simulation Study to Observe the Effects of
  12. Increasing Each of The Network Size and the Network Area Size on MANET’s Routing Protocols. computerscijournal ISSN: 0974-6471 April 2014, Vol. 7, No. (1): Pgs. 67-73.
  13. Jean-Daniel Medjo Me Biomo , Thomas Kunz , Marc St-Hilaire and Yifeng Zhou. Unmanned Aerial ad Hoc Networks: Simulation-Based Evaluation of Entity Mobility Models’ Impact on Routing Performance. Aerospace 2015, 2, 392-422; doi:10.3390/aerospace2030392.
  14. Mustafa Almahdi Algaet, Zul Azri Bin Muhamad Noh, Abd Samad Bin Hasan Basari, Abdul Samad Shibghatullah, Ali Ahmad Milad and Aouache Mustapha. A Review of Service Quality in Integrated Networking System at the Hospital Scenarios. JTECE ISSN: 2180 - 1843 Vol. 7 No. 2 July - December 2015 . MohdRazeef and MohsinNazir, “Reliability of Software Development using Open Source Technology”, in IJARCS, vol2, No. 5, pp. 479-485, Sept-Oct 2011

Paper Title- "Ad-hoc wireless network optimization through OPNET simulation model"

Paper Link- <http://serisc.org/journals/index.php/IJAST/article/view/820>

Journal Name- International Journal of Advanced Science and Technology 2005-4238

Journal Link <http://serisc.org>

Journal Source-



Scopus Preview

[Author Search](#)

[Sources](#)



## Source details

Fee

### International Journal of Advanced Science and Technology

Scopus coverage years: from 2016 to 2020

(coverage discontinued in Scopus)

Publisher: Science and Engineering Research Support Society

ISSN: 2005-4238 E-ISSN: 2207-6360

Subject area: [Energy: General Energy](#) [Computer Science: General Computer Science](#) [Engineering: General Engineering](#)

Source type: Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 20  
0.0

SJR 2019  
0.108

SNIP 2021  
0.250

# A New model Approach for Moodle - OTRS Integrated MTTR calculation

Shilpa Parlikar [Research Scholar]  
Asst. Professor,  
MES'Institute of Management & Career  
Courses (IMCC)  
Email: ssp.imcc@mespune.in

Dr Ujwala Dange  
Dean, Academics  
J D College of Engineering  
Email: ujwala\_dange@rediffmail.com

## *Article Info*

*Volume 83*

*Page Number: 10551 - 10558*

*Publication Issue:*

*March - April 2020*

## *Article History*

*Article Received: 24 July 2019*

*Revised: 12 September 2019*

*Accepted: 15 February 2020*

*Publication: 13 April 2020*

## *Abstract*

MOODLE is an open source Learning Management System. OTRS is a ITIL compatible service desk tool. This paper focused on integration of Moodle and OTRS. Data in different queues are received after integration. This data is processed and results are included in the paper.

---

## **Introduction**

**Moodle:** It is Open source Learning Management System. Moodle stands for Modular, Object- Oriented, Dynamic Learning Environment. We can create different courses and different types of evaluation can be defined under Moodle. Students can enroll for the course. We can define different roles in Moodle like teacher, assistant teacher, student etc.

**OTRS:** OTRS (Open source ticket Request System), Perl based trouble ticket (or issue management) system, used as the basis for our applications. It has two main constituents one is ticket and other is queue & its status.

The tickets are organized into several queues that can be created by the

administrator and connected to particular users with defined rights. During its lifetime, each ticket goes through series of states. A state is property completely orthogonal to the queue and can represent important turning points in its history – external update, timeout or closing reason [1]. It is open source ITIL compatible tool. ITIL is a framework for Information technology service management. It provides the guideline for the end to end service (Service provider to customer). The main focus of the service provider is to keep promise of service made available to agreed period and agreed conditions. For this purpose a document is created called Service Level Agreement (SLA). The document is signed by service provider and customer. Any change in this

agreed terms and conditions, laid to issue that creates a ticket in OTRS system [2].

**Related Work:**

Rebouças, R., Sauv , J., Moura, A., Bartolini, C., & Trastour, D. (2007, May)

designed a decision support tool for change management, For this they studied a whole day working of Change Manager and analyzed. Their tool suggests what decision a change manger should make while supervising the change management process.

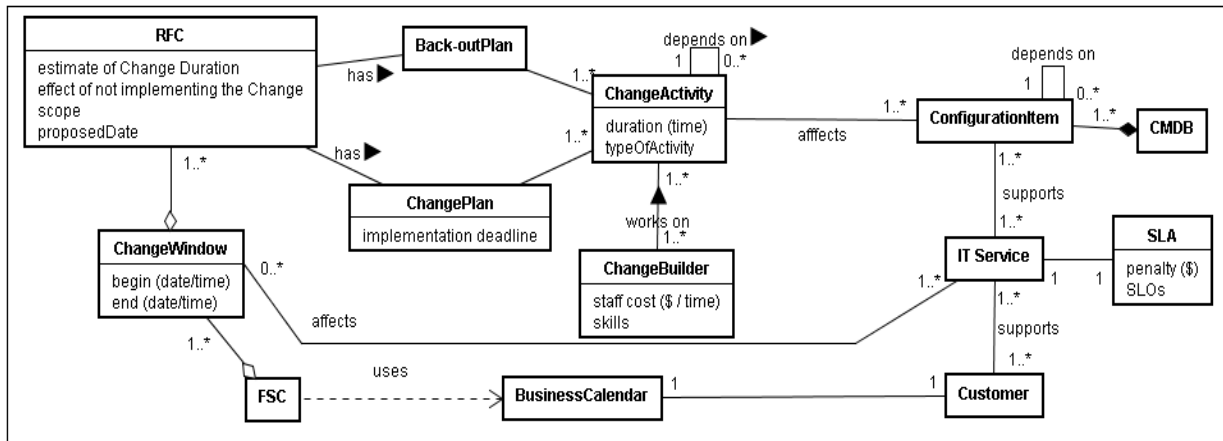


Fig: 1:Change Management conceptual model [3]

When request for change submitted, it is change manger allocates priority. First it is searched that whether for the change can follow standard path of execution, accordingly change manager follow steps for that.

Step 1: "Change dependency definition"

Step 2:" Change window allocation"

Step 3:" Change scheduling".

Rebouças, R. and team [3] focused on Change Scheduling. In this paper we presented a methodology and a software prototype for decision support to optimize scheduling of IT changes driven by business considerations. They gave an account of the analysis and design phases in the inception of our change scheduling prototype, and presented a deep dive into the formalization of the decision problem

that our tool solves: how to define a schedule for allocating changes to pre-negotiated change windows while minimizing the expected negative impact of service disruptions on the business that the IT department supports.

Schaaf, Thomas, and Michael Brenner. [4] , focused on a development of platform independent service level management solution after studying different tools that can be integrated. They wanted to provide solution that will consider SLA specific issues and management related tasks. They found the gap between setting up an integrated, tool-based management system to support the tasks of SLM which is not been addressed sufficiently. In order to fill this gap, an architecture to effectively support the design and development of concrete IT-supported management systems was presented by them.



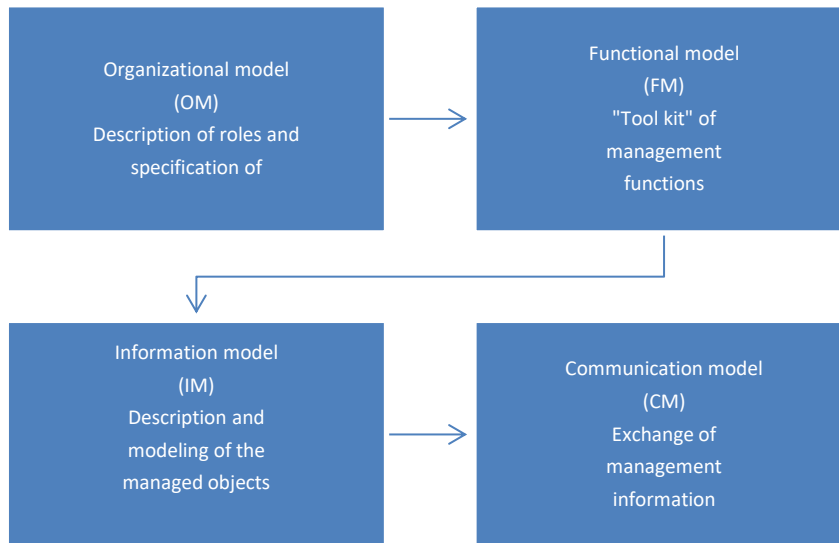


Fig 2: Components of a management architecture

Figure 2 shows the core part of their suggested architecture.

Vicente, Marco and teach [6], In this paper we focused on this architecture's value, on identifying and modeling its valuation concepts and instances. With these we are able to better represent ITIL processes from an EA point of view, and to use architecture-based methods to perform ITSM value analysis. We argue that by decomposing ITIL processes on capabilities, we can assess how effective

are the as-is resources providing these capabilities, weighted by their importance to the organization.

Therefore, the processes to implement will be the ones that have important capabilities that are less present on the organization. In future work our plans are to search and evaluate other ITIL valuation methods to complement our resource/capability approach and define an effective way to assess the value of ITIL processes under an enterprise architecture perspective.

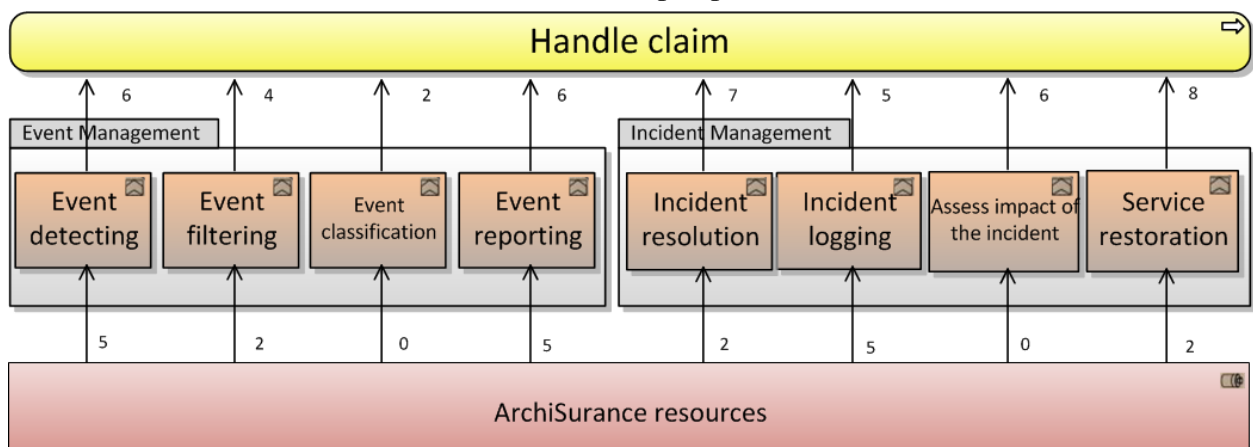


Fig 3: Adaption of Bedell's method to value ITIL capabilities [6]

Figure 2 is a model that represents the effectiveness of the ArchiSurance (it is a fictitious example developed to illustrate the use of the ArchiMate® modeling language) actual resources to deliver the capabilities of ITIL Event and Incident Management processes, along with these capabilities' importance to the handle claim process. The arrows from the resources to the capabilities carry the values of how effective are current enterprise resources to deliver these capabilities.

Also, the value in the arrows that connect capabilities to the handle claim process represents the importance of each capability for the business process. These values are based on our individual interpretation in this reference. In a real situation, and as already mentioned, the effectiveness values could come from Key Performance Indicators measurements and importance could come from stakeholders

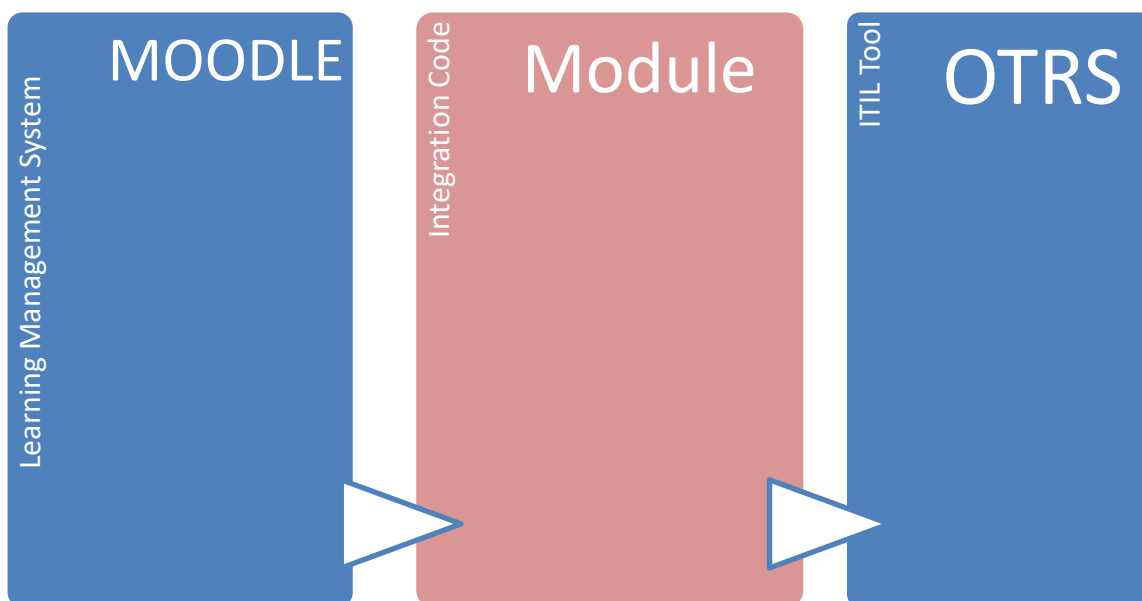
interviews or workshops. However, the selection of rules and associated techniques to assign the input values should be aligned with the desired way of working and thinking of business and IT management [5].

**Model Approach:**

The study was aimed to find out the importance of e-Learning software and its integration with OTRS – ITSM tool. The researcher intended to find out the information technology infrastructure Library (ITIL) framework implementation in e-Learning software - Moodle.

Open source Learning Management System - MOODLE and open source ITIL framework compatible tool OTRS were integrated. The software is implemented on linux platform. After implementation the data are obtained. The data in the form of different queues created in OTRS are obtained.

DATA MODEL:



For the experiment, “service desk” function is selected. Here is where users communicate by default. It is a single point of contact (SPOC) of a system. It is point where request is categorised as incident, problem, simple request etc. Priorities are also assigned here. Based on the categories, different queues are generated.

There are different queues related to Front office, certification enquiry, online learning, sales etc. Sales queue is considered to calculate MTTR as it directly affects the service availability. It is analyzed. It is possible to calculate MTTR (Mean Time To Repair) based on data obtained from Moodle-OTRS integration. Agreed target is mentioned in the Service Level Agreement with the customer. Mean Time To Repair (MTTR) refers to the amount of time required to repair a system and restore it to full functionality.

**Data Source:** QLogy Management Systems, an IT company provide online training, cloud solutions, open solutions, shared solutions and mobility solutions.

The company made data available for research to the researcher. The researcher got access to data from 2011 to 2017. The data received was entered in the implemented model and results are drawn.

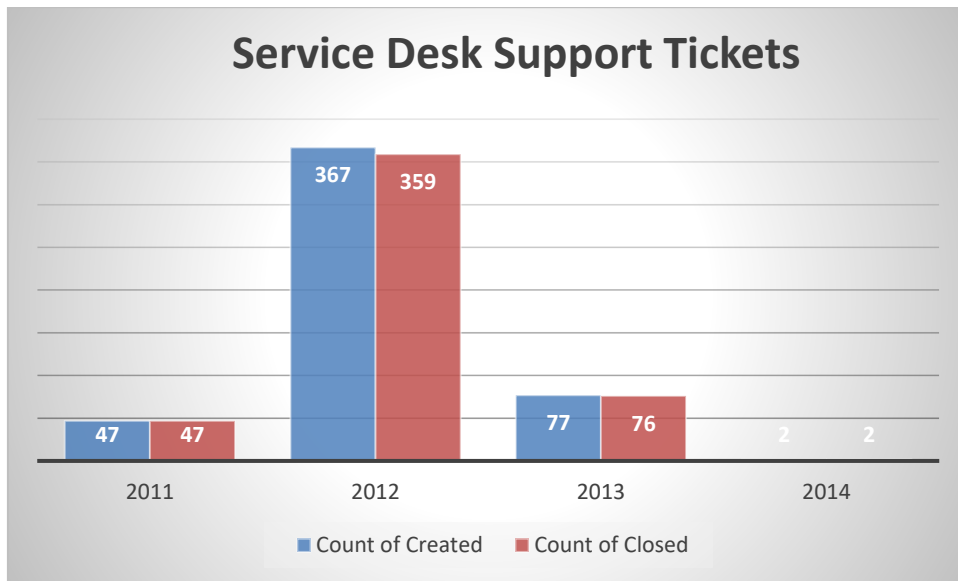
### Experimental Analysis:

The data model is implemented. From OTRS data received in the form of queues. Tickets are categorise in these queues. Using the provided data ,the researcher exercise different calculations. Below are the results of compared with earlier years.

