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Editorial:

We cordially invite you to attend the ***10th World Conference on Applied Science, Engineering and Technology (WCASET - 18)*** which will be held at ***Holiday Inn Singapore Atrium, Singapore*** on ***July 26th-27th, 2018***. The main objective of ***WCASET*** is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in relevant fields of Science, Engineering and Technology. This conference will provide opportunities for the delegates to exchange new ideas and experience face to face, to establish business or research relationship and to find global partners for future collaboration.

These proceedings collect the up-to-date, comprehensive and worldwide state-of-art knowledge on cutting edge development of academia as well as industries. All accepted papers were subjected to strict peer-reviewing by a panel of expert referees. The papers have been selected for these proceedings because of their quality and the relevance to the conference. We hope these proceedings will not only provide the readers a broad overview of the latest research results but also will provide the readers a valuable summary and reference in these fields.

The conference is supported by many universities, research institutes and colleges. Many professors played an important role in the successful holding of the conference, so we would like to take this opportunity to express our sincere gratitude and highest respects to them. They have worked very hard in reviewing papers and making valuable suggestions for the authors to improve their work. We also would like to express our gratitude to the external reviewers, for providing extra help in the review process, and to the authors for contributing their research result to the conference.

Since May 2018, the Organizing Committees have received more than 71 manuscript papers, and the papers cover all the aspects in Electronics, Computer Science, Information Technology, Science Engineering and Technology. Finally, after review, about 37 papers were included to the proceedings of ***WCASET - 2018***.

We would like to extend our appreciation to all participants in the conference for their great contribution to the success of ***WCASET 2018***. We would like to thank the keynote and individual speakers and all participating authors for their hard work and time. We also sincerely appreciate the work by the technical program committee and all reviewers, whose contributions made this conference possible. We would like to extend our thanks to all the referees for their constructive comments on all papers; especially, we would like to thank to organizing committee for their hard work.

Editor-In-Chief
Dr. Nalini Chidambaram
Professor
Bharath University

Acknowledgement

IFERP is hosting the ***10th World Conference on Applied Science, Engineering and Technology*** this year in month of July. The main objective of WCASET is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points, and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions. The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader.

I express my hearty gratitude to all my Colleagues, staffs, Professors, reviewers and members of organizing committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to travel such a long distance to attend this conference.

Mr. Ankit Rath
CEO
Institute for Engineering Research and Publication (IFERP)

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DNA Based Access Control Method in Cloud Environment

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Abstract:-- **Cloud Computing is a thriving technology due to its scalability, flexibility and cost-effective and pay-per-use model. Because of the advantages of the cloud technology most of the organizations are moving the data to the cloud. But many of the new problems are introduced by moving data to the cloud in addition to the existing problems. One of the major problems faced in the cloud environment is access control and security of data. Many of the access control mechanisms are followed in the cloud. In this paper, we are proposing an efficient access control method based on Deoxyribonucleic Acid (DNA) cryptography. By taking the advantages of unique features of DNA sequences, the secure and efficient access control mechanism is developed.**

Index Terms: Access Control, Cloud Computing, DNA, Security.

I. INTRODUCTION

Cloud computing is the renowned technology for storing and processing large volumes of data. Most of the organizations are moving their data in the cloud to make them available whenever and from wherever it is required. Cloud service providers (CSP) provide many services and facilities to the clients in different forms like infrastructure as a service (IaaS), Platform as a service (PaaS), Software as a Service, Data as a service (DaaS)[1]. The advantages of moving data to the cloud are many like scalability, accessibility, availability, increased user mobility, green technology etc[2]. Besides the advantages of cloud, it also faces many challenges like loss of control of data, vendor lock in and security of data[2]. One of the major challenges faced by cloud computing is the security of the data stored in the cloud. The major concern of security and privacy issues in the cloud exists because of the user has no control over the data which is stored in the cloud. In the CSA (Computer Security Alliance) report of top threat in 2013[3], data security is listed as one of the top threats in the cloud. It has three important dimensions namely confidentiality, integrity and availability. Access control is an important method of giving access rights only to the authorized users for achieving data confidentiality.

In the cloud environment, the key components are data owner (DO), Cloud service provider (CSP) and data user (DU). The CSP stores the data in its location or in the data owner's location based on whether public or private cloud is used. It provides services requested by the data user. The data user would be able to access the data from anywhere based on the access policy assigned to the user.

II. RELATED WORKS

A. Access Control Methods

In a cloud computing environment, the security of data is at risk due to the mischievous users and hackers. So, the access control model allows only valid and genuine users to access data from the cloud server.

Many access control schemes have been developed to solve the problems faced by the cloud. Attribute based encryption (ABE) is one of the commonly used access scheme over the conventional cryptographic techniques. It was first introduced by shamir [4] in which sender of a message can specify an identity such that only the intended receiver can decrypt the data. In ABE, the attributes are viewed as an identity to access the data. There are two types of ABE such as Key Policy based ABE (KP-ABE) and Cipher Policy based ABE (CP-ABE). In KP-ABE[5], the ciphertext is associated with the set of attributes, and private key is associated with an access structure. Decryption is possible if and only if the access tree satisfies the attributes in the ciphertext. In CP-ABE[6], ciphertext is assigned to an access policy, and private key is based on the user's attributes. If user's attributes satisfy the access policy, then only a user will be able to decrypt the ciphertext.

In Role Based Access Control Model (RBAC)[7], the access is granted based on the role of the user. The access rights are based on the role and roles are not transferrable. In Gateway Based Access Conrol (GBAC) [8], each user's data is converted into Security Assertion Markup Language (SAML) format and then it is sent to the user. The entire access control is in the hands of the gateway of the CSP which does the translation. This access method

takes more time for searching the data in the server and accessing the data. In Purpose Based Access Control Model (PBAC)[9], the purpose tree is maintained for access control. The access of data will be granted if the reason of access matched with the intended purpose of the data.

B. DNA cryptography

DNA or Deoxyribonucleic Acid is a long molecule, which contains genetic information. All of our body cells contain the same DNA. It can be used to store and transmit data. Strands of DNA are long polymers of millions of linked nucleotides. These nucleotides consist of one of four nitrogen bases, a five carbon sugar and a phosphate group. The nucleotides that make up these polymers are named after the nitrogen base that it consists of: Adenine (A), Cytosine (C), Guanine (G) and Thymine (T)[10]. We can utilize these four letters to encode information. For encoding the information, we can make use of any 24 combinations from four letters.

DNA Cryptography can be defined as a technique of hiding data in terms of DNA sequence. In the cryptographic technique, each letter of the alphabet is converted into a different combination of the four bases which make up the human deoxyribonucleic acid (DNA).
The DNA concept for securing and hiding data is used by many researchers today. Gehani et al. [11] first introduced the DNA concept in the field of cryptography. Phangal et al.[12] used DNA sequencing and substitution method to improve the traditional symmetric key encryption. Abbasy and Shanmugan [13] proposed DNA sequences to hide data for improving confidentiality in cloud. In [14] Hitaswi et.al., proposed encryption and decryption algorithm based on DNA bases. Neha et al.[15] proposed a data hiding through DNA complementary rule. Wang et al. [16] proposed a novel technique of DNA computing with RSA algorithm for secure transmission of data. They have combined DNA computing with asymmetric encryption. In [17], Zhang and Gao proposed a technique for data hiding using DNA codon. Gupta and Singh [18] proposed an encryption scheme based on DNA and Ribonucleic Acid (RNA) sequences.

III. PROPOSED SYSTEM

Our proposed system consists of three entities CSP, Data Owner and Data User. The CSP provides cloud services and infrastructure for storing data for both DO and DU.
In the first phase, CSP generates the public and private key pair for all data users and owners. In the user registration phase, the private key of the user is communicated over the secure channel. Once the user registration is over, the user can login into the system. Whenever the user requests the file from the CSP, it provides the public key of the owner to the user to get the DNA key. Using the public key of the owner it requests the DNA key from the data owner. After checking the authenticity of the user from the CSP, owner creates a DNA key for the user using user's attributes. In the data access phase, the user shows the certificate to the CSP and request the file from the CSP. The CSP provides the encrypted file to the user where the file is decrypted by the user using the DNA key and secret key for decryption which is provided by the owner.