**Service Desk Support Queue** is used to determine whether by integrating OTRS with MOODLE, customer queries are reduced or not.

The tickets are generated for queries. Some of the queries are resolved at service desk point. This is a single point of contact (SPOC) of the system. Based on common observations, query is solved at entry point. Such solutions are stored in a database. These are called workaround solutions. All such queries are grouped here.

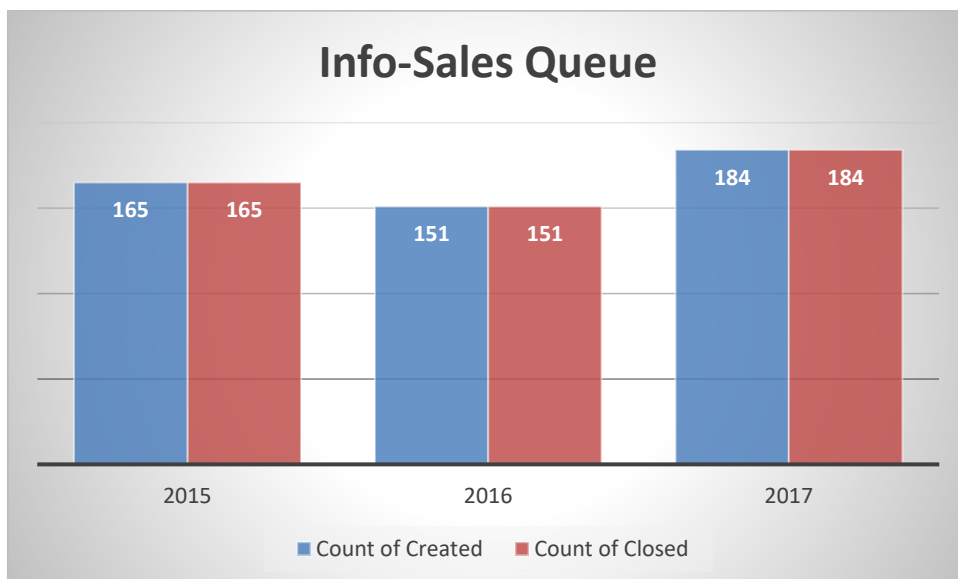
Service Desk Support	Count Created	of Count Closed	of
2011	47	47	
2012	367	359	
2013	77	76	
2014	2	2	
<b>Total</b>	<b>493</b>	<b>484</b>	



#### Info-Sales Queue:

The queue is related to the information about sales. Number tickets generated are closed successfully in the successive years.

Info-Sales	Count of Created	Count of Closed
2015	165	165
2016	151	151
2017	184	184
<b>Total</b>	<b>500</b>	<b>500</b>



**MTTR** - Mean Time To Repair: IEEE Std 982.1-2005 definition states “The average time taken to repair a Configuration Item or IT Service after a Failure. MTTR is measured from when the CI or IT Service fails until it is repaired. MTTR does not include the time required to Recover or Restore. MTTR is sometimes incorrectly used to mean ‘Mean Time to Restore Service’”.

As we all aware that equipment downtime has direct impact on bottom line of any company so it becomes very important to track and analyze MTBR, MTBF and MTTR. It is used to find out reasons behind the short and long time break down duration. MTTR can be calculated from history details of breakdowns.

The researcher has analyze 250 records of ‘Info-ITIL-sales’ queue. Out of 250 records following are the observations:

	Solution In Minutes	Solution Difference In Minutes	Total Up Time
Total Time (in Sec→)	77263	5322737	5400000
Avg in min	309.052	21290.948	21600
Avg in hrs	5.150866667	354.8491333	360

Therefore MTTR = 5.150866667 Hrs. The SLA agreed up time is 5.25 Hrs. Therefore 97.14% availability is achieved.

### Conclusion:

Previous work carried on ITIL solution tools was based CI and KPIs architecture suggestion. The researcher defined a module that integrated Moodle and OTRS.

Based on the experiments carried out on the data received for the period year 2011 to 2017, it is observed that number of tickets submitted in the system got reduced. Also the percentage of closing the ticket was high, For any company sales is more important. Therefor researcher select sales queue to find mean time to resolve the query that is MTTR (Mean Time To Repair). After studying 250 records of sales queue, service availability to the customer mentioned in a service level agreement (SLA) was 97.14%.

### References

1. "OTRS: CSIRT WorkFlow Improvements" (PDF). Cesnet.cz. 2010. Retrieved 14 February 2013.
2. <https://www.iti.org.uk/>
3. Rebouças, Rodrigo, et al. "A decision support tool to optimize scheduling of IT changes." *2007 10th IFIP/IEEE International Symposium on Integrated Network Management*. IEEE, 2007.
4. Schaaf, Thomas, and Michael Brenner. "On tool support for Service Level Management: From requirements to system specifications." *2008 3rd IEEE/IFIP International Workshop on Business-driven IT Management*. IEEE, 2008.
5. D. Quartel, M. W. A. Steen, and M. Lankhorst, "It portfolio valuation- using enterprise architecture and business requirements modeling," pp. 3–13, 2010. [Online]. Available: <http://ieeexplore.ieee.org/lpdocs/epic03/wraper.htm?arnumber=5630226>

6. Vicente, Marco, Nelson Gama, and Miguel Mira da Silva. "The value of ITIL in enterprise architecture." *2013 17th IEEE International Enterprise Distributed Object Computing Conference*. IEEE, 2013.

Paper Title- [A New Model Approach for Moodle OTRS Integrated MTTR Calculation](#)

Paper Link- <http://testmagazine.biz/index.php/testmagazine/article/view/5509/4441>

Journal Name- Test Engineering & Management

Journal Link- <http://www.testmagazine.biz/index.php>

Journal Source-



Scopus Preview

[Author Search](#)

[Sources](#)



## Source details

[Feedback](#)

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)  
[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 2019  
0.1

SJR 2019  
0.101

SNIP 2021  
0.117

# Customer Analytics Improves Banks Performance: A Descriptive Study of Analytical CRM among Private, Cooperative and Nationalised Banks

Jayashree S. Patil  
Assistant Professor  
Department of MCA,  
Institute of Management and Career Courses, Pune, India

## Article Info

Volume 83

Page Number: 10464 - 10470

Publication Issue:

March - April 2020

## Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 13 April 2020

## Abstract

The goal of the research is to study the functioning of customer relationship management techniques. This paper mainly focuses on use of various analytics used in CRM that can affect business development of private, public and nationalized banks. This study also proposed an integrated model for Analytical CRM which will improve business of banks.

**Keywords:** Customer Relationship Management, Business Development, Customer Analytics.

## I. Introduction

Over a span India has paved the way for growth in key business areas such as finance, insurance and health. The 21st century in India is described as the beginning of scientific development in the areas of technology and the enrichment of knowledge. Management of relationships with customers involves customer activity which ensures differentiation at every service level by means of a distinct experience. [8]

The main component for a Bank to improve their customer and sales capabilities is customer relationship management. For banking organizations, customer retention is a major problem which demonstrates the significance of CRM practices. CRM operations are currently underway by the banks to improve the bank's strategy, growth, productivity and competitiveness.

## II. Indian Banking

In today's global world and a market-driven economy, banks have been intermediaries between the demand and supply of the capital. India is home to many banks, including the public sector, the private sector, global banks, and cooperative banks.

Banking Industry in India functions under the sunshade of Reserve Bank of India - the regulatory, central bank. Banking Industry mainly consists of:

- Commercial Banks
- Co-operative Banks

For assessment of the performance of banks, the Reserve Bank of India categorizes them as public sector banks, private sector banks, and foreign banks



### a. Technical Improvement in Banking

Banks need to take several specific decisions every day. We need trustworthy information to reduce the risks associated with them. For this reason, data centers are most often used in which all the necessary data are processed of business purposes.

When banks began to grow, it was often shown that each department has a different risk management system and that customer information is not consistent. And then the banks had to create a central system that would link all the different data stores. New requirements for IT systems now emerge from the time of centralized solutions such as open architecture, the need for company implementation of customized solutions such as credits or sales systems and the need for the convergence of financial group systems

### III. Customer Relationship Management

CRM is an extensive approach that aligns business strategy, corporate culture and IT support so that customer relationships are mutually helpful to both customers and organizations. Expansion in communication tools, cutting edge technology and larger stage to communicate and influence, it is the sophistication of the CRM tools that make a major difference in the brands' valuation in the minds of its customers.

CRM can be viewed as both a development and a consequence of advancement. CRM frameworks could show up available because of development in innovation; then again they too could be considered as development. In contrast to other mechanical advancements, CRM can help banks rapidly and legitimately improve consumer loyalty and increment maintenance of significant clients. [10]

### b. Relative importance of CRM in Banking

Banking being a service industry provides various products and services to a variety of customers. Customers are from different types such as individual, corporate, institutions, etc. The

customer relationship management was established as a common corporate strategy with cut-throat competition within the banking business. By using CRM, a financial institution is able to recognize the most relevant clients and priorities

CRM in banking is considered as one of the marketing strategies which establish a relationship with customers. CRM is not a product or service; it is an overall business strategy that enables companies to effectively manage relationships with their customers. [5].

Due to tremendous growth in the banking sector, it is necessary to increase customer profitability and retain customers. For the banking sector, relationship management can be considered as taking appropriate actions on various operations a customer is handling related to his product, service. Banking being a financial service sector, it is based on the trust of the people. Customer care centers can be considered useful to update customers about various products and services. Customer care centers along with relationship manager/department in the banking sector can take care of customers

### c. Technical benefit of CRM in banking

Scalable CRM implementation is extended with establishing good bonds with customers so that the CRM system will collect data about customers. This data must be stored in a centralized place. In the ideal case of CRM, the bank's global database would have a customer history to share with customer service representatives all over the world so the customer could receive the best service and know that they are valued.

With the support of the Customer Life Cycle system as part of CRM, banks can use information technology to improve their knowledge of customer profiles, usage habits, and individual needs. All customer information that can be shared in the banking network can be stored in a central database. By introducing such a prevalent customer database, banks can provide the greatest service to

customers and can also expect excellent customer reactions.

#### **IV. CRM performance measurement**

To fulfill its expectations, customer relationship management should perform an integrative function within the bank and guarantee that all procedures are incorporated into the global strategy of the bank, which is far from the study's truth. It also proposes certain points for the implementation of the plan for CRM inclusion.[4]

Kim, H. S., & Kim, Y.G. suggests a performance assessment framework called a Customer Relationship Management (CRM) scorecard for diagnosing and assessing the CRM activity of a company. The CRM scorecard was developed through a rigorous and step-by-step development process that collaborated with several companies in a variety of industries[6].

A multi-item scale for measuring the customer relationship management effectiveness (CRME) in Indian retail banks was developed. It was used to examine its relationship with the key customer response variable.[7]

#### **The rationale of the study**

The rationale of the study is to investigate the working of Analytical Customer Relationship Management techniques. What is the role of analytical CRM in business development of bank? Indian banking has been facing competition after liberalization and globalization. Customer satisfaction is important in the growth of the bank. The researcher intended to find out whether there is any relationship between customer satisfaction and usage of CRM.

In the banking industry, due to the rules of the Reserve Bank of India and government policies, CBS (Core Banking Solutions) has implemented. CBS consists of software which performs core operations of banking such as recording

transactions, maintenance of passbook entries and maintaining customer records, etc.

Customer Relationship Management has shifted from CRM to e-CRM by integrating new software with CBS or using separate CRM software. Three pillars of CRM viz Collaborative, Operational and Analytical plays an important role in nurturing the customer relationship. Analytical CRM is used in back-office where a large amount of customer data is classified and analyzed systematically.

#### **V. Objectives**

The researcher has framed objectives of the present study after reviewing literature as-

- To study the working pattern of analytical CRM
- To study the impact of CRM on business development
- Comparative study of CRM in Nationalized, Cooperative, Private and Scheduled banks

#### **VI. Research methodology**

The purpose of this study is to explore the use of Customer Relationship Management methodology implemented in Private, Public and cooperative banks. Descriptive research approached the preferred methodology in this study

Research methodology must be rigorous in order to minimize errors in the collection and analysis of information. For data collection, the methods were chosen, namely surveys, telephone, structured and unstructured interviews.

The present study is focused on analytical CRM and its usage in the business development of banks. For this research, the researcher considers Nationalized, Private and Cooperative banks in Pune city.

#### **d. Sample selection**

The researcher has used a random sampling method for selection of sample i.e. target population. The researcher has attempted almost 30% of the sample

out of the total population. Random data sample of appropriate size is collected to ensure that sufficient data for all condition is obtained

Universe – Banker and Customers of banks

Sampling frame- Bank and customers of banks

Sampling unit- Employees of Private, Nationalized and Cooperative banks

Sample techniques- Simple Random Sampling

#### e. **Data Collection**

##### **Primary Data Collection**

A survey method is used to collect data. A pilot study was conducted for 16 banks and 50 customers. After the pilot study, the questionnaire was refined and primary data collection was done. Apart from regular questionnaire method, Experts Interviews were conducted for collecting primary data. For this research two separate structured questionnaires were designed for bank managers and customers.

- Bank Questionnaire mainly collects data about- CRM basics, Customer analytics, Service analytics, effectiveness of CRM implementation and business development
- Customer questionnaire collect information about services and products availed by customers and also overall satisfaction about banks

##### **Secondary Data Collection**

Secondary data was collected through various literatures like Research papers, Thesis, Journals, White papers/articles, Books on customer relationship management. Researcher also reviewed annual reports of banks, publications on Reserve Bank of India Website, etc.

#### **VII. Integrated ACRM conceptual framework**

After analyzing the data, the researcher identifies certain parameters for developing integrated ACRM. The proposed model will focus on three important phases of the Customer Life Cycle as Customer acquisition, customer retention, and customer expansion. It has been observed from the findings of the current study that the classification of the customer is mostly performed on a kind of transaction and frequency of transactions made by the customer. To understand customer's requirement more thoroughly and suggesting them an appropriate product, researcher identify following a list of parameters. The proposed ACRM framework will accommodate those parameters. Parameters are type of association with the bank and its duration, cognitive analysis.

##### **f. Customer Life Cycle and CRM**

The customer life cycle and CRM has a strong association with each other. Customer Life Cycle (CLC) is a process that covers the stages from customer initialization to customer satisfaction or dissatisfaction with the service provided by customers. CLC focuses on the products and services required by customers throughout the customer's life cycle. CLC can be used as the steps that the customer takes while considering, buying and using a product. It can be effectively split into various steps, such as reach, acquisition, transformation, retention, etc. It can be defined more simply by progressing from receiving a potential customer's attention, showing them what you have to offer, making them a potential customer and keeping them as a customer for life by ensuring satisfaction.

**Customer acquisition**—This is the method by which our customers are attracted to their first purchase. Our customer is acquired.

**Retention of Customer**—Our client returns and for the second moment buys from us. As a client, we hold them. The acquisition of a comparable product

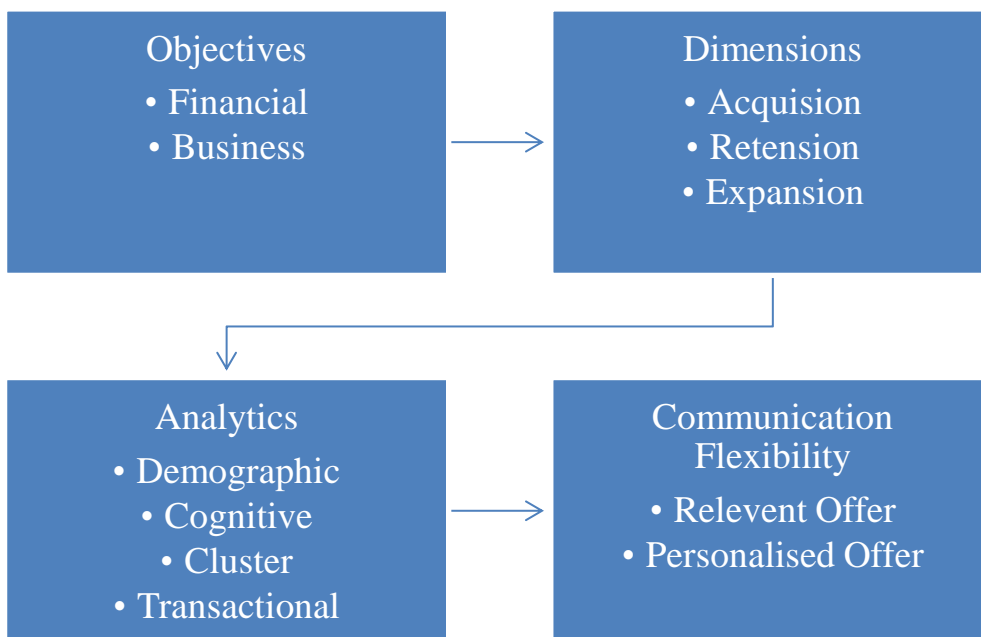
or service or the next stage of the product or service is most possible.

**Extension of the Customer**—our clients come back from us continuously. We present our loyal customers with products and services not entirely linked to their original purchase. These are extra purchases. These are additional. Naturally, our goal

is to maintain our loyal clients as a client of the extended product or service once we have purchased them.

**g. Conceptual Framework**

This conceptual framework comprises of 4 different components. Following Fig.1 describes components of suggested ACRM framework.



**Figure 1 Conceptual Framework**

Objectives are defined based on the vision of the bank. Objectives can be categorized as financial objective, customer-centric objectives or objectives set to enhance business to maximize profit. The bank is a customer-centric organization, so three dimensions of customers must be addressed viz customer acquisition, customer retention, and customer expansion. Analytical CRM models will help the bank to acquire new customers as well as helps to increase the level of customer satisfaction. To improve business development, everything about the customer must be known. We call this analysis as Customer 360. This module tries to analyze customer data in all possible dimensions. According to primary data collected from bank employees, the most commonly used segmentation

criteria are default parameters provided by CRM software. Customization in the classification parameter is not possible many times. This drawback of existing CRM is resolved in this integrated CRM. Here we are increasing depth and breadth of analyzing customer data by introducing new classification as cognitive analysis, loyalty analysis, and demographic analysis. This model performs need analysis of customers and generates reports and transferred data to interactive dashboards. This output can be used for deciding new market strategies or update existing campaign strategies. Based on this analysis bank will able to offer relevant offers and personalized offers to the customer. A customer shares their feedback based

on their experience. Such feedbacks can be used in social CRM for customer expansion.

#### **h. Advantages of ACRM**

Analytical CRM is a solid and consistent platform that offers analytical applications to help predict, scale and optimize customer relationships. The advantages of using and implementing analytical CRM are outlined below-

- This leads to making a more profitable customer base by providing high-value services.
- It helps in retaining profitable customers through sophisticated analysis and making new customers that are clones of the best of the customers.
- Helps in addressing individual customer's needs and efficiently improving the relationships with new and existing customers.
- Improves customer satisfaction and loyalty.

#### **VIII. Conclusion**

The present study concludes that nationalized and private banks are using CRM effectively but they need to explore more in customer analytics and service analytics. Whereas very few cooperative banks have implemented separate software for CRM rest of cooperative banks still using traditional data analysis.

The suggested integrated ACRM conceptual framework can be easily integrated into the existing banking system which will help to analyses and understand customers thoroughly. Customer satisfaction is very important in the current competing scenario for all types of banks. Providing the right solution at the right time is a key mantra for improving customer satisfaction which in turn reduce churn rate.

Banking sector is switching to CRM solutions for leveraging the applications to manage and grow in an effective manner. Cloud computing in banking

sector can achieve better result in developing relationship banking. A further study can be conducted on improving customer relations using sentiment analysis of social media data

#### **REFERENCES:**

- [1] Awasthi, P., & S. Sangle, P. (2013). The importance of value and context for mobile CRM services in banking. *Business Process Management Journal*, 19(6), 864-891.
- [2] Bhattacharya, A. (2011). Preeminent Analysis of Customer Relationship Management (CRM). *International Journal of Research in Management & Technology*, 1(1), 45-51.
- [3] Coltman, T. (2007). Can superior CRM capabilities improve performance in banking? *Journal of financial services Marketing*, 12(2), 102-114. DOI: 10.1057/palgrave.fsm.4760065
- [4] Das, S. K. (2012). Customer relationship management in the banking sector: a comparative study of SBI and other nationalized commercial banks in India. *Journal of Economics and Management (APJEM) Vol, 1*, 2278-0629.
- [5] Jasola, M., & Kapoor, S. (2008). CRM: A Competitive tool for the Indian banking sector. *Communications of the IBIMA*, 5, 178-188
- [6] Kim, H. S., & Kim, Y. G. (2009). A CRM performance measurement framework: Its development process and application. *Industrial marketing management*, 38(4), 477-489
- [7] Padmavathy, C., Balaji, M. S., & Sivakumar, V. J. (2012). Measuring the effectiveness of customer relationship management in Indian retail banks. *International Journal of Bank Marketing*, 30(4), 246-266
- [8] Parthasarathy, A., & Ramasamy, T. (2015). A Study On Customer Relationship Management Practices In Canara Bank Branches In Tamilnadu. In *International*

Conference on Inter-Disciplinary Research in Engineering and Technology (pp. 1-10).

- [9] Shaileshkumar J. Limbad (2016), Measuring Performance of Private Sector Banks on Customer Relationship Management Practices, Journal of Business Management and Research (JBMR), Volume.No.6, Issue.No.1,ISSN(P): 2250-2343, PP: 1-8, June
- [10] Urbanowicz, Monika (2008), "Concept of Customer Relationship Management as an example of innovation in the banking sector", IET Working Papers Series, No. WPS06/2008, IET, 19 pp.

Paper Title- "Customer Analytics Improves Banks Performance: A Descriptive Study of Analytical CRM among Private, Cooperative and Nationalized Banks"

Paper Link- <https://www.testmagzine.biz/index.php/testmagzine/article/view/5498>

Journal Name- Test Engineering & Management

Journal Link- <http://www.testmagzine.biz/index.php>

Journal Source-



## Source details

Feedback

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)  
[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 2019  
0.1

SJR 2019  
0.101

SNIP 2021  
0.117

# Writer Identification using Neural Network

Dr. Santosh Deshpande<sup>1</sup>, Mukul Kulkarni<sup>2</sup>

<sup>1</sup>Director, Institute of Management and Career Courses, Pune, India

<sup>2</sup>Assistant Professor, Savitribai Phule Pune University, Pune, India

## Article Info

Volume 83

Page Number: 10529 - 10533

Publication Issue:

March - April 2020

## Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 13 April 2020

## Abstract

Computer Vision has been evolving everyday with advancement in the Deep Learning. Residual Neural Networks is one of such image classification techniques. This paper is an application of ResNet 50 for the purpose of writer identification using handwriting biometric – signature. Different signature verification competitions had used many approaches. Here SigComp2009 dataset is used and experimental results are discussed. ResNet 50 is able to achieved 92% accuracy for 780 signatures used randomly from ICDAR 2009 dataset of genuine signatures.

**Keywords:** Handwriting Signature Recognition, Image processing, Neural Network, ICDAR 2009, RES-NET.

## I. INTRODUCTION

Writer identification using handwriting biometrics like signature is commonly used over decades. Even in today's world, most advanced banking system or legal firms also still rely on the offline signatures for transactions. New development in technology helped in the verification of online signatures but still demand for offline writer identification still exist in variety of scenarios like banking transactions, legal documents, commercial and non-commercial application. In all of these cases, writer identification and verification is very important. Compare to online writer identification, offline writer identification is more used and newer aspects of writer identification are still emerging. [1]

Over the periodic development in the computer vision, image processing and pattern recognition has given new approaches for writer identification. Since any writer is unable to replicate exactly same own signature, it's very difficult for any method to classify writer based

on their different set of signatures with natural variations. In past, there have been competitions to solve this problem using different approaches. Following is the list of competitions

1. Signature Verification Competition (SigComp2009) – 1953 Signatures[2]
2. Forensic Signature Verification Competition (4NSigComp2010) – 334 Signatures[3]
3. Signature Verification Competition (SigComp2011) - 1932(Dutch) and 1177(Chinese)[4]
4. Forensic Signature Verification Competition (4NSigComp2012) – 501[5]
5. Signature Verification and Writer Identification Competitions (SigWiComp2013) - 2340 (Japanese)[6]
6. Signature verification and Writer identification Competition (SigWlcomp2015) – 1268 Signatures [7]

Table 1 Signature Verification Competition

Sr. No.	Competition	signatures	Accuracy (Offline)	Dataset
---------	-------------	------------	--------------------	---------



1	ICDAR 2009 Signature Verification Competition	1953	90.85	Offline& Online
2	SigComp2011	1932(Dutch) 1177(Chinese)	97.67(Dutch) 80.04(Chinese)	Offline & Online
3	4NSigComp2012	501	80.84 (Chinese) 93.17 (Dutch)	Offline & Online
4	SigWiComp2013	2340	99.16 (Japanese)	Offline & Online
5	SigWlcomp2015	1268	99.34 (Italian) 98.02 (Bengali)	Offline & Online

In this paper, we have implemented RESNET 50 for writer identification on ICDAR 2009 dataset and reported the results.

## II. DEEP LEARNING MODEL – RES-NET50

Deep learning is used to identify the features of each image to classify them using neural networks. Neural networks create model like feature extraction which is built on extracting distinct features learn from training dataset. In this identified learning is been transferred from upper layer to lower using transfer mechanism.[8] In some cases, higher layer model faced problems like diminishing of the data due to larger Neural network layer transfer making distinct features absolute. To overcome these problems an intuitive model of residual network is proposed in which learning from previous node can be passed to next node in the form of residuals.

RESNET is such deep neural network used for image segmentation. It has been majorly used for the process of analyzing images, classification of images from different sets. The major property of residual network is its connection and specification of node where previous residuals are passed on to next block as it is for deeper layers making it more effective than similar other traditional convocational neural networks[9].

For the process of writer image segmentation and identification RESNET50 has been firstly

attempted in the paper. Handwritten signatures identification has been addressing problems like variation in the writers’ style, language dependency and multi lingual signatures. In the signature competition mentioned above, researchers have tried to solve such problems using custom made architectures, multi-model approaches and language specific methods. Due to advancement into image processing and considering newer computer vision problem we are focusing on start of art techniques like RESNET50.

## III. METHODOLOGY

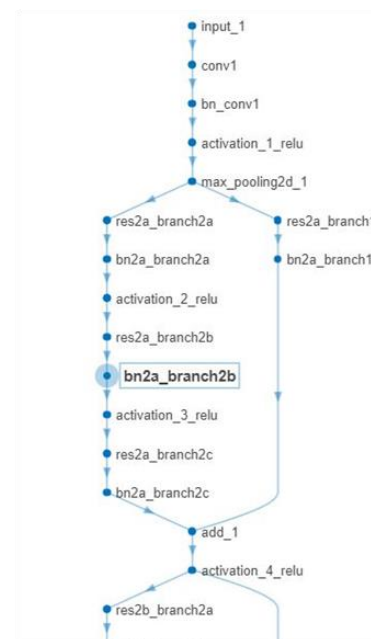


Figure 1. ResNet50 Architecture

## Design of ResNet 50

Fig. 1 Shows ResNet50 architecture. In the methodology, input is passed on to first conventional neural network to create first convolutional layer weights. Network model goes layers wise to deeper network to update weights till max weight polling weight assigned. This process continues till last layer convolutional layers' weights are calculated and store as shown in Fig.2. Once learning model complete this process, testing set of images are being classify

using learned weights and results are compared with saved writer values and confusion matrix is calculates.

Initially each writers' 10 signatures are randomly taken out of those 7 set of signatures were used as input to ResNet 50. Weights were calculated based on these images. Remaining 3 signatures were passed to learn model to classify them as per learned weight results were compared. Supervised learning model used to check accuracy of each user and overall accuracy was reported.

add_10 Element-wise addition of 2 inputs	Addition	14×14×1024	-
activation_31_relu ReLU	ReLU	14×14×1024	-
res4d_branch2a 256 1x1x1024 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×256	Weigh... 1x1x1024x2... Bias 1x1x256
bn4d_branch2a Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_32_relu ReLU	ReLU	14×14×256	-
res4d_branch2b 256 3x3x256 convolutions with stride [1 1] and padding 'same'	Convolution	14×14×256	Weights 3x3x256x256 Bias 1x1x256
bn4d_branch2b Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_33_relu ReLU	ReLU	14×14×256	-
res4d_branch2c 1024 1x1x256 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×1024	Weigh... 1x1x256x10... Bias 1x1x1024
bn4d_branch2c Batch normalization with 1024 channels	Batch Normalization	14×14×1024	Offset 1x1x1024 Scale 1x1x1024
add_11 Element-wise addition of 2 inputs	Addition	14×14×1024	-
activation_34_relu ReLU	ReLU	14×14×1024	-
res4e_branch2a 256 1x1x1024 convolutions with stride [1 1] and padding [0 0 0 0]	Convolution	14×14×256	Weigh... 1x1x1024x2... Bias 1x1x256
bn4e_branch2a Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_35_relu ReLU	ReLU	14×14×256	-
res4e_branch2b 256 3x3x256 convolutions with stride [1 1] and padding 'same'	Convolution	14×14×256	Weights 3x3x256x256 Bias 1x1x256
bn4e_branch2b Batch normalization with 256 channels	Batch Normalization	14×14×256	Offset 1x1x256 Scale 1x1x256
activation_36_relu ReLU	ReLU	14×14×256	-

Figure 2 ResNet50 Layered Detail

## IV. EXPERIMENTAL RESULTS

In this paper, we are proposing RESNET 50 model for writer identification using signatures. First section of Res-Net50 was displayed as shown in Fig. 3. First convolution layer weights are displayed to view the process of classification as shown in fig.4. Each writers' accuracy being calculated and displayed writer-wise as shown in fig. 5. Our objective is to contribute to the area

making effective simple model for everyday use. This method consists of RESENT 50 model used for training and testing of signatures from ICDAR 2009 dataset. All the images used are from ICDAR 2009 signature competition. We have used 78 writers' 12 signature each making dataset of 936 genuine signatures. In the model we have used 546 random signatures for training set and 234 random signatures for testing set.

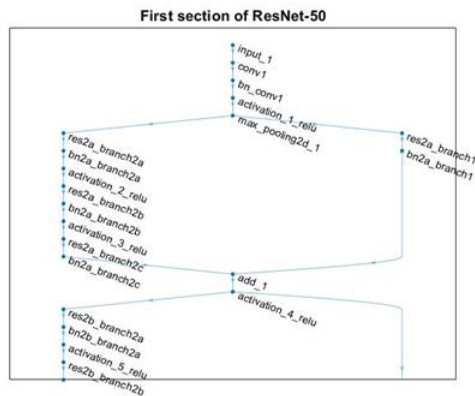


Figure 3 First Section of Res-Net 50

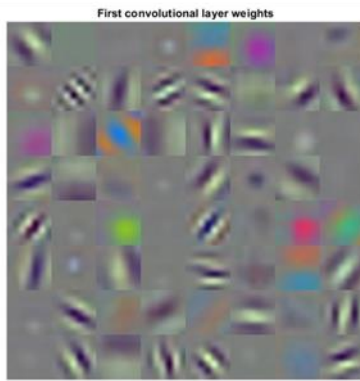


Figure 4 First convolution layer weights

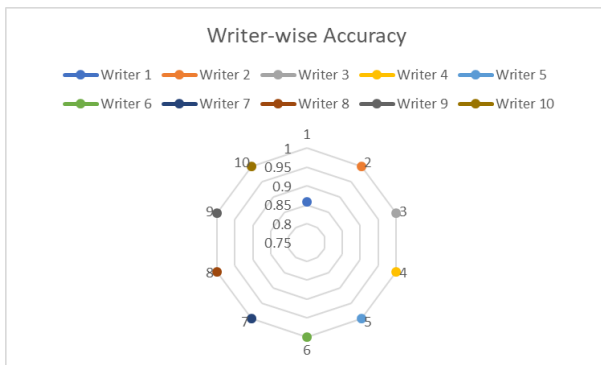


Figure 5 Writer-wise Accuracy

In the preprocessing phase we have randomly selected 78 writers with randomly taken 10 signatures. These signatures are used by ResNet 50 for training and testing further. Each writer-wise and image-wise accuracy was reported. Confusion matrix was stored and overall the model reported accuracy of **92.12%**.

## V.CONCLUSION

In this paper we have discussed about different competitions related to writer identification taken place over the years. We have explored the techniques used in for signature classification and provided with alternative approach using deep neural network. In our experimental results we have used ResNet 50 with ICDAR 2009 signature dataset to identify writer. The result of 92.12 accuracy gives us boost to work further. Our future work is to build more robust NN with training transfer engine to use it more effectively.