A. DNA Based Key Generation

The attributes of the user are considered as a full string and each letter of the string is assigned some decimal value. This decimal sequence is generated by the data owner using their own sequence using Table 1. These decimal values are converted into binary string in the next step. This binary string is used as key for the encryption of data which is stored in the cloud. Here we are using 256 bits DNA key for simplicity. In the next step, the binary string is divided into four parts of 64 bits each. Each 64 bit part is assigned a four letter sequence using any one out of 24 combinations of letters A, T, C and G randomly using the Table 2. Then the complementary rules are applied in the sequence which is obtained from the previous step. Here, we are using the complimentary rules as A->C, T->G, G->A,C->T. The complimentary rules are used to complicate the intruder to guess the DNA sequences. The complimented sequence is rotated twice to the left to form the DNA based key

Table 1. Decimal Encoding Table

Character	Decimal Value	Character	Decimal Value
A	1	a	37
B	2	b	38
C	3	--	--
D	4	$	98
---	---	#	97
--	--	@	96
--	---	--	---
---	---	[	104
0	27	]	102
1	28	&	101

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Table 2. DNA Base Assignment Table

Sr. No	DNA Base	Sr. No	DNA Base
1	ACGT	13	GATC
2	ACTG	14	GACT
3	ATCG	15	GTAC
4	ATGC	16	GTCA
5	AGTC	17	GCTA
6	AGCT	18	GCAT
7	CAGT	19	TCGA
8	CATG	20	TCAG
9	CGAT	21	TACG
10	CGTA	22	TAGC
11	CTGA	23	TGAC
12	CTAG	24	TGCA

IV. IMPLEMENTATION

To experiment the proposed scheme, a cloud simulation platform has been set up using cloud sim 3.0. CloudSim[19] toolkit was developed by a group of researchers at the University of Melbourne. CloudSim toolkit has four layers, namely cloud services, cloud resources, user interface structures and virtual machine services. There are several entities in the CloudSim toolkit, namely Cloud Information Service (CIS), host, data center, Virtual Machine (VM), cloudlet, broker and VM Manager (VMM). CloudSim toolkit is installed on laptop with 3.40 GHz Intel corei3 processor, 4 GB RAM and 500 TB storage capacity with Windows 10 Operating System. Java version 8 with Netbeans 8.1 as IDE is used for execution purpose.

V. PERFORMANCE OF THE PROPOSED SYSTEM

Our proposed scheme is secure against the collision attack, man-in-the-middle attack and password guessing attack.

It does not reveal any sensitive information about the user to the CSP. The DNA sequence is generated using the user's personal information like aadhar card no, email id and date of birth etc. The attributes of two users cannot be same. Even any malicious user, who wants to access data illegitimately from the cloud, would not be getting all the attribute information of an authorized user. The decimal encoding table is provided by the owner only to the authorized user.

DNA based secret key will not be provided to the user unless and otherwise it is authenticated from the CSP. No middle man can request the key from the data owner. So, our proposed system is secure against the man-in-the-middle attack.

Our proposed system is also secure against the password guessing attack. DNA key is generated based on the user's attributes. DNA key is generated based on the data owner's decimal encoding and ATCG combinations. The final key is generated by using complimentary rules and rotation. We use the complementary rules and rotation for confusing the attacker.

The key generation time is less when compared to other access control schemes. In the cloud environment the number of users varies from time to time. From the Fig.1, it clearly shows that even if there are ups and downs in the key generation time, it is less compared to other access control methods.

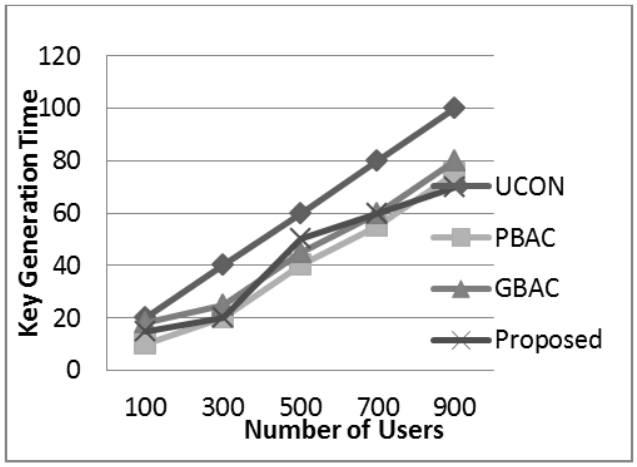

Figure 1. Number of Users Vs Key Generation Time

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Project Characteristics Indicating Safety Performance

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Abstract:-- **Safety performance has been long discussed and assessed in order to ensure less harm identified and reduce accidents in construction projects. Practically, accident rate is one common used key performance indicator to indicate the on-site safety performance in construction projects worldwide. Theoretically, there were various indicators that developed for the assessment of the safety performance of construction projects. These indicators were derived from previous literatures and lack of potential linkage to the project performance of construction projects. Thus, it is worth to explore the project characteristics that identified in construction projects with outstanding safety performance. This study introduced the project characteristics that identified in the construction projects with outstanding safety performance. The project characteristics were firstly identified by the sate-of-the-practice review and verified by panels of experts through structured interview and questionnaire survey. In general, findings of literature and structured interview were consistent. A series of interviews were supplemented the literatures' findings. There were totally 27 project characteristics that indicating outstanding safety performance of a construction project. Eighteen experts were participated in the questionnaire surveys to verify the importance levels of the proposed project characteristics. All experts agreed with project characteristics that indicating the safety performance of the construction projects. The most agreed project characteristics were good housekeeping, more support and commitment from senior management, clear understanding of construction work activities, and good planning of project execution. These are indicative to future development of project management practice and sustainable safety strategies in construction industry locally and globally.**

KEYWORDS: Safety performance; Construction industry; Safety commitment; Safety audit

BACKGROUND

Construction involves high risk work activities and contributed to 20% of overall industrial accidents during the period between 1996 and 2005 in Japan, South Korea and Hong Kong (Poon, Tang, & Wong, 2008; Yiu & Chan, 2016). Particularly, in Hong Kong, 62% of industrial fatalities in the year of 2015 were constituted from construction sector, and a total of 3,723 accidents were reported from construction sites (Labour Department, 2017). The high accident and fatality rates of construction industry are mainly attributed to its hazardous workplace environment and fast changing work practices (Fan, Lo, Ching, & Kan, 2014; Tam & Fung IV, 1998). There are a few well-recognized key performance indicators that represent the safety performance in construction industry. Accident rate is considered as a common key performance indicator. Other safety performance indicators and indexes currently available were mostly derived from previous literatures without specification of assumed fitting criteria. The less reliability of the indicators, the fewer construction companies adopted. With the consideration of the limited evidence of safety performance due to the impact of on-site project practices (Bottani, Monica, & Vignali, 2009; Robson et al., 2007), this study aims to identify the project characteristics that indicating outstanding safety performance on construction sites.

PROJECT CHARACTERISTICS

Journal papers on the topic of construction safety were obtained through systematic searching in Scopus database. Scopus database was commonly reviewed for the research studies in construction management due to its better coverage and accuracy of sources of information (Ameyaw, Hu, Shan, Chan, & Le, 2016; Hon, Chan, & Yam, 2011). Articles containing the most-searched terms 'safety performance' and 'construction' in the 'title/abstract/keyword' were considered for review in this research. By reviewing the content of these articles, there were 20 project characteristics identified from the articles. Table 1 shows 20 project characteristics that potentially found in construction project with outstanding safety performance. These project characteristics will then be verified through interviews and questionnaire survey.

Table 1. Key characteristics to distinguish safety performance in Hong Kong Construction Industry

Key characteristics to distinguish safety performance in Hong Kong Construction Industry		References
1	More support and commitment from senior management	(Goh & Chua, 2013; Ismail, Doostdar, & Harun, 2012)
2	Better logistic arrangement of site materials	(Moorkamp, Kramer, Van Gulijk, & Ale, 2014; Tam, Fung IV, & Chan, 2001)
3	Clear understanding of construction work activities	(Moorkamp et al., 2014)
4	Lower accident rates	(Bottani et al., 2009)
5	Good planning of project execution	(Bottani et al., 2009)
6	Clear site activities / working sequences	(Tam et al., 2001)
7	Strong financial performance	(Bottani et al., 2009)
8	Well-functioned communication system	(Bottani et al., 2009)
9	Higher education level of workers	(Tam et al., 2001)
10	Strict operational procedures	(Bottani et al., 2009)
11	Higher teamwork spirits	(Tam et al., 2001)
12	Clear safety organization with defined responsibilities and accountabilities	(Ismail et al., 2012; Tam et al., 2001);;
13	Incentives offered for employees' participation	(Bottani et al., 2009; Ismail et al., 2012)
14	Rigorous enforcement of safety regulations	(Ismail et al., 2012; Tam et al., 2001)
15	Availability of site safety manual	(Tam et al., 2001)
16	Innovative technology	(Tam et al., 2001)
17	Project manager with higher safety awareness	(Tam et al., 2001)
18	Top management of the firm with higher safety awareness	(Goh & Chua, 2013)
19	Active participation in OSH activities by employees	(Bottani et al., 2009)
20	Better safety culture	(Goh & Chua, 2013)

RESEARCH METHODOLOGY

Based on the literature findings, this study adapted structured interview and questionnaire survey to verify the proposed project characteristics. In the interview, stakeholders of construction sector were invited to participate in the structured interview, namely contractor, client and consultant. Eleven respondents were asked to suggest the key characteristics to distinguish a construction project with 'outstanding' safety performance and a construction project with 'ordinary' safety performance project. A series of interviews were conducted in between 1 May to 30 June 2015. All respondents were registered safety officer and registered safety auditors by profession. They all engaged in sizeable companies with more than 500 employees in a single working day and equipped with at least 8 year working experiences in Hong Kong construction projects. Their viewpoints were expected to supplement the literature findings. Coding the findings from the previous literature and a series of interviews, all project characteristics were categorized by their nature. A list of project characteristics was then verified through the questionnaire survey.

For the questionnaire survey, the respondents were asked to indicate their endorsement of the identified project characteristics based on their previous 12 months working experience in the Hong Kong construction sector. There were two sections in the survey, asking about the background information of respondents in the first section and rating the agreement level of project characteristics in the second section of the questionnaire survey. A five-point Likert rating scale was adopted in the second section of the survey, namely '5' as strongly agree; '4' as agree '3' as neutral; '2' as disagree; and '1' as strongly disagree. I To ensure the representativeness of the collected data, the selection criteria for the experts were strict and covered a wide range of scope in terms of their knowledge, availability and willingness (Ameyaw et al., 2016; Chan, Yung, Lam, Tam, & Cheung, 2001). The target respondents of the questionnaire survey were well-experienced experts with professional recognition in construction sector. There were totally eighteen experts, on behalf of key stakeholders, namely client, contractor and consultant groups. All respondents indicated more than 8 years of working experiences as managerial roles or above in construction projects. They have engaged in diverse nature of construction projects which included building works, civil engineering works and repair and maintenance works. A three-round questionnaire survey was conducted in between September 2015 and April 2016. Experts were showed the mean score of each project characteristic after each round of the questionnaire survey. They could adjust the rating of each project characteristics after each round of the survey. The score of each project characteristic was finalised in the third round due to the mutual agreement of

the scores from all participated experts. The final scores of the project characteristics were expected to be the most appropriate and accurate rating (Hallowell & Gambatese, 2009; Yeung, Chan, Chan, & Li, 2007).

Using the software Statistical Product and Service Solutions (SPSS) 24.0, statistical analysis was conducted to analyze the data collected from the questionnaire survey, namely Chi-square test, Kruskal-Wallis test and Kendall's coefficient of concordance. Chi-square was conducted to test consistency of respondents' responses. Kruskal-Wallis test was conducted to check the inter-group responses to see if there are significant differences among respondents from different groups (S. Siegel & Castellan, 1981). Kendall's coefficient of concordance (W) is employed to assess the group agreement of the experts' rankings (S. C. Siegel & Castellan).

RESULTS AND DISCUSSIONS

The findings of interviews were consistent to literatures' findings. There were seven more project characteristics being identified by experts in the structured interviews. The project characteristics indicating safety performance, that supplemented the literatures, included (1) caring of people, (2) adequate rest time for employees, (3) good housekeeping, (4) good site physical conditions, (5) effective control and review of site activities, (6) better protection to transportation and storage of site materials, and (7) good sense of belonging.

The questionnaire survey incorporating all 27 project characteristics including the above-mentioned seven project characteristics. Table 2 shows the results of Kruskal-Wallis test and mean ranks among groups of respondents. All project characteristics, C01-C27, indicated the significant values of Kruskal-Wallis test were larger than 0.05. Thus, there was no evidence established to show the differences among sub-groups for the perceptions of project characteristics showing safety performance. With the consideration of mean rank, the overall rankings indicating by the contractor group were relatively lower than those indicating by client and consultant groups. Client group found C12 effective control and review of site activities and C17 clear safety organization with defined responsibilities and accountabilities as the two most agreed project characteristics that indicating outstanding safety performance. C12 was significant important as one of key project success factors, it indicate that there is a potential linkage of successful project management and outstanding safety management (Sawacha, Naoum, & Fong, 1999). C17 is one of the essential elements of safety management system (Labour Department, 2002). It highlighted that the implementation of safety management system was beneficial to the project performance of construction projects (Yiu, Sze & Chan, 2017). Consultant group found C13 well-functioned communication system and C18 incentives offered for employees' participation as the two agreed project characteristics that indicating outstanding safety performance. C13 was one of the key project success factor for project management, thus it implies the importance of effective communication of site matters for assuring project efficiency and safety performance (Sawacha et al., 1999). C18 was highly depends on the contractual incentives initiated by client and incentives spent by contractors. In general, client and contractor with more commitment on OSH would spend more resources on safety (Yiu, Sze & Chan, 2017).

Table 2. Kruskal-Wallis Test between the Client, Consultant and Contractor Group on Characteristics of construction project with 'outstanding' safety performance

No.	Characteristics of construction project with 'outstanding' safety performance	Mean rank			Significance Level*
		Client	Consultant	Contractor	
C01	Caring of people	11.750	8.500	8.286	.385
C02	Adequate rest time for employees	11.417	8.500	8.571	.518
C03	Good housekeeping	9.500	11.000	8.429	.445
C04	Good site physical conditions	8.167	11.300	9.357	.526
C05	More support and commitment from senior management	8.500	11.200	9.143	.592
C06	Better logistic arrangement of site materials	11.000	9.300	8.357	.630
C07	Clear understanding of construction work activities	9.667	10.200	8.857	.868
C08	Lower accident rates	8.500	11.800	8.714	.481
C09	Good planning of project execution	9.167	9.100	10.071	.908