## REFERENCES

- [1] S. A. Daramola, M. A. Adefuminyi, and T. M. John, "Online signature for attendance verification system using Levenberg-Marquardt Neural Network," *Lect. Notes Eng. Comput. Sci.*, vol. 2223, pp. 444–449, 2016.
- [2] V. L. Blankers, C. E. Van Den Heuvel, K. Y. Franke, and L. G. Vuurpijl, "The ICDAR 2009 signature verification competition," *Proc. Int. Conf. Doc. Anal. Recognition, ICDAR*, pp. 1403–1407, 2009.
- [3] M. Blumenstein, M. A. Ferrer, and J. F. Vargas, "The 4NSigComp2010 off-line signature verification competition: Scenario 2," *Proc. - 12th Int. Conf. Front. Handwrit. Recognition, ICFHR 2010*, pp. 721–726, 2010.
- [4] M. Liwicki et al., "Signature verification competition for online and offline skilled forgeries (SigComp2011)," *Proc. Int. Conf. Doc. Anal. Recognition, ICDAR*, pp. 1480–1484, 2011.
- [5] M. Liwicki, M. I. Malik, L. Alewijnse, E. Van Den Heuvel, and B. Found, "ICFHR2012 Competition on Automatic Forensic Signature Verification (4NsigComp 2012)," *Proc. - Int. Work. Front. Handwrit. Recognition, IWFHR*, no. 4NsigComp, pp. 823–828, 2012.
- [6] M. I. Malik, M. Liwicki, L. Alewijnse, W. Ohyama, M. Blumenstein, and B. Found, "ICDAR 2013 competitions on signature verification and writer identification for on- and offline skilled forgeries (SigWiComp 2013),"

- Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, pp. 1477–1483, 2013.
- [7] M. I. Malik et al., “ICDAR2015 competition on signature verification and writer identification for on- and off-line skilled forgeries (SigWIcomp2015),” Proc. Int. Conf. Doc. Anal. Recognition, ICDAR, vol. 2015-Novem, pp. 1186–1190, 2015.
- [8] L. G. Hafemann, R. Sabourin, and L. S. Oliveira, “Analyzing features learned for Offline Signature Verification using Deep CNNs,” Proc. - Int. Conf. Pattern Recognit., vol. 0, pp. 2989–2994, 2016.
- [9] W. M. K. S. Ilmini and T. G. I. Fernando, “Computational personality traits assessment: A review,” 2017 IEEE Int. Conf. Ind. Inf. Syst. ICIIS 2017 - Proc., vol. 2018-Janua, pp. 1–6, 2018.
- [10][https://en.wikipedia.org/wiki/Residual\\_neural\\_network](https://en.wikipedia.org/wiki/Residual_neural_network)

Paper Title- "Writer Identification using Neural Network"

Paper Link- <http://testmagzine.biz/index.php/testmagzine/article/view/5504/4437>

Journal Name- Test Engineering & Management

Journal Link- <http://www.testmagzine.biz/index.php>

Journal Source-



Scopus Preview

[Author Search](#) [Sources](#)



## Source details

[Feedback](#)

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)  
[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 2019  
**0.1**

SJR 2019  
**0.101**

SNIP 2021  
**0.117**

# Impact of Evolving Skills Education and Technology from Young Age

Dr. Venugopal Narsingoju<sup>1</sup>, Mrs. Bhavana Narsingoju<sup>2</sup>

<sup>1</sup> Assistant Professor, MES's Institute of Management and Career Courses (IMCC), Pune

<sup>2</sup> Principal, Symbiosis Junior College, Kiwale, Pune

## Article Info

Volume 83

Page Number: 10534 - 10539

Publication Issue:

March - April 2020

## Abstract

India is a country where maximum population is Youth only. If we need to focus on economic development of India still we need to work hard due to various problems like Poverty, Unemployment, illiteracy, medical infrastructure etc. The crucial change makers are only Youth, who can contribute for the economic prosperity of India.

The main aim of skill India is introduced by Hon'ble Narendra Modi in March 2015 to create various opportunities, space and scope for self-development and the talents of Young India. This program was initiated to provide skill development to all villages of India [1]

In the present scenario it is found that the most of youth are facing problem of unemployment not because they are not educated, only because they are lacking in skills which market needs. Most of them are not aware about the development of modern technology which are changing daily. The continuous additions to skill development programs are going on. To provide creative technical skills training to young population and to make them market ready. Attempts are made through skill development programme to youth population to encourage the concept of self-entrepreneurship by providing them various courses, activities and training programs at cheapest fees structure and also by providing them financial assistance [2].

There are Lots of activities which are implemented by Government to enhance the level of creativity and influence leadership and entrepreneurship qualities in youth. But still there are certain loopholes are found [2]. Now the new approach is to concentrate on job creation and youth without idleness. In this paper attempt has been made to show all impacts of skill development programs in education from 2015 till now and yet problems which we still are facing for more development.

**Keywords:** Creative Skills Development, Economic Growth, Job Creation, Talent Acquisition.

## Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 13 April 2020

## 1. INTRODUCTION

India is a country where maximum population is Youth. If we need to focus on economic development of India we still need to work more on it. There are various issues like Poverty, Unemployment, illiteracy, medical infrastructure etc. There are only Youth who can change and contribute to the economic prosperity of India.

The main aim of skill India is introduced by Hon'ble Narendra Modi in March 2015 to create various opportunities, space and scope for self-development and the talents of Young India. This program was initiated to provide skill development to all over India. Various opportunities in in occupation like Construction, Textile, Transportation, Agriculture, Weaving, Handcraft,

Horticulture, Fishing, Retail, Supply Chain Management, Logistics, Sports

Management, Beauty and Wellness, Communication Skills, Personality development, Foreign Language Training Programs [4], various development skills and managerial skills which can lead to employability, So to make students aware and learn all skill development courses need to introduced from Young Age.

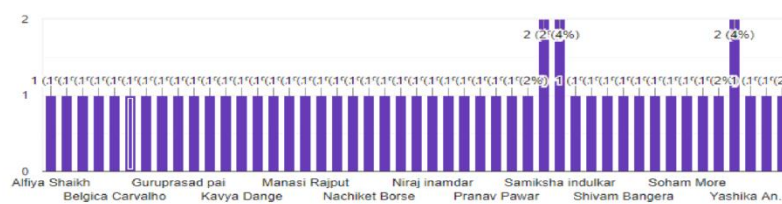
## 2. RESEARCH DESIGN

### 2.1 Objective of the Research

The main Objective of the study are;

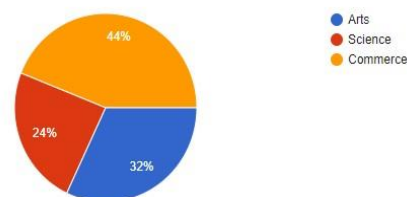
- To make more awareness for skill development concept.
- To know problems faced by students
- To know the need of Skill development programs from Young Age.

### Analysis & Interpretation



Graph 1: Responses from Students

For the complete analysis that weather students are happy with the existing education system or not responses collected from students by google forms.



Graph 2: Responses from Arts, Science and Commerce Students

## 2.2 Research Methodology

This research is made from Primary Data and the Secondary Data. Primary Data is collected by distributing the questionnaire to respondents and through telephonic interviews. Database is collected from Pune and nearby Area. Secondary data is collected from website relating to all different websites.

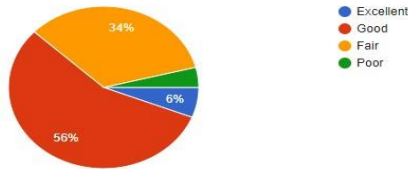
## 3. DATA ANALYSIS AND INTERPRETATION

The database is collected and interpreted as:

Questionnaire: When can we introduce Skill development programs during young age?

As per research says,

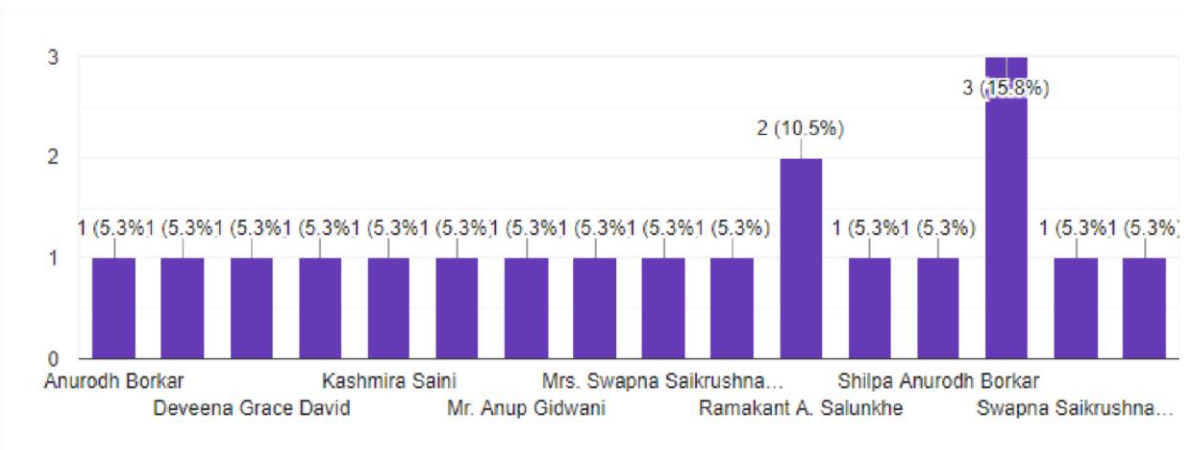
It has been observed that most actively participated students in the survey were from Commerce stream as they are facing many Problems which are not skill oriented.



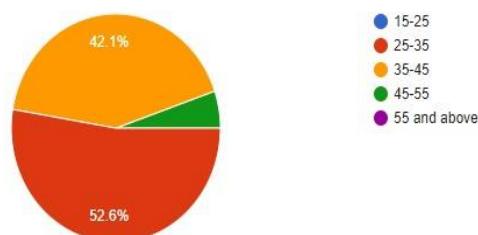
**Graph 3: Responses from Students**

Responses from Students gives us idea that there is change which we need in education system. For that

**Analysis & Interpretation**



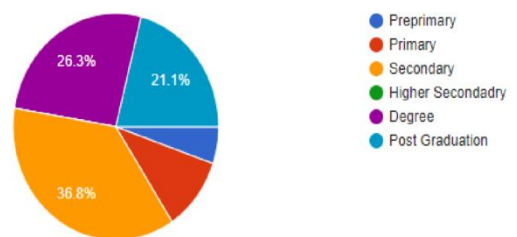
Based on the responses from Students and Educationalist the analysis is represented in the following graph where educationalist presents their opinion.



change it is important to start with various program which are skill based and will make students market ready.

Not only based on the responses from students any analysis can be made so the questionnaire again floated amongst Students and Educationalist to analyse the when can we implement Skill Development programs for the students, which can be suitable age and which can the level of entry point for launching various activity based programs for students.

As maximum young educationalist suggested to that there is an intense need of introducing Skill based Education in Secondary Level of Education only.



**Pie Diagram 1: Necessity of Skill Development Programs**

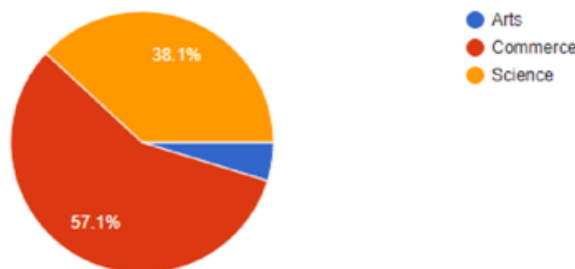
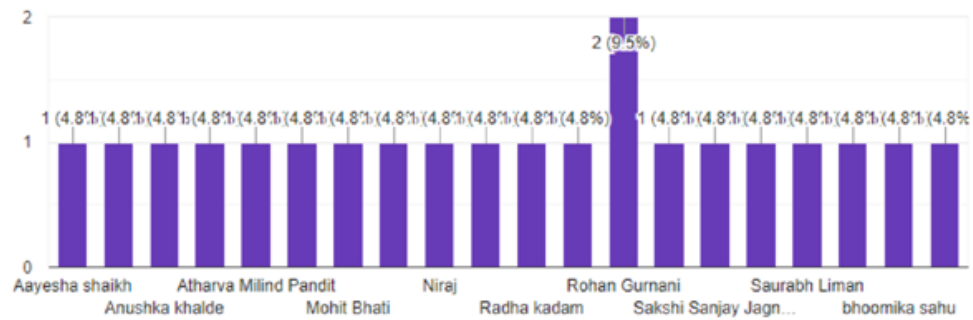


**Prediction: Suggestions from Educationalist**

*Analysis & Interpretation*

Based on only educationalist we cannot derive any conclusion hence the survey of introducing Skill based education from Young Age.

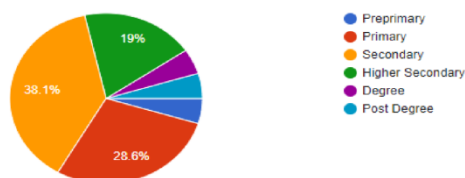
also made based on the questionnaire given to students for understanding their problems and need



Questionnaire was given to students of various stream as Arts, Commerce and Science and as per the result says maximum respondents were belonging from Commerce Stream.

Above result also gives us the idea that Even Students also wants the skill based courses and education to start from Secondary Level.

From the data collected in the form of result from both comparative study of survey made in between Educationalist and Students.



The Analysis of Comparative Study can be given as:

*Analysis & Interpretation*

**Pie Diagram 2: ecessity of Skill Development Programs**

**Prediction: Suggestions from Students**

**Table 1: Comparative Analysis of Responses from Educationalist and Students**

Category	Educationalist	Students
Pre-primary	5.3%	4.8%
Primary	10.5%	28.6%
Secondary	<b>36.8%</b>	<b>38.1%</b>
Higher Secondary	0%	19%
Degree	26.3%	4.8%
Post Degree	21.1%	4.58%

Above table of comparative study explains us that we have collected maximum responses for Implementing Skill based Education in Young age in Secondary Level of Education only.

**Based On the Analysis & Interpretation, following are the some finding of the Study,**

- Students are not happy with the traditional education system.
- Students are not getting platform to explore and learn various techniques from young age.
- Maximum respondents are from Commerce Stream.
- Average age of respondent is from 25-35.
- Maximum students' responses say to start Skill based Education from Secondary Level of Education only that means from young age only.
- Educationalist also want to start Skill based education from Secondary Level of education only, as maximum respondents are from the same category.

- Skill education has become the need of the education system and to make students market ready.

**Based On the Data Analysis & Findings, following are some suggestions offered by Respondents,**

- Some respondents from students suggested us that syllabus of some subjects is need to get revised as per the need of market.
- Some respondents from students suggested us to remove some theoretical chapters which are not in practical need.
- Some educationalist suggested that Skill based courses need to start from primary age only but got contradicted from some others.
- Maximum respondents want to develop themselves in various skill based courses provided by Government in low costs to make available for various students.
- Maximum respondent suggested us to start Skill based course in Young age only as it can train students as per the market need and to solve the problem of unemployment can help job seeker to become entrepreneur.

**4. CONCLUSION:**

In a country like India where maximum population is young and the major problem is Unemployment, various skill based courses can be introduced from Secondary level of education to create more jobs and instead to start with Self entrepreneurship. Youth can be provided with the support from government to give training program in low cost fees. Support and Guidance can be given to youth for Personality Development and for the overall development of youth.

The great step, initiated by Hon'ble Prime Minister Narendra Modi can motivate students

and also can create a great platform for youngsters to start with own ventures with minimum investments and also with the opportunity of the low interest rates loan also.

Now with the changing needs of Global world if we can start Skill based Courses from Secondary level of Education or from the young age only can result in more job creators instead of job seekers. With this new approach, drastic changes can be observed.

### References

- [1][Online]. Available:  
<https://skillindia.nsdcindia.org/>.
- [2][Online]. Available:  
<https://www.skillindia.gov.in/>.
- [3][Online]. Available:  
<http://www.iaeme.com/IJM/index.asp> .
- [4][Online]. Available: <http://www.ssou.ac.in/>.
- [5][Online]. Available:  
[https://en.wikipedia.org/wiki/Skill\\_India](https://en.wikipedia.org/wiki/Skill_India).
- [6][Online]. Available:  
<https://www.orfonline.org/expert-speak/skills-universities-roadmap-india/>.