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C10	Clear site activities / working sequences	9.583	9.600	9.357	.994
C11	Strong financial performance	11.750	9.200	7.786	.340
C12	Effective control and review of site activities	12.167	8.800	7.714	.216
C13	Well-functioned communication system	9.667	13.400	6.571	.054
C14	Higher education level of workers	9.833	10.000	8.857	.912
C15	Strict operational procedures	9.917	11.600	7.643	.391
C16	Higher teamwork spirits	10.500	10.700	7.786	.474
C17	Clear safety organization with defined responsibilities and accountabilities	13.167	8.100	7.357	.074
C18	Incentives offered for employees' participation	10.250	12.100	7.000	.200
C19	Rigorous enforcement of safety regulations	11.250	10.000	7.643	.429
2C0	Availability of site safety manual	9.333	9.900	9.357	.979
C21	Innovative technology	11.667	9.800	7.429	.324
C22	Project manager with higher safety awareness	10.417	10.600	7.929	.532
C23	Top management of the firm with higher safety awareness	10.417	10.600	7.929	.532
C24	Active participation in OSH activities by employees	9.083	10.500	9.143	.852
C25	Better protection to transportation and storage of site materials	8.917	8.800	10.500	.798
C26	Good sense of belonging	10.833	9.300	8.500	.681
C27	Better safety culture	10.500	9.600	8.571	.743
	*less than 0.05 which indicates significant statistical differences				

Table 3 also indicates the ranking of experts' agreement of project characteristics that showing the outstanding safety performance. Seeing that there are more than 7 project characteristics in this questionnaire survey, chi-square was also used to test the consistency of respondents' responses. The experts' rankings were consistent for each group and all experts in the questionnaire survey. The most agreed project characteristics were C03 good housekeeping, C05 more support and commitment from senior management, C07 clear understanding of construction work activities, and C09 good planning of project execution. These project characteristics were considered as observed in construction projects with outstanding safety performance. C03 was physical conditions that observed in construction project. Housekeeping was found important in accident prevention (Labour Department, 2017). C5 indicated that senior commitment and support were important because it facilitate the resources allocation and thus project management. C5 was also considered as critical success factors for implementation of safety management system. C7 was mostly likely related to the competency profiles of the project teams. No matters the role of project team members, understanding of construction sequences could be beneficial to the overall project management. Certainly, project manager was expected to have strong academic background in construction management while safety practitioner was expected to have relevant working experiences in construction sequences. Client ranked C09 as less important project characteristics when comparing with consultant and contractor groups. This significant difference might be caused by the different roles ambiguity. The on-site project management was mostly replied on the contractor and consultant, so contractor and consultant expressed a higher importance on good project planning and execution.

Table 3. Ranking of Perceived Benefits of Implementing SMS among Client, Consultant and Contractor Groups

No.	Results on Characteristics of construction project with 'outstanding' safety performance	All respondents		Client group		Consultant group		Contractor group	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
C03	Good housekeeping	4.83	1	4.83	1	5	1	4.71	1
C05	More support and commitment from	4.61	2	4.50	5	4.8	2	4.57	3

	senior management								
C09	Good planning of project execution	4.61	2	4.50	5	4.6	5	4.71	1
C07	Clear understanding of construction work activities	4.61	2	4.67	3	4.6	5	4.57	3
C04	Good site physical conditions	4.56	5	4.33	13	4.8	2	4.57	3
C10	Clear site activities / working sequences	4.56	5	4.50	5	4.6	5	4.57	3
C22	Project manager with higher safety awareness	4.44	7	4.50	5	4.6	5	4.29	7
C23	Top management of the firm with higher safety awareness	4.44	7	4.50	5	4.6	5	4.29	7
C27	Better safety culture	4.39	9	4.50	5	4.4	10	4.29	7
C17	Clear safety organization with defined responsibilities and accountabilities	4.33	10	4.83	1	4.2	13	4.00	11
C12	Effective control and review of site activities	4.33	10	4.67	3	4.2	13	4.14	10
C13	Well-functioned communication system	4.28	12	4.33	13	4.8	2	3.86	17

Table 3. Ranking of Perceived Benefits of Implementing SMS among Client, Consultant and Contractor Groups (continued)

No.	Results on Characteristics of construction project with 'outstanding' safety performance	All respondents		Client group		Consultant group		Contractor group	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
C16	Higher teamwork spirits	4.22	13	4.33	13	4.4	10	4.00	11
C06	Better logistic arrangement of site materials	4.22	13	4.50	5	4.2	13	4.00	11
C01	Caring of people	4.06	15	4.50	5	3.6	22	4.00	11
C24	Active participation in OSH activities by employees	4.06	15	4.00	20	4.2	13	4.00	11
C18	Incentives offered for employees' participation	3.94	17	4.00	20	4.4	10	3.57	20
C19	Rigorous enforcement of safety regulations	3.89	18	4.17	16	4	18	3.57	20
C26	Good sense of belonging	3.89	18	4.17	16	3.8	19	3.71	18
C11	Strong financial performance	3.83	20	4.17	16	3.8	19	3.57	20
C15	Strict operational procedures	3.83	20	3.83	23	4.2	13	3.57	20
C02	Adequate rest time for employees	3.78	22	4.17	16	3.4	26	3.71	18
C25	Better protection to transportation and storage of site materials	3.72	23	3.50	24	3.6	22	4.00	11
C08	Lower accident rates	3.61	24	3.50	24	3.8	19	3.57	20
C21	Innovative technology	3.56	25	4.00	20	3.6	22	3.14	27
C14	Higher education level of workers	3.44	26	3.50	24	3.6	22	3.29	25
C20	Availability of site safety manual	3.28	27	3.17	27	3.4	26	3.29	25
	Number of samples *(N)*	18		6		5		7	
	Kendall's coefficient of concordance (*W*)	0.295		0.256		0.389		0.412	

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Chi-Square	138.143	40.008	50.593	75.044
Degrees of freedom (*df*)	26	26	26	26
Level of significance (*p*)	<0.001	0.039	0.003	<0.001

5. CONCLUSIONS

Construction safety is considered to important practically in project management. This study was established a potential linkage between the project characteristics and safety performance of construction projects from the viewpoints of well-experienced construction practitioners. There were 11 experts and 18 experts participated in the structured interview and questionnaire survey respectively. In addition to the 20 project characteristics found in the previous literatures, there were seven more project characteristics being supplemented by the experts during interviews. The identified project characteristics were then verified by the experts through the questionnaire survey in three rounds. The most agreed project characteristics were C03 good housekeeping, C05 more support and commitment from senior management, C07 clear understanding of construction work activities, and C09 good planning of project execution. These project characteristics were considered as observed in construction projects with outstanding safety performance. The results indicated that the close relationship between the project management and safety performance of construction projects. The implementation of site safety management practices could also facilitate the performance of project efficiency in a long run.

ACKNOWLEDGEMENTS

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Land Use Change Impact on Flood Reduction Capacity of Lake Sentani, Jayapura

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Abstract:-- **Flood is a natural phenomenon that occurs in certain places due to natural causes and human activities. However, the imbalance in hydrological cycle will cause the flood to do damage, both materially and non-materially. Therefore, it is important to control the occurrence and magnitude. Human activities that can cause such imbalance, one of them, is land use change. Many areas of pervious area are shifting into impervious areas, which will increase the amount of surface runoff generated. This research will cover about how land use changes over the year can influence the surface runoff generated in a certain area. This research is conducted in Sentani watershed, Jayapura, Papua, Indonesia. Calculation with the aid of ArcMap 10.1 and WinTR-20 results in around 6% changes in flood discharge in the outlet for land use in year 2007, 2010, 2012, and 2016. The reservoir capacity in reducing flood discharge is also increasing over the years.**

KEYWORDS: Flood, Lake Sentani, Land use change, SCS-CN model

I. INTRODUCTION

Flood is a natural phenomenon that occurs in certain places. It is caused both by natural forces and human activities. By natural forces, flood can occur due to heavy rain in such short amount of time. Aside from natural causes, flood can also be caused by the expansion of human activities. One of the example is the change of land use due to the increment of human activities. Such cause may directly cause shifting in land cover from pervious cover to impervious cover in order to fulfill the rapidly growing demands of human activities. This phenomenon can happen everywhere, not only in urban areas but also suburban and rural areas can suffer from it too. flood occurs when a river bursts its banks and the water spills onto the floodplain. Flooding tends to be caused by heavy rain: the faster the rainwater reaches the river channel, the more likely it is to flood. The nature of the landscape around a river will influence how quickly rainwater reaches the channel [1] (River Flooding and Management Issues, n.d.).

Flood certainly brings damage both material-wise and non-material-wise. In material aspects, there are damages which sum up to hundreds of billion rupiah, depending on the location and density of the area. The denser and more important the flood location, the damage will also be more latent. As for the nonmaterial-wise, one of the example is casualties in the form of human lives caused by flood. This depends also on location and density in the area. One of the causes in imbalance in hydrologic cycle is changes in land use. Over the year, along with the rapid development of human activities, they will demand more area to hold activities, hence changes in land use. The main point of this change is how previously pervious area are shifting into impervious area, which obviously will affect how the area reacts to the same rainfall event.

Sentani watershed has gone through land use change as the years go by. According from the land use distribution data in Sentani watershed throughout the years, there is an increment of 5.35% from 2007 to 2010, and 5.08% from 2010 to 2012. This is mainly caused by the development of human activities that are centered in the surrounding area. Lately, Sentani Lake also suffers from shallowing due to land erosion, considering that the slope between Cyclops Ridge and Sentani Lake is quite steep. Aside from that, the activities in the catchment area which triggers land use change also increase critical land potential within the watershed.Along with land use change phenomenon, it is certain that there will also be changes in terms of rainfall runoff pattern occurred in the watershed. The problem with pervious cover area turning into impervious cover area possess great threat, that is the increment of surface runoff volume.This research will find out about the impact of land use change to surface runoff pattern in Sentani watershed, which has 14 sub-watersheds. This paper will also discuss about the effectivity of Sentani Lake in flood reduction.

II. STUDY AREA DESCRIPTION

This research revolves around Sentani Lake, Jayapura. This lake has the watershed, Sentani watershed, which consists of 14 sub-watersheds around it. All of these sub-

watersheds are emptying into Sentani Lake. Sentani Lake's location is surrounded by Cyclops Ridge with extremely steep slope, hence it is to be expected that the lake suffers a lot from sedimentation which makes the lake's depth decrease.

Lake Sentani is one of the lakes located in Jayapura District, Papua. This lake is located between Jayapura City and Jayapura District, with the coordinates of 140o 23' – 140o 50' BT dan 2o 31' – 2o 41' LS. Geographically, Sentani Lake is surrounded with East Sentani district, Sentani district, West Sentani district, Kemtuk district, Kemtuk Gresi district, Abepura district, and Jayapura city.

Fig. 1. Sentani lake

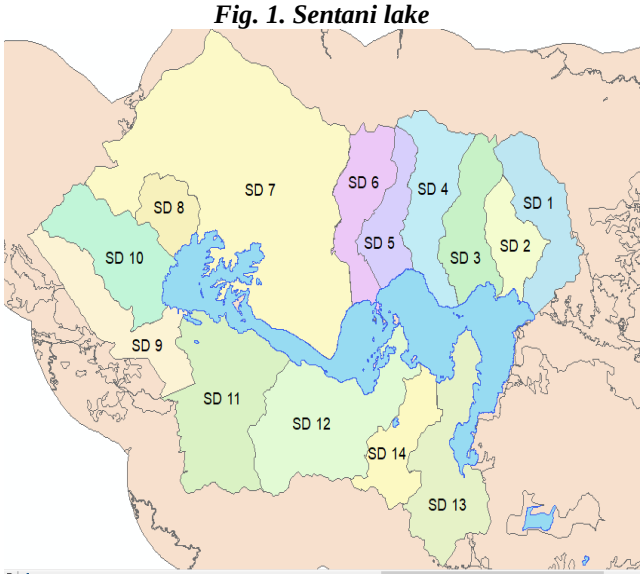

Fig. 2. Sub-watershed of Sentani watershed

Last year in 2013, Lake Sentani water level increase of 1 - 2 m caused the inundation area around Lake Sentani. The puddle has resulted in billions of rupiah losses as reported by the tempo Wednesday, March 27, 2013. The phenomenon of rising water levels according to Tempo, quoting from Papua Governor Constant Karma, is one of the reasons that exist around Lake Sentani. lake as high as less as 2 m Said phenomenon is known as groundwater flood (Levi, 2013). [2]

Another analysis states that in Sentani watershed especially on Lake Sentani, water level increase is caused by high rainfall, the rate of erosion and slope of the Sentani basin is greater than 5%. These conditions lead to erosion and sedimentation that impact on the rise of waterfront Sentani lake [3].

Another analysis suggests that increasing critical land and high rainfall intensity in the upper reaches of Lake Sentani can lead to an increase in lake water levels, as upstream rainfall runoff will enter as an inflow on Lake Sentani [4].

III. BASIC CONCEPTS

The amount of water in Earth will relatively be the same from time to time. This is because the amount of water is going through a natural cycle called hydrologic cycle [5]. To put it simply, the heat transfer from sun and other climate factors will cause water to evaporate into the atmosphere. Evaporation occurs not only in water body, but also from plants' transpiration. This evaporation will result in condensation in the atmosphere when the temperature is cold enough. The result of this condensation is precipitation in other parts of the earth, if the resulting condensation is brought to other parts of the earth by wind. The result of precipitation will also go through several alternatives of process. Some will be retained by vegetation and absorbed, some will infiltrate into soil layer and the rest will produce surface runoff. The infiltrated water will also have two options, either the water will be percolated into deeper layer of rock soil or forming groundwater layer.

All the water going through hydrologic process will eventually be flowing back into water bodies, in which the cycle will start all over again. This process happens continuously.

Although the cycle is balanced by default, disturbances from external factors will overthrow the balance. One of the resulting phenomenon from hydrologic cycle imbalance is flood.

One of the methods used to calculate flood discharge is SCS-CN method. Although there are many other methods to calculate flood discharge, it depends on the study area and circumstances. In this research, SCS-CN method is used. This method was developed by USDA Soil Conservation Service, which is basically a hydrological model to estimate the amount of flood by adopting watershed characteristics. This method estimates the

volume of flood based on land cover type, humidity of the soil based on preceeding rainfall of five days in the area, and soil type [6]. The equation for SCS-CN model according to rainfall height calculation [7] is as follows:

$$Q = \frac{(P - I_a)^2}{((P - I_a) + S)} \qquad for\ P > 0.2\ S \tag{1}$$

$$Q = 0 \qquad for\ P > 0.2\ S \tag{2}$$

Where:

Q : Discharge (cms)
P : Rainfall accumulation (mm)
S : Maximum reservoir capacity after runoff occurrence (mm)
I_a : Initial abstraction (mm), can be predicted with empirical formula ($I_a = 0.2\ S$)

WinTR-20 is a hydrological modelling tools developed by United States Department of Agriculture. WinTR-20 uses SCS-CN method-based calculation. This model is a storm event surface water hydrologic model applied at a watershed scale. This model assists in the hydrologic evaluation of flood events for use in the analysis of water resource projects (USDA, 2015) [8]. Based on this, this program can also model several changes or design alternatives and the impact within the watershed.

IV. METHODOLOGY

In order to acquire each sub-watershed properties, such as land cover, slope, and area, a geographical-based software is needed. In this case, ArcMap v10.1. This program which was developed by ESRI is used to determine the geographical properties of the watershed.

After the collection stage of geographical properties of the watershed, a further analysis is needed. For the rainfall input, data from rain gage stations are gathered. There are three rain gage stations which has influence on the watershed: Genyem, Sentani, and Jayapura. All three of them each has different (USDA, 2015)percentage of impact on Sentani watershed.

Combining both geographical information of the watershed and rainfall data requires yet another software. WinTR-20 is a rainfall-runoff simulation model. It is meant to perform a hydrological model in a watershed with the area of minimum 0.1 acre or minimum time of concentration (Tc) of 0.6 minute [8]. WinTR-20 adapts the calculation method of SCS-CN (Soil Conservation Service – Curve Number).
The complete steps for this research is explained in the following flowchart.