Paper Title- Impact of Evolving Skills Education and Technology from Young Age

Paper Link- <https://www.testmagzine.biz/index.php/testmagzine/article/view/5505/4438>

Journal Name- Test Engineering & Management

Journal Link- <http://www.testmagzine.biz/index.php>

Journal Source-



Scopus Preview

[Author Search](#) [Sources](#)



## Source details

[Feedback](#)

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)  
[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

CiteScore 2019  
**0.1**

SJR 2019  
**0.101**

SNIP 2021  
**0.117**

# Green Cloud Computing: Review on Green IT Areas, Energy Reduction Techniques, Virtualization of Server and Datacenters

Dr. Venugopal S. Narsingoju<sup>1</sup>, Mrs. Bhavana Narsingoju<sup>2</sup>, Dr. S. B. Kishor<sup>3</sup>

<sup>1</sup>Assistant Professor, MES' Institute of Management and Career Courses (IMCC), Pune

<sup>2</sup>Principal, SOES' Symbiosis Junior College (Arts, Science & Commerce), Kiwale, Pune

<sup>3</sup>Head, Department of Computer Science, Sardar Patel Mahavidyalaya, Chandrapur

## **Abstract:**

*In last few decades Information & Communication Technology is growing continuously which also introduced Concept of Cloud Computing and Green Cloud Computing. With this increasing demand of Cloud Computing it makes us think about Energy and Power not only for minimization but also for the purpose of recycling. The information and communication technology is creating its impact on environment due to the large amount of CO2 emission and energy consumption. In Cloud Computing, various data centers still represents a huge percentage of the companies energy cost since the usage is growing continuously. Since this issue took in notice the research work is continuously growing in Green Cloud Computing. Green Cloud computing represents various solution to companies and users to use cloud and its perks and reducing the negative environment impact and also reduces cost factor, making it more energy efficient, reducing carbon footprint and e- reduction. Day by day various applications and practices are being deployed to make companies more eco-friendly.*

*In this paper efforts made by researchers to introduce various Energy reduction techniques to reduce the carbon footprint and also introduced the concept of virtualization of servers and data centre's implementing the use in virtual machines scheduling and migration to show how these can make the system more efficient.*

**Keywords:** Cloud Computing, Green Cloud Computing, Virtualization & Techniques, Energy Efficient.

## **1. Introduction:**

### **a. Cloud Computing:**

Cloud Computing is a paradigm shift which provide computing over the internet. A Cloud Computing service consist of highly optimized datacentres. A Cloud Computing service consist of highly optimized datacentres. [1]

It gives us energy efficient, price effective technology. This proves effective technology helps in accessing, sharing of services and management of resources. It provides various hardware, software and various information resources which are

useful for the users. Cloud computing provides us three types of the Private Cloud, Public Cloud and Hybrid Cloud. There are various advantages of Cloud Computing like saving of cost reliability, flexibility etc.

## **1. Cloud Computing Deployment Model: Public, Private & Protected**

### **i) Public Cloud:**

A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Public cloud services may be free. Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services (applications, storage, and other resources) that are made available by a service provider for a public audience and when communication is effected over a non-trusted network. Generally, public cloud service providers like Amazon Web Services (AWS), IBM, Oracle, Microsoft, Google, and Alibaba own and operate the infrastructure at their data centres and access is generally via the Internet.

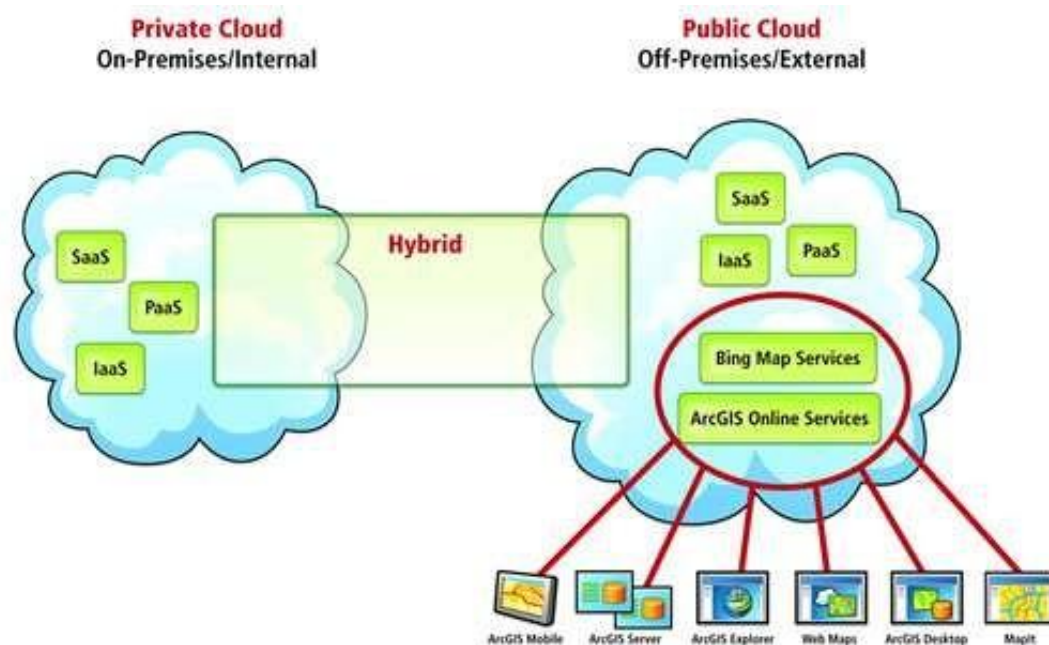
### **ii) Private Cloud:**

Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third party, and hosted either internally or externally. Undertaking a private cloud project requires significant engagement to virtualize the business environment, and requires the organization to reevaluate decisions about existing resources. It can improve business, but every step in the project raises security issues that must be addressed to prevent serious vulnerabilities. Self-run data centres are generally capital intensive. They have a significant physical footprint, requiring allocations of space, hardware, and environmental controls. These assets have to be refreshed periodically, resulting in additional capital expenditures.

### **iii) Hybrid Cloud:**

Hybrid cloud is a composition of a public cloud and a private environment, such as a private cloud or on premise resources that remain distinct entities but are bound together, offering the benefits of multiple deployment models. Hybrid cloud can also mean the ability to connect collocation, managed and/or dedicated services with cloud resources. Gartner defines a hybrid cloud

service as a cloud computing service that is composed of some combination of private, public and community cloud services, from different service providers. A hybrid cloud service crosses isolation and provider boundaries so that it can't be simply put in one category of private, public, or community cloud service. It allows one to extend either the capacity or the capability of a cloud service, by aggregation, integration or customization with another cloud service.



**Figure 1: Cloud Computing Deployment Model: Public, Private & Protected [2]**

## 2. Services on Cloud computing:

- a. IaaS: cloud-based services, pay-as-you-go for services such as storage, networking, and virtualization.
- b. PaaS: hardware and software tools available over the internet.
- c. SaaS: software that's available via a third-party over the internet.

- b. **Introduction to Green Cloud Computing:** Green computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, engineering, manufacturing, using and disposing of computing devices in a way that reduces their environmental impact [2].

### c. Introduction to Virtualization:

Virtualization is the creation of virtual servers, infrastructures, devices and computing resources. A great example of how it works in your daily life is the separation of your hard drive into different parts. While you may have only one hard drive, your system sees it as two, three or more different and separate segments. Similarly, this technology has been used for a long time. It started as the ability to run multiple operating systems on one hardware set and now it a vital part of testing and cloud-based computing.

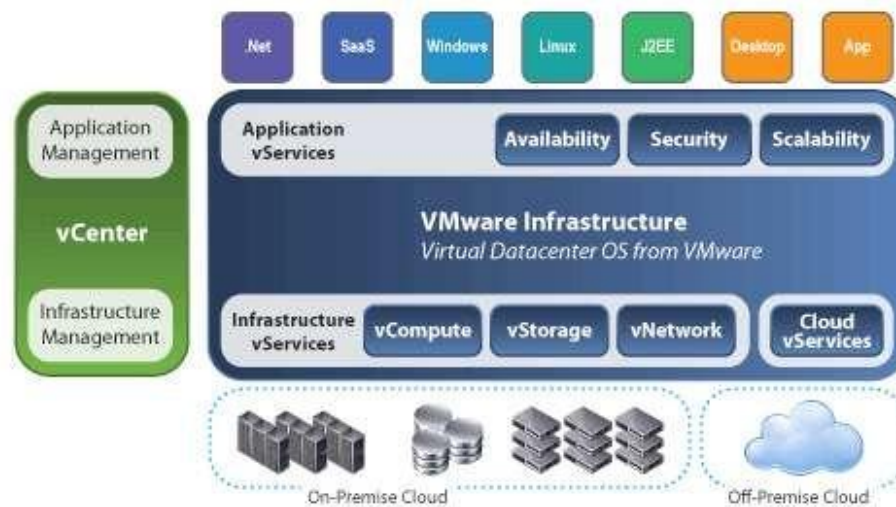


Figure 2: Virtualization Concept

### 1. Parts of virtualization:

Virtualization concept is based on various modules like origin, definition and application need of Green IT.

**1.1 Origin:** The origin of Green Computing is started in 1987, when the report named "Our Common Future" is issued by the World Commission. It basically stated the idea about "sustainable development. In 1992, one consumer Energy Star plan is launched by the U.S. Environmental Protection Agency (EPA). The purpose of this is to minimize the consumption of energy it was primarily for computer products. [1] [3]

**1.2 Definition:** Green Computing aims to attain economic viability and improves the way computing devices are used. Green IT practices include various development of environmentally sustainable production practices, energy efficient computers and improved the disposal and recycling procedures.

**1.3 Application Areas of Green IT:**



Green IT areas have various applications such as:

1. virtualization of servers
2. power management of power
3. Environmentally sustainable design
4. Energy Efficient resources
5. ECO labelling for IT Products

**1.4 Need of Green IT:** In Cloud Computing Data Centres as they are remotely monitored and controlled and hence it requires more data efficient and more scalability. The model should be energy efficient and economically reliable. While offering any cloud computing model it should be energy efficient and reliable in terms of cost and security too. As data are growing exponentially, the Green Cloud computing having issues related to infrastructures for computations that can not only minimize the consumption of energy but can also make the Cloud services reliable and economically efficient [1]

There are various approaches to promote Green Cloud Computing which can be employed in various forms as Green Use, Green Disposal, Green Design and Green Manufacturing.

### **Overview on Energy Consumed & Energy Reduction techniques:**

Energy Consumption and Performance of the system is depend on various factors which can provide basic power management of the system. Some simple techniques provide basic energy management for servers in Cloud environments, i.e. turning on and off servers, putting them to sleep. Other techniques for saving energy include use of Dynamic Voltage/Frequency Scaling (DVFS) and use of virtualization techniques for better resource [1]. There are various researchers who are putting their various efforts to reduce the energy consumption in clouds and data centres. In today's scenario green cloud computing presents various optimization techniques and various energy reduction techniques to use in more energy efficient.

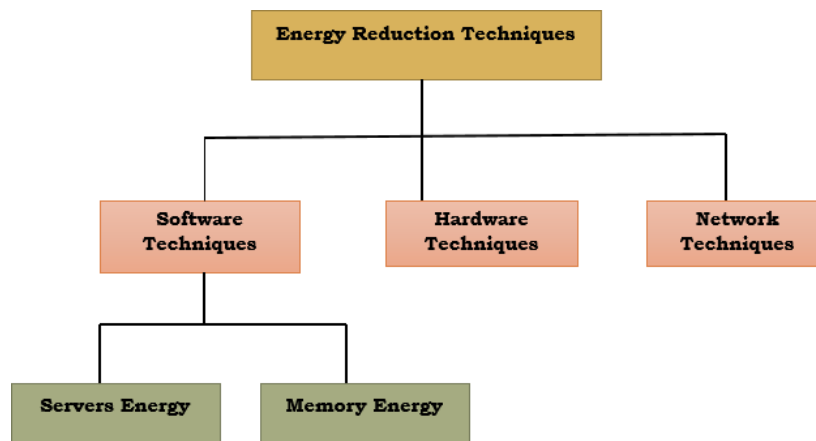
The Energy Consumption model can be presented in various formats on usage and no of clicks. The most commonly used metric to determine the energy efficiency of a data centres is power usage effectiveness (PUE). This simple ratio is the total power entering the data centres divided by the power used by the IT equipment [4].

The Power usage effectiveness can be calculated as Total Facility Power by IT Equipment Power.

$$\text{PUE} = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

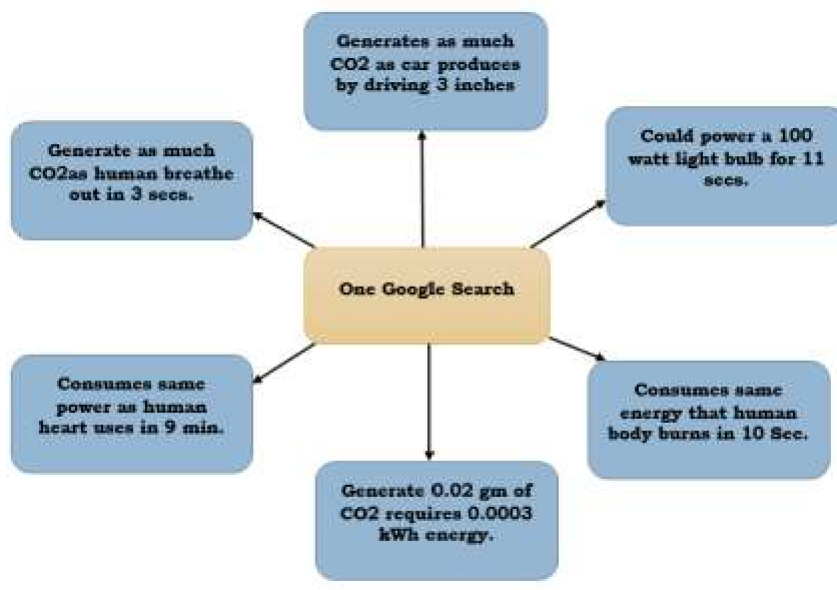
**Figure 3: Power Usage Effectiveness [5]**

Energy reduction technique can be processed in various formats of reduction like Software Optimization, Hardware Optimization and Network Optimization.



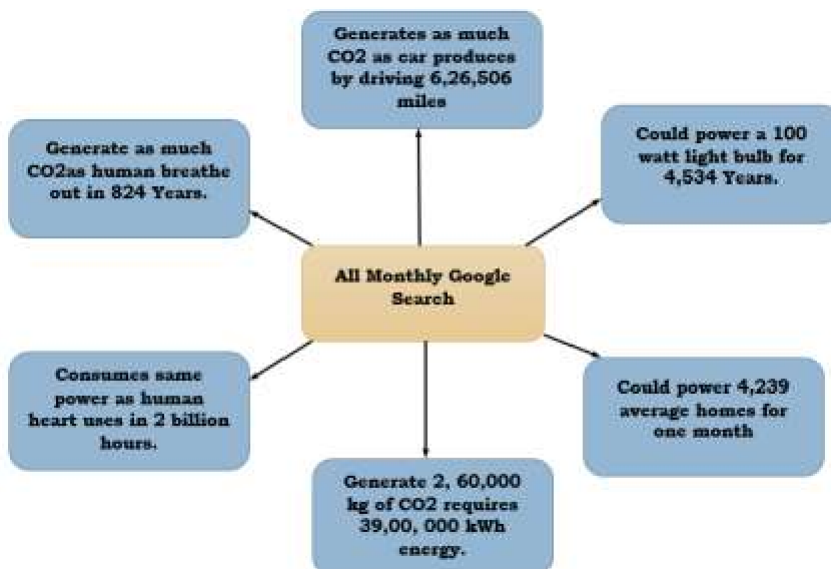
**Figure 4: Energy Reduction Techniques**

The energy consumption model can be presented on basis of associated analysis tool and empirical energy analysis approaches to calculate total energy consumption in Cloud environment based on various runtime tasks which are based on number of clicks.



**Figure 5: Energy Consumption on one click on Google Search**

The comparative analysis of energy consumption on one click on google search and energy consumption on monthly basis is showed in diagrammatic representation as

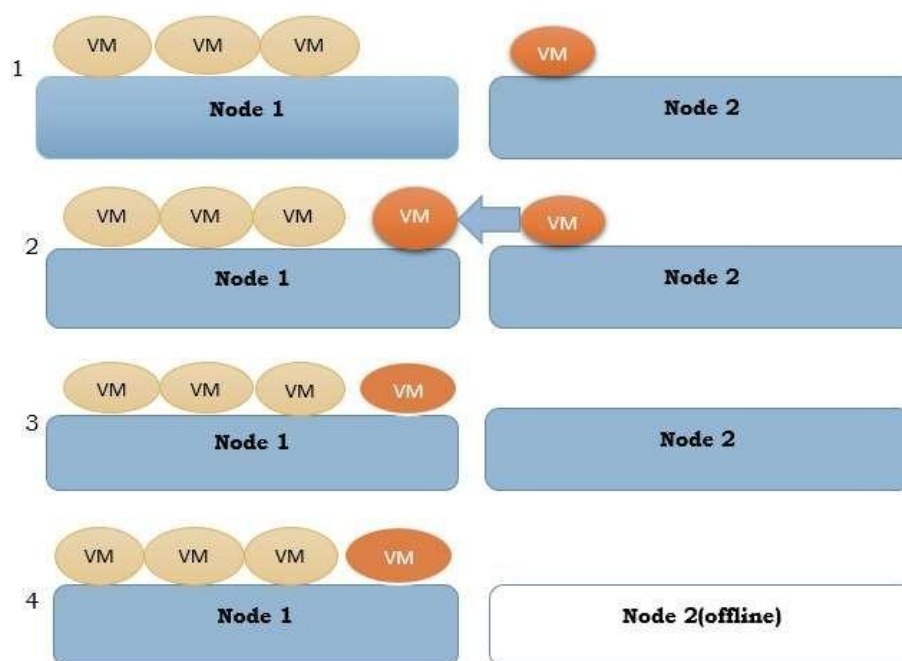


**Figure 6: Energy Consumption on one click on Google Search on all monthly basis.**

The analysis tool had been checked and given the input as in the form of characterized energy consumed by each input and characterised by each task based on the parameter like the number of processes, the size of the data transmitted and configured to the system.