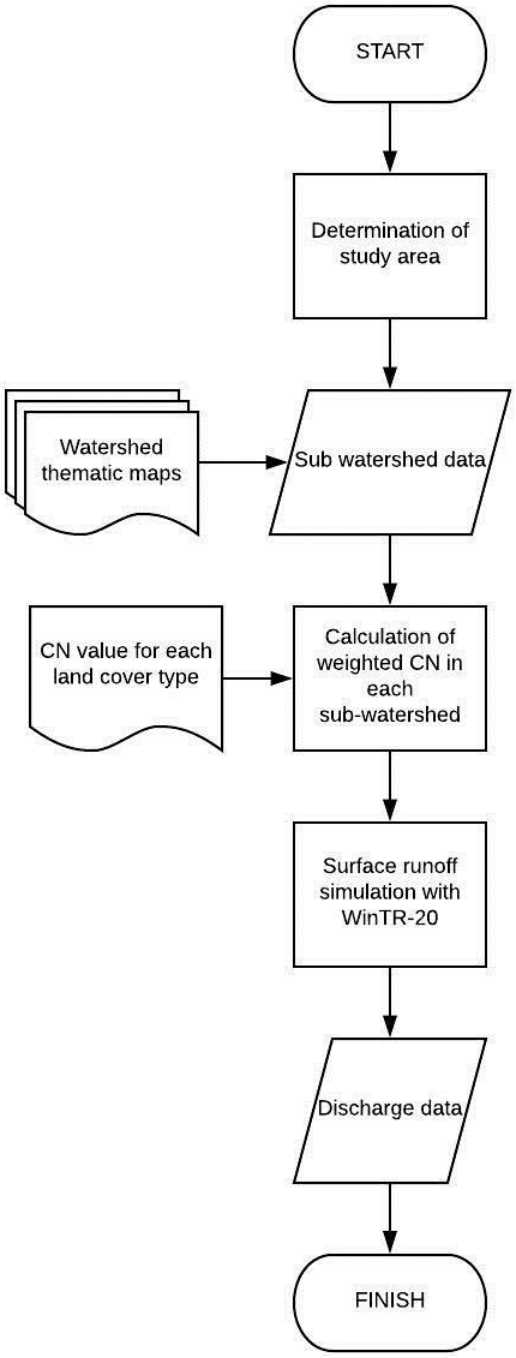

Fig. 3. Research flowchart

V. RESULTS AND DISCUSSIONS

The first step of this research is to determine how changes in land cover composition over the year can affect the amount of runoff produced by a certain rain event. The rain event will be determined as hypothetical data taken from one of the data in the rain gage stations that affects Sentani

watershed. The rain is considered as uniformly distributed throughout the whole area. Although this may not happen frequently. After determining the rain that will be simulated, the next step is to run the simulations with different landcover for each time.

As for the available data, the land cover data for Sentani watershed is obtained from Balai Wilayah Sungai Papua. There are three years variation of land cover map, which are from year 2007, 2010, and 2012. As for the newest land cover map, the year 2016, it is obtained from Geography Department, Faculty of Mathematics and Natural Science, Universitas Indonesia.

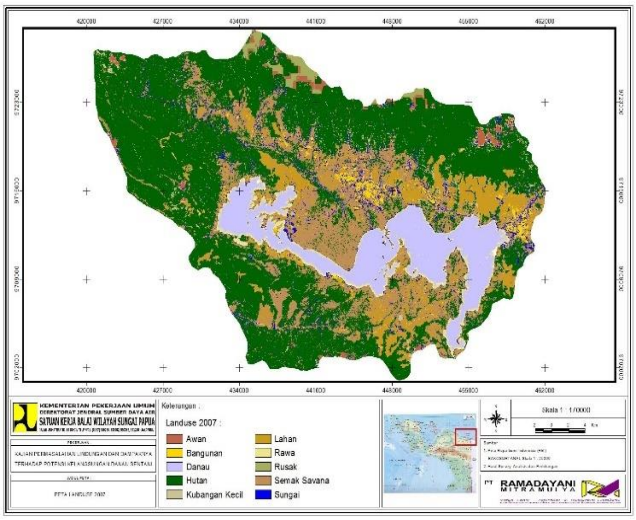

Fig. 4. Sentani watershed land cover in 2007

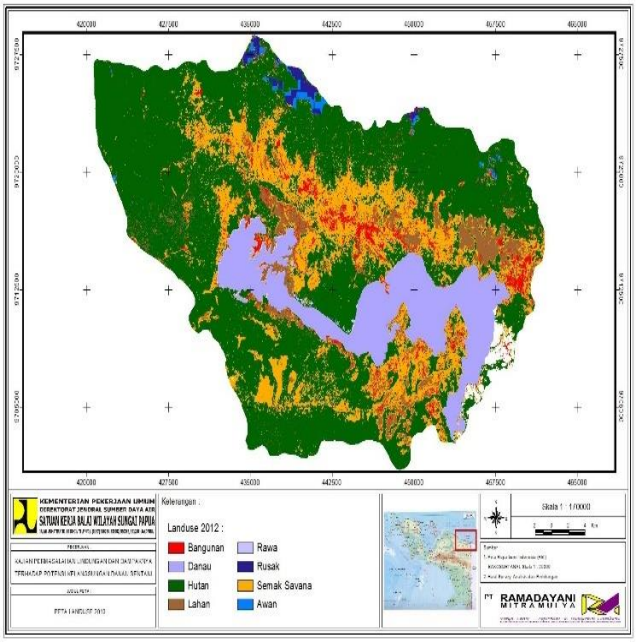

Fig. 5. Sentani watershed land cover in 2010

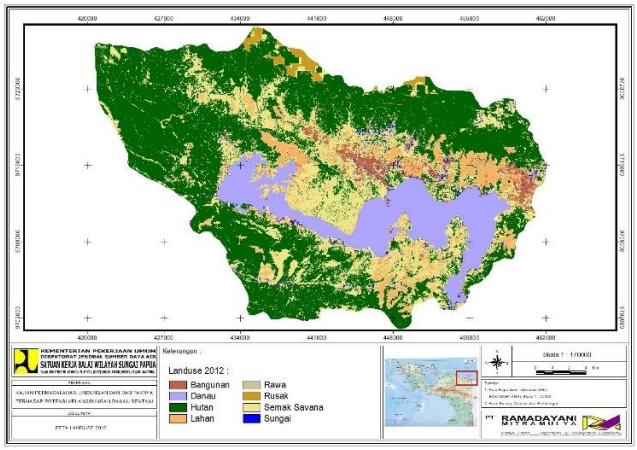

Fig. 6. Sentani watershed land cover in 2012

It can be seen from above that there are several changes in terms of land cover in Sentani watershed. There is a bit of noticeable growth in terms of impervious cover area, which increases about 5.3% from 2007 to 2010, and 5.1% from 2010 to 2012. As the consequences, the forest area is decreasing for about 4.75% from 2007 to 2010, then decreasing yet again to almost 5% in the span of just two years.

In order to determine the amount of surface runoff produced by each sub-watershed, it is of the essential to determine the properties of each sub-watershed first. The table below explains the properties of each sub-watershed, which is assumed to not change throughout the years.

Table I. Sub-watershed properties of Sentani watershed

Sub-watershed	Area (sq km)	Length of main river (m)	Slope	Tc (hour)
Expo	34500	14877.028	0.066	1.507
Tlaga Ria	24380	7769	0.067	0.912
Harapan	18887	9070.911	0.107	0.856
Yakembeng	32553	13061	0.072	1.325
Netar	24809	12243	0.103	1.094
Kuruwaka	23480	12165	0.128	1.004
Yahim	236089	33670	0.042	3.360
DAS 1	17161	5010.262	0.058	0.686
DAS 3	29682	6822.837	0.048	0.941
DAS 2	25545	6281.181	0.072	0.753
DAS 4	64168	14099.335	0.053	1.577
Hendo	40271	5815	0.025	1.060
Belo	23777	6733.888	0.015	1.459
Waisyake	24892	10598	0.014	2.120

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These parameters are assumed to not change throughout the year, therefore they do not change in the WinTR-20 input. The only parameter that changes in the WinTR-20 input is the CN value for each year of simulation.

The changes of CN value in each sub-watershed is determined by two ways. As for 2007, 2010, and 2012 data, the table has already been done by Balai Wilayah Sungai Papua. Although the composition for each type of land cover has been determined, a further calculation is still needed nevertheless. By multiplying the percentage of each land cover type with corresponding CN value, the weighted CN value for each watershed is determined.

All that is left is to determine the land cover composition in 2016 data. This step needs aid from ArcMap 10.1, as the land cover map available for the year is in the format of .shp. After determining each land cover composition for each watershed, the calculation is the same with above. Multiplying each percentage of land cover with its corresponding CN value will produce the weighted value of CN for each watershed.

The result for all calculations regarding CN value is presented in the table below.

Table II. Changes in CN value for each sub-watershed

Sub-watershed	CN 2007	CN 2010	CN 2012	CN - 2016
Expo	54.951	57.639	60.327	52.646
Tlaga Ria	51.494	53.244	54.995	55.603
Harapan	52.497	51.969	51.441	54.924
Yakembeng	51.498	51.429	51.360	52.762
Netar	56.071	57.004	57.936	61.02
Kuruwaka	58.218	58.833	59.447	58.339
Yahim	53.095	53.500	53.904	55.301
DAS 1	51.900	52.065	52.229	52.415
DAS 3	48.557	48.371	48.184	45.867
DAS 2	48.194	49.058	49.921	46.73
DAS 4	51.001	51.308	51.614	49.229
Hendo	52.429	52.799	53.170	54.286
Belo	59.682	60.549	61.417	54.975
Waisyake	56.955	57.384	57.813	57.75

The next step is to simulate the rainfall-runoff simulator using WinTR-20. This program is based on SCS-CN calculation method. It is necessary to determine first the parameters needed to simulate the whole system.
As much as the properties of each sub-watershed is of the essence, physical representative of the system is also as important. This can be described by schematic system of Sentani watershed. To put it simply, the whole schematic is that all sub-watersheds around the lake will meet their outlet in the lake, and then the lake will also have an outlet. Said schematic can be described with the figure below.

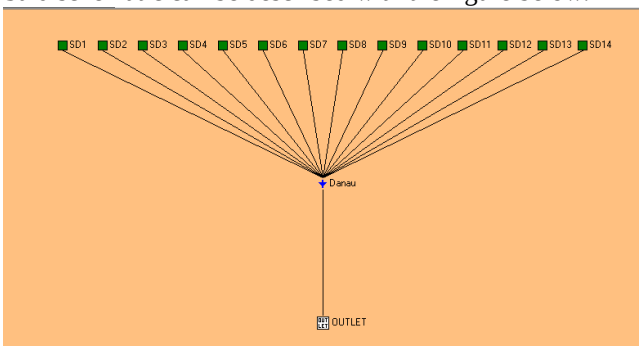

Fig. 7. Schematic system of Sentani watershed

The function of schematic is to determine where the outflow will come and go into and out of the system. Each of the system will be described with smaller system, called sub-watershed. The sub-watershed has their own properties, such as area, slope, CN, and time of concentration. Time of concentration is the time needed for a drop of water to reach the outlet of the sub-watershed all the way from the upstream.
After determining the schematic and giving out properties in each sub-watershed, all that is left to do is to run the system. The program WinTR-20 will produce peak time and peak flow for each sub-watersheds in each scenarios, along with the discharge-time plot.

Table III. Peak time and peak flow simulation results for each sub-watershed in each scenarios

Sub-watershed	CN 2007		CN 2010		CN 2012		CN 2016	
	Peak Time (hour)	Peak Flow (cms)	Peak Time (hour)	Peak Flow (cms)	Peak Time (hour)	Peak Flow (cms)	Peak Time (hour)	Peak Flow (cms)
Expo	13.32	7.11	13.18	12.15	13.15	18.64	13.76	4.14
Tlaga Ria	13.47	2.39	12.97	3.89	12.81	6.24	12.75	7.25
Harapan	13.08	2.48	13.21	2.13	13.44	1.84	12.76	4.87
Yakembeng	13.9	3.01	13.99	2.96	13.99	2.9	13.53	4.15
Netar	12.91	7.55	12.9	9.15	12.81	10.95	12.77	18.21

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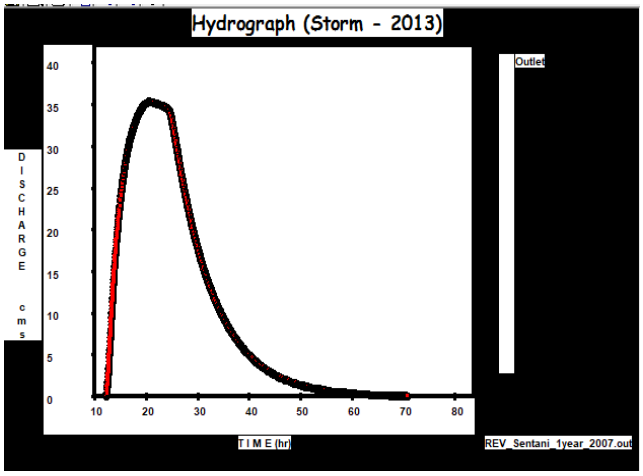
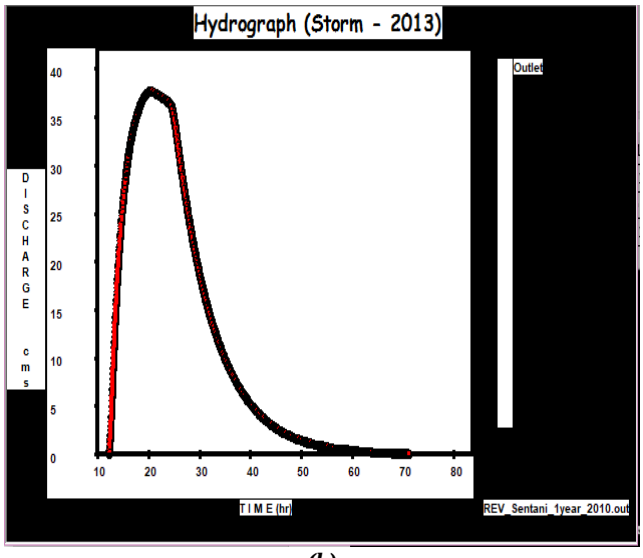
Kuruwaka	12.73	11.46	12.72	12.81	12.71	14.23	12.73	11.72
Yahim	12.76	39.02	12.7	44	12.65	49.56	12.58	73.81
DAS 1	13.01	1.96	12.96	2.07	12.91	2.17	12.86	2.3
DAS 3	15.57	1.29	15.67	1.22	15.73	1.17	18.86	0.63
DAS 2	15.59	1.01	15.25	1.25	13.86	1.63	18.14	0.68
DAS 4	13.94	7.22	14.27	5.46	14.16	5.91	15.8	3.22
Hendo	13.36	4.96	13.21	5.47	13.14	6.03	12.98	8.13
Belo	13.11	11.91	13.1	13.54	13.09	15.32	13.27	5
Waisyake	13.74	6.5	13.73	7	13.72	7.53	13.72	7.45
Danau	13.1	96.14	13.01	109.61	12.91	128.87	12.71	131.17
Outlet	20.56	35.37	20.33	37.71	20.06	41	20.08	39.73



(a)