The energy consumption can be reduced by using Virtualization model.

Green Cloud computing can be made more efficient with less energy consumption by the utilization of virtual machine image management. By using the technique of virtualization within the cloud new techniques can be implemented. Idly the machine can be dynamically shutdown and restarted to conserve the energy and the energy can be conserved and low load systems can be utilized. This concept can used for the machines when the machine is not in use and can have no effect on the power consumption as well as machine can be managed during peak load as well as machine can be managed in full capacity too for the shutting down process and cannot have peak load when all machines are loading. Live migration feature within Cloud system is a recent concept. Live migration can be noticed by a change in virtual environment. Live migration can be applied seamlessly moving VMs away from the user noticing a change in a virtualized environment. Live migration can be applied to green computing in order to migrate away from machines.



**Figure 7: energy consumption can be reduced by using Virtualization model**

### **Conclusion & Future Scope:**

As the cloud computing continues to grow and hence the need for power saving, as the prevalence of Cloud computing continues to rise, the need for power saving mechanisms within the Cloud also increases. In this paper we have presented the novel system for cloud framework for improving system efficiency in data centres. So to demonstrate energy efficient techniques we have used VM models and booting process management on automatic shut down And management of powers. By this

way we can have future opportunities that could explore a scheduling in various power saving methods.

Future opportunities could explore a scheduling in terms of Physical servers and such a scheduler change can drive for the better data centres designs. While the number of clouds are discussed in this paper there is a need for improvements in the Cloud Computing Technology in terms of Physical Data centres.

## Bibliography

- [1] Tarun, "1. GREEN CLOUD COMPUTING: A REVIEW ON GREEN CLOUD COMPUTING AND VIRTUALIZATION IN GREEN COMPUTING," *IJCEA*, vol. XII, no. Special, 2018.
- [2] "<https://www.esri.com/news/arcwatch/0110/feature.html>," [Online].
- [3] "<https://www.techopedia.com/definition/14753/green-computing>," [Online].
- [4] "[https://en.wikipedia.org/wiki/Green\\_computing](https://en.wikipedia.org/wiki/Green_computing)," [Online].
- [5] Y. P. e. al, "Application of Green Cloud Computing for Efficient Resource," *IJCSIT*, vol. 3, pp. 5101-5107, 2012.
- [6] "<https://www.deltapowersolutions.com/en/mcis/white-paper-datacenter-efficiency-and-pue-measurement.php>," [Online].
- [7] "Review of Energy Reduction Techniques for Green Cloud Computing," *IJACSA*, vol. 7, 2016.
- [8] "<https://www.sam-solutions.com/blog/virtualization-techniques-in-cloud-computing/>," [Online].

Paper Title- "Green Cloud Computing: Review on Green IT Areas, Energy Reduction Techniques, Virtualization of Server and Datacentres"

Paper Link- [NA](#)

Journal Name- Parishodh Journal A Peer Reviewed/ Referred Journal

Journal Link - <http://www.parishodhpu.com/>

Journal Source-

The screenshot shows a web browser window with the URL `ugccare.unipune.ac.in/Apps1/User/WebA/SearchList`. The page title is "UGC-CARE List". On the left, there is a dark sidebar with the university logo and navigation links for "Home", "UGC", and "Search". The main content area displays the search results for the query "2347-6648". It shows a single result in a table with columns for Sr.No., Journal Title, Publisher, ISSN, E-ISSN, and Action. Below the table, it indicates "Showing 1 to 1 of 1 entries" and includes a pagination control with "Previous", "1", and "Next" buttons.

Sr.No.	Journal Title	Publisher	ISSN	E-ISSN	Action
1	Parishodh	Hindi-Department, Panjab University	2347-6648	NA	Discontinued from April 2020

## Review of e-Commerce Security Challenges

<sup>1</sup>Kalpna Dhende, <sup>2</sup>Dr. Shweta Meshram

Department of Master in computer Application  
MES's Institute of Management and career courses, Pune, India

**Article History:** Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 23 May 2021

**Abstract:** e-Commerce means nothing but the exchange of goods and services over the Internet.

This paper gives a way for e-commerce security so as to improve confidence in customer. Web security has become most important issue now a day. Online payment system now a day most of time people uses online payment system for payment, so all the manual payment is replaced by online payment system. The main objective of this paper is to know the views of consumers towards the security aspects of e-commerce technology. This paper gives the idea about the perception and awareness of security from the consumers' views. The paper also examines the measures that can be taken so that the views of users can be changed to adopt this new on-line system. This new security challenges are the results of the use of the new technology and communication medium, and the flow of information from organization to organization, from organization to consumers, and also within the organization.

**Index Terms**—e-Commerce, Security, Threats and Vulnerabilities, SSL, Firewall, viruses. E-commerce security, e-business security challenges.

### I. INTRODUCTION

E-commerce Security is a part of the Information Security framework and is specifically applied to the components that affect e-commerce that include Computer Security, Data security and other wider Information Security framework. E-commerce security has its own shades and is one of the highest security components that affect the end user through their daily payment interaction with business. e-Commerce environments composed of front-end web pages, back-end databases, web servers, and internal network infrastructure. The vulnerable areas of an e-commerce system must be identified and resolved to reduce the risk to security.

### II. SECURITY OVERVIEW

In an e-Commerce system security hardware, software, and environment are the main important and vulnerable points. Hardware security includes devices used in running the e-Commerce website like web servers, database servers and client's computer.

The Properly configured firewall system can be helpful to protect the network. Any software used in running the e-Commerce system such as the operating system, web server software, database software and web browser are part of securing software .to protect the network from various threats, operating system should be configured properly. Software and routinely released patches should be regularly updated to fix security holes. The website development should provide protection against attacks like hidden-field manipulation, tampering, buffer overflow, and cross-site scripting. Cryptography algorithm can be used to protect confidential data which can be entered by end user.

### III. Security Threats

#### 3.1 Online Credit Card Fraud

Credit card fraud main cause is the usage of credit card over the Internet. Credit card to a certain extent portrays the following threats:

MasterCard misrepresentation fundamental driver is the utilization of Visa over the Internet. Charge card to a limited degree depicts the accompanying dangers:

presently a day's Visa misrepresentation is most normal approach to take cash. programmer can hack charge card number and can utilize it for individual use. The lone safety effort on charge card buys is the mark on the receipt however that can without much of a stretch be produced. The greater part of time individuals neglect to gather their duplicate of cards subsequent to taking care of bills of cafés. These receipts are containing individuals' MasterCard number and people signature for anybody to see and utilize. Just by this data somebody can buy online things. Also, the approved individual will not notification this until the individual gets month to month proclamation so Make sure

the site is trusted and secure when doing shopping on the web. With the assistance of phishing procedures, a few programmers may take a few to get back some composure of your Visa number.

### **3.2 Confidentiality**

Secrecy is one of the significant measure which can be broken from numerous points of view. Assaultants don't require refined comprehension of the PCs and Internet to break an organization's PC. passwords and charge card numbers and extortion guidance guides are accessible in Internet visit rooms. Other than this, many web worker have PCs that runs different workers other than the web worker. Model is the FTP worker.

### **3.3 Authentication**

Space Name System (DNS) satirizing is additionally conceivable with inappropriately set authorizations. In DNS parodying, If the two pages seem to be indistinguishable, even judicious clients can be effortlessly cheated and the company's notoriety harmed.

### **3.4 Vulnerabilities**

Security penetrates happens time after time when safety efforts are by passed. Classified subtleties can be shared like sharing passwords or OTP via telephone or tossing security manuals without destroying can make issues on the off chance that it falls in some unacceptable hand.

By having tight access control one can have control on framework security. That is by giving the Workers access just to their work capacities and not more than that.

### **3.5 Security System Design**

Great security configuration incorporates great general control, appropriate isolation of obligations, plainly outlined lines of power, inward review, great documentation, legitimate approval, interior review and endorsement for the two exchanges and program changes. With every one of these actions set up, we ought to deliberately concentrate on the anticipation, discovery and amendment of safety penetrates.

## **IV Main Security Solutions**

Online business requires another kind of safety. conventional security frameworks are intended to keep individuals out and limit admittance to significant data and registering assets. nonetheless, web based business requires security frameworks that give approved untouchables admittance to restricted organization assets and applications, regardless of whether they're online installment frameworks, stock information, or the capacity to do exchanges with the assistance of Internet. As the innovation arises, the accompanying procedures have been created to straighten out security. Once more, the issue here is the means by which far the purchasers know about these innovations. A couple of innovation techniques to conquer the Internet security dangers are recorded underneath.

### **4.1 Encryption**

Touchy data, for example, charge card subtleties can be secured by encryption, that should be possible with the utilization of mystery codes. The objective of encryption is to make lucid content into non decipherable arrangement so it makes inconceivable for a programmer who acquires the code text (ambiguous type of the message in the wake of being encoded) as it goes through the organization, to recuperate the first message. Encryption is the change of significant data in any structure into a structure that must be delivered clear with the assistance of decoding key. There are two fundamental sorts of encryption in like manner use today – symmetric, or private key frameworks and deviated or public key frameworks. In a symmetric key framework, a similar key is utilized to encode and decode the plaintext. The key is known as a private key and should be shared by the sender and recipient of the content. Public-key encryption utilizes two firmly related keys. One key is utilized to scramble the message, and the other key is utilized to unscramble the message. The public key can be spread the word about for different gatherings or we can say to recipient, and can be circulated uninhibitedly. The private key should be kept secret, and should be known distinctly to its approved proprietor. The two keys, in any case, should be secured against the smallest change, or the component won't work. Model is RSA calculation

### **4.2 Digital Signature**

A computerized mark is a numerical method used to approve the realness and honesty of a message, programming or advanced record. It's what might be compared to a transcribed mark or stepped seal, yet it offers undeniably more intrinsic security. A computerized mark is expected to tackle the issue of altering and pantomime in advanced correspondences.



Advanced marks can give proof of starting point, personality and status of electronic archives, exchanges or computerized messages. Endorsers can likewise utilize them to recognize educated assent. In numerous nations, including the United States, advanced marks are viewed as legitimately restricting similarly as conventional written by hand record marks.

### 4.3 Digital Certificate

Validation is additionally fortified by the utilization of computerized authentications. Advanced declarations confirm that the holder of a public and private key is who they guarantee to be. Outsiders called endorsement specialists (CA) issue advanced authentications. Most declarations follow the Internet Engineering Task Force's (IETF) X.509 testament standard. Under rendition 3.0 of this norm, an endorsement contains things, for example, the subject's name (proprietor of the private key), legitimacy period, subject's public key data and a marked hash of the testament information (for example hashed substance of the endorsement endorsed with the CA's private key). Endorsements are utilized to validate Web locales (website authentications), people (individual testaments) and programming organizations (programming distributor declarations) VeriSign issues three classes of authentications. Class 1 checks that an email really comes from the user's address. Class 2 checks the user's character against a business credit information base. Class 3 necessities authenticated records. Organizations like Microsoft offer frameworks that permit organizations to give their own private, in-house authentications. These can be utilized to recognize clients on their own organizations

### 4.4 Cross-site script (XSS)

Cross-webpage scripting (referred to likewise as XSS) is a sort of assault focused on web application clients. Assailant infuses customer side code (regularly a JavaScript) into weak web application so that the content is run on client's programs visiting weak page. Envision that you've assemble a web application permitting your clients to send private messages to one another. One of the clients discovers that you don't encode messages, so it is feasible to send unadulterated HTML or JavaScript code to other individual. The client chooses to send this message to his pal:

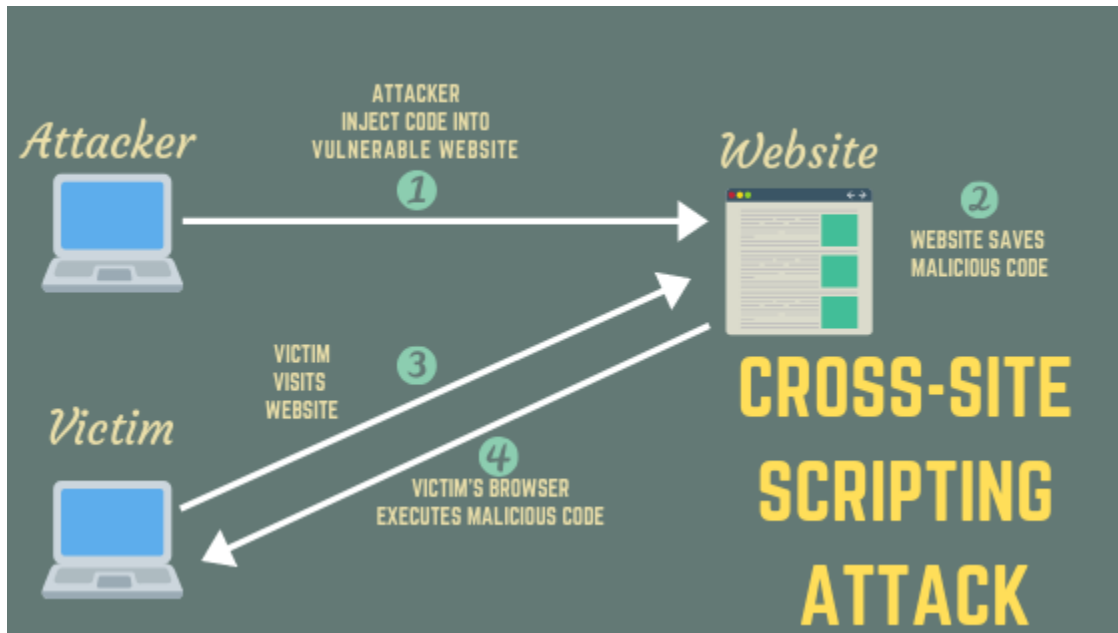


Figure 4.4 Cross site scripting

### 4.5. Personal Firewalls

While interfacing our PC to an organization, it gets helpless against assault. An individual firewall ensures our PC from external assailant by restricting the sorts of traffic started by and coordinated to our PC. The aggressor can check the hard drive to recognize any put away private subtleties or information. Numerous PCs are tainted by spyware or some likeness thereof. Most are 'innocuous', however an expanding number pass into infections that will take and send secret data,

#### **4.6. Secure Socket Layer (SSL)**

Secure Socket Layer is a convention that scrambles information between the customer's PC and the site's worker. At the point when a Secure attachment Layer-ensured page is mentioned, the program distinguishes that the worker as a confided in substance and starts a handshake to pass encryption key data to and fro. Presently, on ensuing solicitations to the worker, the data streaming to and fro is scrambled so a programmer sniffing the organization can't peruse the substance. SSL permits moving information in a scrambled structure. All data that a client should keep hidden ought to be communicated through SSL. Such data should incorporate Mastercard number and related data, and may, contingent upon the sort of business, incorporate client's name, address, and the rundown of items that the client is purchasing. It ought to likewise incorporate the client's secret word and request ID.

#### **4.7. Web Server Firewall**

A web worker or web application firewall, either an equipment machine or programming arrangement, is set in the middle of the customer end point and the web application. Web application firewalls secure cardholder information since all web layer traffic is investigated searching for traffic A firewall resembles the channel encompassing a palace. The external firewall has ports open that permit ingoing and active HTTP demands. This permits the customer program to speak with the worker.

#### **4.8. Password policies**

We may decide to have various strategies for customers versus our inside clients. For instance, we may pick to lockout a director after 3 fizzled login endeavors rather than 6. These secret phrase arrangements ensure against assaults that endeavor to figure the client's secret key. They guarantee that passwords are adequately sufficient so they can't be effectively speculated.

#### **4.9. Installing Recent Patches**

Programming bugs and weaknesses can be recognized each day. Despite the fact that a significant number of them are found by security specialists, instead of programmers, they may in any case be abused by programmers once they turned into a public information. This is the motivation behind why it is critical to introduce all product fixes when they become accessible.

#### **5.0. Intrusion Detection and Audits of Security Logs**

Security logs are very important to follow the client record. For model, if an individual compose secret phrase wrong, and every one of the 6 time if the individual is composing incorrect password then ,that people account gets locked. This occasion ought to likewise be signed in the system, this should be possible by sending email to the administrator. We can likewise have logged or record the unapproved admittance to the framework.

### **V. CONCLUSIONS**

Current technology allows to design secure site. It is important to always keep in mind that whatever are the security measures are described and explained do afford a good sense of protection, we should always use and follows above security ensures in order to have safe online shopping or online payment.

### **References**

1. Foresight (1998), "E-commerce Sets New Rules," *Systems Relationship Marketing*, on behalf of DatatecLtd, Vol. 1 No. 3, November.
2. Morgan, C. (1999), Protecting Your Website Against Credit Card Fraud. *Computerworld*, , p.71.
3. Young, J., Spies like us. *Forbes*, June 3, 1996, pp. 70-92
4. Chokani.S and Ford, W., Internet Public Key Infrastructure Certificate Policy and Certification practices Statement Framework, Internet Draft, September, 1997
5. Greenwich, Conn.-IVANS (Insurance Value Added Network Services) source :[www.ivans.com](http://www.ivans.com)
6. McKeefry [www.ebnonline.com/supplements/extras/story/OEG20000406S0006](http://www.ebnonline.com/supplements/extras/story/OEG20000406S0006)

7. Chew, K.W., (2003) “*To Determine the Readiness of Business Entities and Consumers for A Successful Implementation of Electronic Commerce in Malaysia*” End-of –Project Report submitted to the Ministry of Science, Technology and the Environment, Malaysia.
8. Julie,B(1997),. <http://disc.cba.uh.edu/~rhirsch/fall96/barba.htm>
9. Portz *et al* (2000) <http://uwstudentfpweb.uwyo.edu/J/JP/WebTrust.html> Ramsey and eMarketer - [www.newsfactor.com/perl/story/6530.html](http://www.newsfactor.com/perl/story/6530.html)
10. Chadwick,S.A., <http://chadwick.jlmc.iastate.edu/>
11. Electronic Commerce, Second Annual Edition, Gary P. Scheneider and James T. Perry, p3
12. Bonafield, C.H., (1998), *Cashing In on E-Commerce. Network Computing.*
13. Miyazaki, Anthony D. and Fernandez, A., (2000), "Internet Privacy and Security: An Examination of Online Retailer Disclosures," *Journal of Public Policy and Marketing*, 19 (spring), 54-61.
14. Kalakota, R and. Whinston, A. B. (1997). *Electronic Commerce: A Manager’s Guide.* Addison Wesley.
15. Turban, E., King, D., Lee, J., Warkentin, M. and Chung, H.M. (2002) *Electronic Commerce: A Managerial Perspective 2002*, Prentice Hall, USA.
16. E-Commerce and Security, <http://www.it.uu.se/edu/course/homepage/ehandel/vt08/>
17. A. Kahate, *Cryptography and Network security*, Tata McGraw Hill Education Private Limited, 2nd edition, 2008
18. SQL Injection, [http://en.wikipedia.org/wiki/SQL\\_injection](http://en.wikipedia.org/wiki/SQL_injection)
19. Security Response, <http://securityresponse.symantec.com/avcenter/refa.html>
20. C. V. Berghe, J. Riordan, and F. Piessens, *A Vulnerability Taxonomy Methodology applied to Web Services*, IBM Zurich Research Laboratory, 2005.
21. R. Ganesan, M. Gobi, and K. Vivekanandan, \A novel digital envelope approach for a secure e- commerce channel," *International Journal of Network Security*, 2010.
22. M. Hung, and Y. Zou, \A Framework for Extracting Work flows from E-Commerce Systems," *Proceedings of Software Technology and Engineering Practice*, pp. 43{46, 2005.
23. F. Nabi, \Secure business application logic for ecommerce systems," *Computers & Security*, pp. 208{217, 2005.
24. Qi XIE, Lihong ZHAO. Research and realization of web services security. *Computer Engineering and Design*,2007,
25. Zhu Lingxi. *E-Business Security. BeiJing.* Beijing Jiaotong University. 2006.
26. W3C Working Group Note, “Web services architecture”, <http://www.w3c.org/TR/ws-arch>, 2004.
27. Apache Software Foundation, “Filters - Apache HTTP Server,” [http://httpd.apache.org/docs-2.1 /filter.html](http://httpd.apache.org/docs-2.1/filter.html), Nov.2004.

28. E-commerce  
[http://www.ibm.com/developerworks/websphere/library/techarticles/0504\\_mckegney/0504\\_mckegney.Html](http://www.ibm.com/developerworks/websphere/library/techarticles/0504_mckegney/0504_mckegney.Html)
29. Ravi Kalakota, Andrew B. Whinston. *Electronic Commerce: A Manager's Guide*, Addison-Wesley, ISBN: 0-201-88067-9
30. Critical Threats e-Commerce hosting, <http://www.plaveb.com/blog/3-critical-threats-toecommerce-hosting>
31. Threats e-Commerce Server, <http://www.technologyexecutivesclub.com/Articles/security/artThreatstoEcommerceServers.php>
32. E-Commerce site security, <http://www.applicure.com/solutions/eco>
33. e-commerce-security H. S. Yoon and L. G. Oceaña, "Influencing factors of trust in consumer-to-consumer electronic commerce with gender and age," *International Journal of Information Management*, vol. 35, pp. 352-363, 2015.
34. UNCTAD, "Information Economy Report 2015-Unlocking the Potential of E-commerce for Developing Countries," 2015.
35. OECD, [https://www.wto.org/english/tratop\\_e/ecom\\_e/wkprog\\_e.htm](https://www.wto.org/english/tratop_e/ecom_e/wkprog_e.htm) (accessed 20 April 2016), 2011.
36. S. Kurnia, J. Choudrie, R. M. Mahbubur, and B. Alzougool, "E-commerce technology adoption: A Malaysian grocery SME retail sector study," *Journal of Business Research*, vol. 68, pp. 1906-1918, 2015.
37. S. Chatterjee, "Security and privacy issues in E-Commerce: A proposed guidelines to mitigate the risk,"


Paper Title- "Review of e-Commerce Security Challenges"

Paper Link - <https://www.turcomat.org/index.php/turkbilmat/article/view/8107>


Journal Name- Turkish Journal of Computer and Mathematics Education (1309-4653)

Journal Link <https://www.turcomat.org>

Journal Source-



Scopus Preview

Author Search Sources ?  Create account

## Source details

Feedback > Comp

### Turkish Journal of Computer and Mathematics Education

Scopus coverage years: from 2018 to 2020  
(coverage discontinued in Scopus)

Publisher: Karadeniz Technical University  
E-ISSN: 1309-4653

Subject area: [Social Sciences: Education](#) [Mathematics: General Mathematics](#) [Mathematics: Computational Mathematics](#)  
[Computer Science: Computational Theory and Mathematics](#)

Source type: Journal

[View all documents >](#) [Set document alert](#) [Save to source list](#)

CiteScore 2020	0.3
SJR 2020	0.218
SNIP 2021	0.487

# Mediating Role of Perceived Organizational Support on a Relationship between Job Burnout and Mental Well Being – A study of Private Hospital Nurses

Prof. Dr. Poonam Vatharkar

Assistant Professor, Organizational Behavior and Human Resource Management  
MES's Institute of Management & Career Courses –MBA. Pune –India.

## Article Info

Volume 83

Page Number: 10490 - 10500

Publication Issue:

March - April 2020

## Abstract

It is well documented fact that nursing is a stressful profession. The current study was undertaken to understand the impact of job burnout (JB) on mental well-being (MWB) and the role perceived organizational support (POS) plays to diminish negative impact of job burnout on mental well-being of nurses working in private hospitals. Perceived organizational support was expected to mediate between the relationship of job burnout and mental well-being. Data was collected through a survey of 150 nurses. Multiple regression analysis was used to test the mediation on POS. The results show strong correlation between job burnout (JB), perceived organizational support (POS) and mental well-being (MWB). POS partially mediates on the link between JB and MWB. These results focus on the importance of organizational support in ensuring the mental well-being of individuals. Hospital management must enact measures to provide support to nurses through proper compensation; acknowledgement and recognition of their efforts that will help protect their mental well-being.

**Keywords:** Job Burnout, Perceived Organizational Support, Mental Well- Being, Nurses

## Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 13 April 2020

## 1. Introduction

Job burnout occurs due to excessive job related stress typically in service providing occupations like nursing.

Chronic job burnout has harmful impact on daily function of employees (Bakker and Costa, 2014). Studies also suggest that factors related to structural environment of job like high job demands and low job resources lead to creation of job burnout among individuals (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Alarcon, 2011).

Extant research in the area of burnout shows that individuals who are at the risk of burnout i.e. who are exhausted and have cynical attitude towards work, demonstrate poor job performance and may have to deal with serious psychological and health related problems like depression, anxiety, sleep

disturbance and memory impairment (Bakker, Demerouti, & SanzVergel, 2014, Peterson et al., 2008).

Studies suggest that job burnout, particularly work related exhaustion may lead to overall survival risk for individuals (Ahola, Väänänen, Koskinen, Kouvonen, and Shirom, 2010)

When individuals are exposed to intense emotional stress for longer period of time they experience negative psychological state called job burnout. Conventionally, job burnout comprises of three dimensions called emotional exhaustion, depersonalization and reduced personal accomplishment (Lamb, 2009).

Emotional exhaustion occurs when individuals feel emotionally drained, extremely tired and experience lack of energy and necessary emotional resources to cope with continuing

demands of their work (Kang, Twigg and Hertzman, 2010; Martina, 2018). Due to acute exhaustion individuals tend to distance themselves emotionally from their jobs, it lessens their involvement with their work and may lead to individuals quitting their jobs.

Depersonalization is when individuals show negative and cold-hearted attitude towards others in job like towards co-workers, customers and others in the organization. It leads to uncaring, detached response to various aspects of job and people at work (Martina, 2018).

Reduced personal accomplishment is related to lack of efficacy and success related to job of individuals (Chiang, Birtch and Kwong Kwan, 2010).

Job burnout also is associated with negative psychological and organizational outcomes. Psychological outcomes of burnout include depression, lower physical health, pessimism, anger, alcohol and drugs abuse. Whereas, reduced job satisfaction, reduced productivity and motivation of employees, increased absenteeism, (Shukla and Trivedi, 2008; Kounenou, Koumoundourou, Makri-Botsari, 2010) are organizational outcomes of job burnout. All these outcomes negatively affects organizational performance and productivity.

The concept of well-being is very essential for service providing professions like nursing and can be understood as positive physical, social and mental state (Department of Health, England, 2010). Individuals are said to have mental well-being when they have ability to develop their potential, build strong and positive relationships with others, work creatively and productively and can contribute to their community (Beddington, Cooper, Field, Goswami, Huppert, Jenkins et al. (2008).

Mental well-being also includes areas like feeling of optimism, satisfaction, self-esteem, having

purpose in life, having sense of belonging and support and having certain degree of control over one's life (The Scottish Government Report (2012).

Perceived organizational support can be understood as a link between job burnout and mental well-being. Perceived organizational support is employee's perception that their contribution to the organization is being valued and organization cares about their well-being (Eisenberger et al., 1986). Perceived organizational support satisfies emotional needs of employees and gives them sense of responsibility and belongingness towards the organization.

In general social support means people from social network of individuals upon whom they can rely for social, economic and /or instrumental help/support (Thoits, 1982). Social support individuals receive from supervisors, co-workers, family members and society plays crucial role when individuals is trying to deal with job burnout.

Perceived organizational support is one of the ways to help employees deal with unavoidable stressors and resulting burnout at the workplace.

Therefore, the major intention of the current study is to investigate the impact of job burnout on mental well-being of private hospital nurses and the role of perceived organizational support in minimizing this impact.

## 2. Literature Review & Hypothesis

Job burnout occurs when individuals are exposed to intense emotional stress for longer period of time (Maslach, Schaufeli and Leiter, 2001).

Studies in the area of mentalwell-being claim that, experience of painful emotions such as grief; disappointments and failure are normal part of life. However, when individuals experience very intense, frequent stress of such emotions, it affects

their ability to function in daily life (Report by mental health foundation, UK, 2013)

Therefore we propose that,

*H1 - If job burnout is high, mental well-being will be low.*

There are evidences showing that due to excessive stress of job individuals experience job burnout. When there is a feeling of job burnout individuals tend to feel pessimistic about others and also develop a feeling of being less important or useless (Ahola, Kivimaki, Honkonena, Virtanen, Koskinen, Vahtera and Lonnqvist, 2008).

Furthermore, when employees feel burned out, they need more time to complete their tasks, and they make more mistakes (Bakker and Costa, 2014). In such condition they require more organizational resources like support from peers and supervisors to work effectively. However, due to higher level of exhaustion they are less likely to deploy these resources and less willing to receive help from others (Bakker et al., 2014), which may reduce their perception of the support they receive from their superiors as well as co-workers.

Therefore we propose that,

*H2 - If job burnout is high, perceived organizational support will be low.*

It is well documented that social support individuals receive from supervisors; co-workers within the organizational setting is highly correlated with better physical health, lesser psychological issues and better mental health and well-being (Pierce, Sarason, & Sarosan, 1990).

Therefore we propose that,

*H3 – If perceived organizational support is high, mental well-being will be high.*

Extant research in the area of job burnout and social support claim that the support that working individuals receive from superiors and co-workers

(known as work support) as well as from family, friends and people outside the work environment (popularly known as non-work support) have profound impact in reducing work related burnout of individuals. Many researchers (Ellis & Miller, 1994, Beehr, 1985) claim that the support coming from organizational sources like supervisors and co-workers has significant role to play rather than non-work support.

Previous research asserts that social support works as a key coping resource, as it reduces the job burnout by providing individuals with social, economic and instrumental assistance. This is provided in the form of affection, understanding, esteem as well as advice. Such support leads to enhanced mental well-being of individuals.

Therefore, it is proposed that,

*H4 – Perceived organizational support will mediate between job burnout and mental well-being such that if perceived organizational support is high negative impact of job burnout on mental well-being will reduce.*

## **Methods**

**Sample** – Survey method was adopted to study the impact of job burnout and perceived organizational support on mental well-being of nurses. Data was collected through a survey of 150 female nurses working in private hospitals in Pune city of Maharashtra state. Respondents were contacted personally and were explained the purpose of the questionnaire and assured confidentiality of responses. Of the 250 questionnaires that were distributed, 150 usable responses were received by the data analysis deadline.

The sample has an average age of 32 years. Approximately 55% of the respondents were unmarried. Average work experience was around 10 years.



### 3. Research Model

The proposed research model is presented in Figure 1.

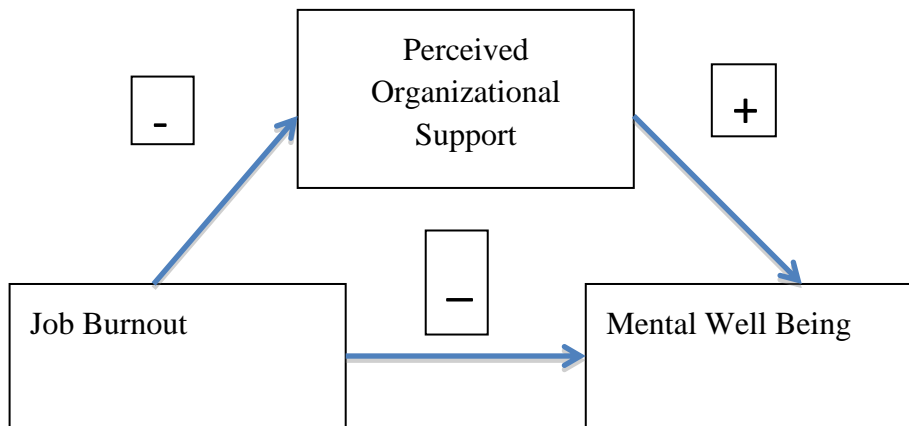


Figure -1: Research Model

### 4. Measures

**Job Burnout** –Job burnout was measured using the Copenhagen Burnout Inventory (CBI), a questionnaire with three sub-dimensions: Personal burnout, work-related burnout, and patient related burnout developed by Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). There were 19 items in this scale. Each item was rated on 5-point scale from “1=Always” to “5 = Never”. Sample items include “*Do you feel worn out at the end of the working day?*”, “*Does it drain your energy to work with patients?*” and “*How often do you feel worn out?*”

**Perceived Organizational Support** -Perceived Organizational Support was measured using scale developed by Eisenberger et al., 1986. The questionnaire comprises of 17 items. Out of these 17 items, 8 questions are concerning perceived degree to which the organization values employee’s contribution. Remaining nine questions focus on organizational actions for employee well-being. Each item was rated on 7-point scale ranging from “1 = Strongly Disagree” to “7 = Strongly Agree.” Example items include: “*The organization values my contribution to its*

*well-being,*” and “*Even if I did the best job possible, the organization would fail to notice.*”

**Mental Well-being**– Mental Well-being was measured using The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) that was developed by researchers at the Universities of Warwick and Edinburgh (2008). The scale contains 14 items. Each item is scored on 5-point scale ranging from 1 = none of the time to 5 = all of the time. Sample items include, “*I’ve been feeling optimistic about the future*”, “*I’ve been feeling useful*” and “*I’ve been feeling close to other people*”.

### 5. Analysis & Results

**Cronbach’s Alpha** – The validity and reliability of the survey instruments used was tested with Cronbach’s Alpha. Past studies recommend using Cronbach’s Alpha to validate the survey instruments (Prosad, Kapoor and Sengupta, 2015; Wood and Zaichkowsky, 2004). Cronbach’s Alpha was tested for all the three variables, job burnout, perceived organizational support and mental well-being. The results in Table 1 show alpha reliability of job burnout as 0.92, perceived organizational support as 0.80 and mental well-being as 0.93. The alpha reliabilities of scales used

in the study are reported along the diagonal in the table. All scales have acceptable reliabilities.

**Table 1- Mean, Std. Deviation and Zero Order Correlations among study variables**

Variables	M	SD	JB	POS	MWB
Job Burnout	4.15	.73	<b>0.92</b>		
Perceived Organizational Support	3.80	.79	-.605**	<b>0.80</b>	
Mental Well Being	3.23	.79	-.472**	.652**	<b>0.93</b>

\*\*  $p < .01$

**Table 2 – Regression Results**

	Independent Variable	Dependent Variable	Unstandardized $\beta$	t	$R^2$	$\Delta R^2$
H1	Job Burnout	Mental well being	-.491	-8.329**	.126	.053**
H2	Job Burnout	Perceived organizational support	-.615	-3.976**	.282	.132**
H3	Perceived organizational support	Mental well being	.453	4.755**	.252	.188**
H4	Burnout Perceived organizational support	Mental well being	-.310 .262	-7.278* 4.742**	.275	.127**

\* $p < .05$  \*\* $p < .01$

Control variables – Age, Education, Gender

Mean, standard deviations and correlations for all variables are reported in Table 1. Strong correlations were found between job burnout (JB), perceived organizational support (POS) and mental well-being (MWB).

Multiple regression analysis was used to test the hypotheses. Variables like age, education and gender were controlled for and were entered into model 1 to nullify any impact these variables may have in prediction of dependent variable. The results in Table 2 (Controlling for age, education

and gender) show complete support for H1 to H3 and partial support for H4.

While testing the mediation of POS on the relationship between JB and MWB, we regressed JB on MWB and added POS to the regression equation. When POS was added, the relationship between job burnout and mental well-being became weaker in this analysis, indicating partial mediation.

## 6. Discussion

As expected, it was found that job burnout significantly negatively impacts mental wellbeing of nurses.

This finding could be explained with the help of self-determination theory, which asserts that individuals have three intrinsic psychological needs namely need for autonomy, competence and relatedness (Deci & Ryan, 2000). The need for autonomy indicates the urge to exercise one's will and be causal agent; the need for competence refers to individual's innate desire to be effective while dealing with their environment and the need for relatedness means a general tendency to connect, interact and experience caring for other people (Baumeister & Leary, 1995).

Past research claims that satisfaction of these needs on day to day basis leads to better performance and fosters mental well-being of individuals (Gagne & Vansteenkiste, 2013; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000).

Studies have shown that burned out employees seem to spend excessive time on work related activities like administrative duties, core work tasks, meeting with clients etc. This in turn reduces their momentary need satisfaction and daily happiness. Burned out employees fail to satisfy their daily psychological needs (Bakker and Oerlemans, 2014) and hence experience lower level of mental well-being.

Further it was found that job burnout was significantly negatively correlated with perceived organizational support.

This interesting finding could be explained with the help of previous research that has provided evidences regarding negative relationship between job burnout and job resources (Bakker and Costa, 2014).

When job burnout increases, it leads to increase in job demands and decrease in job resources (Ten

Brummelhuis et al., 2011). Job resources are factors like job autonomy and information, participation in decision making and support from supervisor and co-workers. Research suggest that when individuals experience high degree of job burnout, they exhibit withdrawal behaviour, they are less open to new experiences (Bakker, Van der Zee, Lewig, & Dollard, 2006), have less access to job resources (Vein, De Beer, Pienaar, and Rothmann Jr., 2013) and hence are less likely to get benefitted from these resources.

Therefore, in current study it was found that higher level of job burnout led to lower perception of perceived organizational support which is one of the vital job resources.

A significant positive correlation was found among perceived organizational support and mental well-being of respondents. Extant research in the field of mental well-being asserts that social networks and relationships are the protective factors that promotes mental well-being of individuals (Report by mental health foundation, UK, 2013)

A partial mediation by perceived organizational support suggests that it may help nurses to deal with the job burnout and reduce its negative impact on mental well-being.

This finding is supported by previous research in this area which suggests that when employees are suffering from job burnout they need support from others in the organization (Bakker and Costa, 2014) which may help them to maintain their physical and mental well-being.

## 7. Recommendations

The present study suggests that higher level of job burnout leads to reduced mental well-being. Furthermore, it claims that perceived organizational support can help to reduce the negative impact of job burnout on mental well-being of employees. Thus, current study

highlights the need of perceived organizational support for enhancing mental well-being and performance of employees.

The principle of reciprocity mentioned in social exchange theory, applies when employees perceive higher level of perceived organizational support. As employees feel that organization care about their well-being, they also put best efforts while performing their job duties.

One of the key finding of this study is the role played by perceived organizational support to mitigate negative impact of job burnout on mental well-being of private hospital nurses. Organizational support comes from organizations acknowledging and compensating efforts of employees, addressing their complaints and caring about their well-being.

Management should develop policies in such a way that acknowledges and rewards individual employee's contribution to work. There should be appropriate compensation policies that consider competency as well as performance levels of employees. Policies regarding pay for overtime work should fairly reward the efforts of employees, so that they will be happy working beyond their call of duty.

Appreciation received from supervisors and co-workers plays crucial role in boosting motivation and performance of individuals. Exceptionally good performers should be rewarded not only in terms of money but many times non-monetary rewards like publicly praising the employee, displaying best performer's name on notice board and a simple pat on back also is perceived as great source of support.

There should also be a systematic grievance handling mechanism active within the organization. If employees have complaint regarding any job related issue, it should be channelized properly and resolved fairly. All this

will make nurses feel supported by their organizations.

Proper feedback system, whereby patients give feedback about nurse's performance will also help them put extra efforts in their performance and hospitals can also find out good performers and encourage them.

It is also evident from previous research that a profession like nursing attracts people who are emotionally more stable, extroverted and social than general population (Tyler and Cushway, 1992). This study has found higher rate of burnout and lower mental well-being among the study population. It is noteworthy that the study population consists of females who are young (with average age of 32 years) and many of them are unmarried (55%). This finding focuses the need that hospital management must pay attention to the substantial number of nurses who despite of their young age are submitting to higher level of job burnout which is affecting their mental well-being negatively.

The study reports higher level of job burnout ( $M=4.15$ ) in private hospital nurses. Previous studies argue that due to excess level of job burnout, individuals feel emotionally and physically exhausted, there performance gets negatively affected and as a result they stop caring. Nursing is a profession where caring is a fundamental aspect.

Burned out individuals also demonstrate withdrawal behaviour (Hanisch, 1995) which includes lateness, turnover and absence from work (Maslach et al., 2001). When, burned out employees continue to be at work, it leads to presenteeism (Cooper, 1996). Presenteeism is when individuals keep on working, when they should be on sick leave, either due to sickness or because they are no more effective (Cooper, 1996). In this case, their performance at work and collective performance of others working with them may suffer (Demerouti, Le Blanc, Bakker,

Schaufeli and Hox, 2009; Swider and Zimmerman 2010), which can affect their decision making and patient care quality.

When employees are burned out, they lack the concentration required to performance well and hence make more mistakes. They also find it difficult to process thoughts (Fredrickson,2001), which reduces their focus on new information (Derryberry& Tucker, 1994) and finally damages their quality of decision making. Due to job burnout, employees also feel detached from their work and are less willing to help others (Swider & Zimmerman, 2010).

Therefore, we highly recommend that hospital management should play active role in prevention and reduction of burnout of nurses.

Last but not the least, extant research suggest that factors like low nurse-to-patient ratio and more administrative duties given to nurses which leaves little time for them for patient care may also contribute towards higher level of job burnout and lower mental well-being among nurses, hospital management should have constructive dialogue with nurses and design their work profiles accordingly.

## 8. Conclusion

Many previous studies have shown that the factors causing higher level of stress or job burnout are inherent to the work of nurses. These factors may include physical structure or environment of work, excessive workload due to insufficient staffing, time pressures due to unsociable hours of work and scarcity of equipment and resources to complete the task efficiently, which ultimately gives rise to feeling of work overload and stress. Similarly, having to deal with suffering or dying patients and their relatives on daily basis may further aggravate the feeling of burnout (Tyler and Cushway, 1992). All these things negatively affect mental well-being of nurses and hamper their job performance. Nursing being care-giving

profession, lower mental well-being and higher job burnout impairs quality of patient care. Though, the profession of nursing is inherently stressful, the support provided by organizations plays crucial role in minimizing job related burnout and thereby protect mental well-being of nurses.

## References

- [1] Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, 79, 549–562.
- [2] Ahola, K., Väänänen, A., Koskinen, A., Kouvonen, A., & Shirom, A. (2010). Burnout as a predictor of all-cause mortality among industrial employees: A 10-year prospective register-linkage study. *Journal of Psychosomatic Research*, 69, 51–57
- [3] Shukla and T. Trivedi, “Burnout in Indian Teachers ”, *Asia Pacific Education Review*, Vol. 9 , No.3 , pp. 320-334, 2008
- [4] Kang, N. Twigg and J. Hertzman, “An examination of social support and social identity factors and their relationship to certified chefs“ burnout ” , *International Journal of Hospitality Management*, Vol. 29 , pp.168–176, 2010
- [5] Beddington J, Cooper CL, Field J, Goswami U, Huppert FA, Jenkins R, et al. (2008). The mental wealth of nations. *Nature*, 455(7216) p. 1057-60.
- [6] Bakker, A. B., & Costa, P. L. (2014). Chronic job burnout and daily functioning: A theoretical analysis. *Burnout Research*, 1(3), 112-119.
- [7] Bakker, A. B., Van Der Zee, K. I., Lewig, K. A., & Dollard, M. F. (2006). The relationship between the big five personality factors and burnout: A study among volunteer counselors. *The Journal of social psychology*, 146(1), 31-50.

- [8] Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD–R approach. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 389–411.
- [9] Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117,497–529.
- [10] Bakker, A. B., & Demerouti, E. (2014). Job demands–resources theory. In P. Y. Chen, & C. L. Cooper (Eds.), *Work and wellbeing: Wellbeing: A complete reference guide*(Vol. III) (pp. 37–64).
- [11] Bakker, A. B., & Oerlemans, W. G. M. (2014). Momentary work happiness as a function of enduring burnout and engagement: A day reconstruction study (submitted for publication).
- [12] Beehr, T. A. (1985). The role of social support in coping with organizational stress. *Human stress and cognition in organizations: An integrated perspective*, 375-398.
- [13] Chiang, F. F., Birtch, T. A., & Kwan, H. K. (2010). The moderating roles of job control and work-life balance practices on employee stress in the hotel and catering industry. *International Journal of Hospitality Management*, 29(1), 25-32.
- [14] Cooper, C. (1996, June 21). Hot under the collar. In *Times Higher Education Supplement*.
- [15] Department of Health (2010). *Healthy Lives, Healthy People: Our strategy for public health in England*. London: The Stationery Office.
- [16] Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The Job Demands–Resources model of burnout. *Journal of Applied Psychology*, 86,499–512.
- [17] Demerouti, E., Le Blanc, P. M., Bakker, A. B., Schaufeli, W. B., & Hox, J.(2009). Present but sick: A three-wave study on job demands, presenteeism and burnout. *Career Development International*, 14, 50–68.
- [18] De Beer, L. T., Pienaar, J., & Rothmann, S., Jr. (2013). Investigating the reversedcausality of engagement and burnout in job demands–resources theory. *South African Journal of Industrial Psychology*, 39, 1–9.
- [19] Derryberry, D., & Tucker, D. M. (1994). Motivating the focus of attention. In P. M.Niedenthal, & S. Kitayama (Eds.), *Heart’s eye: Emotional influences in perceptionand attention* (pp. 167–196). New York: Academic Press.
- [20] Ellis, B. H., & Miller, K. I. (1994). Supportive communication among nurses: Effects on commitment, burnout, and retention. *Health communication*, 6(2), 77-96.
- [21] Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *Journal of Applied psychology*, 71(3), 500.
- [22] Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotion. *American Psychologist*, 56,218–226.
- [23] F. T. Chiang, T. A. Birtch and H. Kwong Kwan, “ The moderating roles of job control and work-life balance practices on employee stress in the hotel and catering industry”, *Journal of Vocational Behavior*, Vol. 76,pp.68–77, 2010
- [24] Gagné, M., & Vansteenkiste, M. (2013). Self-determination theory’s contribution to positive organizational psychology. In A. B. Bakker (Ed.), *Advances in positive organizational psychology* (Vol. 1) (pp. 61–82). Bingley, UK: Emerald

- [25] Hanisch, K. A. (1995). Behavioral families and multiple causes: Matching the complexity of responses to the complexity of antecedents. *Current Directions in Psychological Science*, 4, 156–162.
- [26] Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207
- [27] K. Ahola, M. Kivimaki, T. Honkonena, M. Virtanen, S. Koskinen, J. Vahtera and J. Lonnqvist, "Occupational burnout and medically certified sickness absence: A population-based study of Finnish employees" , *Journal of Psychosomatic Research*, Vol.64, pp 185–193, 2008
- [28] Kounenou, K., Koumoundourou, G., & Makri-Botsari, E. (2010). Greek school career counselors competencies and burnout syndrome. *Procedia-Social and Behavioral Sciences*, 2(2), 1890-1895.
- [29] Lamb, S. (2009). Personality traits and resilience as predictors of job stress and burnout among call center employees. Unpublished master's thesis, University of the Free State, Bloemfontein
- [30] Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, 81, 123–133.
- [31] Maslach, C., Jackson, S. E., Leiter, M. P., Schaufeli, W. B., & Schwab, R. L. (1986). *Maslach burnout inventory* (Vol. 21, pp. 3463-3464). Palo Alto, CA: Consulting psychologists press.
- [32] Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. In S. T. Fiske, D.L. Schacter, & C. Zahn-Waxler (Eds.), *Annual review of psychology* (Vol. 52) (pp.397–422).
- [33] Martina, K. (2018). How job resources and personal resources influence work engagement and burnout. *African Journal of Economic and Management Studies*, 9(2), 148-164.
- [34] Prosad, J. M., Kapoor, S., & Sengupta, J. (2015b). Behavioral biases of Indian investors: a survey of Delhi-NCR region. *Qualitative Research in Financial Markets*. 7(3), 230 – 263.
- [35] Peterson, U., Demerouti, E., Bergström, G., Samuelsson, M., Asberg, M., & Nygren, A. (2008). Burnout and physical and mental health among Swedish health-care workers. *Journal of Advanced Nursing*, 62, 84–95.
- [36] Pierce, G. Sarason, I. & Sarason, B. (1990). Integrating social support perspectives: working models, personal relationships, and situational factors. In S. duck with R. silver (Eds.) *personal relationships and social support* (pp.173- 189). London: sage publications
- [37] Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, 26, 419–435.
- [38] Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.
- [39] Swider, B. W., & Zimmerman, R. D. (2010). Born to burnout: A meta-analytic path model of personality, job burnout, and work outcomes. *Journal of Vocational Behavior*, 76, 487–506.
- [40] Report by mental health foundation, UK, 2013)
- [41] The Scottish Government (2012). *Mental Health Strategy for Scotland 2012-15*. Edinburgh.

- [42] Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., ... & Stewart-Brown, S. (2007). The Warwick-Edinburgh mental well-being scale (WEMWBS): development and UK validation. *Health and Quality of life Outcomes*, 5(1), 63.
- [43] Ten Brummelhuis, L. L., Ter Hoeven, C. L., Bakker, A. B., & Peper, B. (2011). Breaking through the loss cycle of burnout: The role of motivation. *Journal of Occupational and Organizational Psychology*, 84(2), 268-287.
- [44] Thoits, P. A. (1982). Conceptual, methodological, and theoretical problems in studying social support as a buffer against life stress. *Journal of Health and Social Behavior*, 23(2), 145-159.
- [45] Tyler, P., & Cushway, D. (1992). Stress, coping and mental well-being in hospital nurses. *Stress medicine*, 8(2), 91-98.
- [46] Wood, R. & Zaichkowsky, J.L. (2004). Attitudes and trading behavior of stock market investors: segmentation approach. *Journal of Behavioral Finance*, 5(3), 170-179.



Paper Title- Mediating Role of Perceived Organizational Support on a Relationship between Job Burnout and Mental Well Being – A study of Private Hospital Nurses

Paper Link- <http://testmagzine.biz/index.php/testmagzine/article/view/5501>

Journal Name- Test Engineering & Management

Journal Link- <http://www.testmagzine.biz/index.php>

Journal Source-



Scopus Preview

Author Search

Sources



## Source details

Feedback

### Test Engineering and Management

Scopus coverage years: from 1970 to 1971, from 1974 to 1979, from 1985 to 1989, from 1993 to 2020  
(coverage discontinued in Scopus)

Publisher: Mattingley Publishing Co., Inc.

ISSN: 0193-4120

Subject area: [Business, Management and Accounting: General Business, Management and Accounting](#) [Physics and Astronomy: Instrumentation](#)

[Engineering: Mechanical Engineering](#) [Engineering: Mechanics of Materials](#)

Source type: Trade Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#)

[Source Homepage](#)

CiteScore 2019  
0.1

SJR 2019  
0.101

SNIP 2021  
0.117