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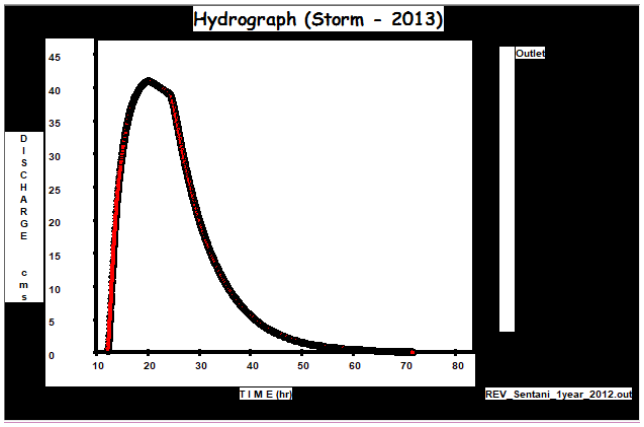

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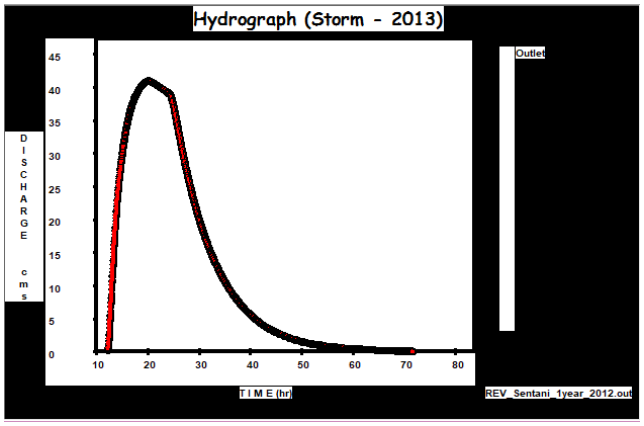

(d)

Fig. 7. Hydrograph produced from each year simulations; results are shown in the outlet. (a) is the simulation result for 2007 land cover composition, (b) is for 2010 land cover composition, (c) is for 2012 land cover composition, and (d) is for 2016 land cover composition.

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As it can be seen from above figures, the differences in between those years are not as distinct that it can be determined with naked eye. According to the calculation, from 2007 to 2010 there is an increment of about 6.616% in terms of outlet discharge, and 8.724% increment from 2010 to 2012, just in the span of two years. As for year 2016, in the past four years, the discharge produced by the simulation shows a declining trend of about 4%, in other words the discharge produced in 2016 is 3.098% lower than the one produced in 2012.

In terms of Sentani's capability to reduce flood, it will also be discussed here. In year 2007, the capability is at 63.21%, it means that Sentani lake acting as a reservoir can reduce up to 63.21% of the surface runoff flowing into the system. In year 2010, the capability is raised by about two percent, which is about 65.60% of total surface runoff. In 2010, the result raises even higher, that is 68.18%, and for the last scenario of year 2016, the effectivity is reaching 69.71%.

CONCLUSION

This paper revolves around the land use change issue and how it affects the hydrological response in an area. It also discusses about the retention capacity of Sentani lake acting as reservoir in terms of flood discharge reduction. The simulation is done over the years, taking year 2007, 2010, 2012, and recent 2016 as samples. The differences in between those years are not as distinct that it can be determined with naked eye. According to the calculation, from 2007 to 2010 there is an increment of about 6.616% in terms of outlet discharge, and 8.724% increment from 2010 to 2012, just in the span of two years. As for the year 2016, the discharge produced by the simulation shows a declining trend of about 4%.

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Rainfall-Runoff Modelling Calibration on the Watershed with Minimum Stream Gage Network Data

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Abstract:-- **The hydrological model has an important role to present the accurate and reliable information for water resources management. In this research, combination of HEC-GeoHMS and HEC-HMS that adopt the SCS-CN model have been chosen to analyse the hydrological characteristic at Upper Ciliwung Watershed. Ciliwung Watershed is one of 13 watersheds that has big influence to flood management in Jakarta. Flooding is the natural hazard that occurs every year at Jakarta. One of important part of flood early warning system at Jakarta is Katulampa Weir that located at Upper Ciliwung watershed. The area of it watershed is about 150 km2 that only has one stream gauge station at Katulampa. Accurate representation of rainfall runoff modelling at this location is important in order to predict the discharge and water infrastructure design. The objective of this paper is to obtain the parameter combination of Upper Ciliwung Watershed which can produce the discharge close to the discharge observation using HEC-HMS. The comparison between HEC-HMS and observation gage at Upper Ciliwung Watershed was calculated by Nash-Sutcliffe Efficiency (NSE) method. Nash value of discharge simulation at Upper Ciliwung Watershed compare with the discharge observation at Katumpa Weir reach up until 0,9.**

KEYWORDS: HEC-GeoHMS,, separated by commas.

I. INTRODUCTION

Hydrological model plays an important role on the discharge forecasting to present the accurate and reliable information for water resources management [1] Hydrological modeling also could simulate the same measured rainfall with varying catchment condition to generate more data. The representation of watershed processes that influenced by complex spatio-temporal hydrological processes can be accommodated by the hydrological modeling [2]. The representation of watershed characteristic on the hydrological model is really important because the hydrological response is affected not only by rainfall but also the complex parameter of watershed [3]. Model calibration is a necessary requirement to obtain the flood prediction from the hydrological model. The availability of rainfall station and discharge gage data are the essential requirement to calibrate the hydrological model. Upper Ciliwung watershed is one of the most important section of Ciliwung watershed. The dendritic shape of Upper Ciliwung watershed may cause the flash flood at Katulampa Weir. Katulampa weir is one of several Jakarta early warning system location during rainy season. In order to predict the surface runoff, many hydrological model was applied at Upper Ciliwung Watershed. In 2016, Murniningsih,et.al.[4] identified the influence of spatial landuse variability at it watershed using WIN TR-20. The other study, assessment of climate and landuse change the impact of flooding at Upper Ciliwung watershed using HEC-HMS give the Nash value 0.6 to 0.8 [5]. Flooding is one of natural hazard that occur every year at Jakarta, the accurate predicting of flood is important to water management. Area of Upper Ciliwung Watershed is about 150 km2 only cover by three (3) rainfall station and one (1) automatic water level recording. In order to provide a better analyze of rainfall-runoff prediction at the outlet, development of approach system is necessary for hydrological models. HEC-GEO HMS (one interface of GIS) is a model that develop used the interface of GIS. This model used to help the user with limited GIS experience, an extension tool in ArcGIS called Hydrologic Engineering Center-GeoHydrologic Modeling System (HEC-GeoHMS) to provide geospatial hydrology modelling. The Objective of this research are to analyze the performance of HEC-GEO HMS in order to represent the watershed properties and to calibrate the performance of HEC-HMS at Upper Ciliwung Watershed using Nash-Sutcliffe Efficiency (NSE) method.

II. RESEARCH METHODOLOGY

A.Case Study Identification

Ciliwung is one out of 13 rivers, which flowing through Jakarta before debouching into the Java Sea, and the most

influential river to Jakarta. The area of Ciliwung Watershed about 400 km2 with the longest river that flows across Bogor, Depok, South Jakarta and East Jakarta about 120 km. Ciliwung watershed is one of critical watershed in Indonesia [6]. Upper Ciliwung watershed, from upstream until Katulampa weir, has a dendritic shape that characterizes the fast increasing flow or we called flash flood. Nevertheless, the downstream part of Ciliwung has elongated and narrowing shape. With this shape characteristic, the Upper Ciliwung Watershed has an important role, as contributor of runoff from the watershed, which is quite large. The boundary of Upper Ciliwung watershed is delineated from Gede Pangrango until Katulampa Weir at Bogor City. The watershed area is around 150 km2 and 25 km long. The Ciliwung Watershed and the discretization of Upper Ciliwung Watershed present at the figure 1.

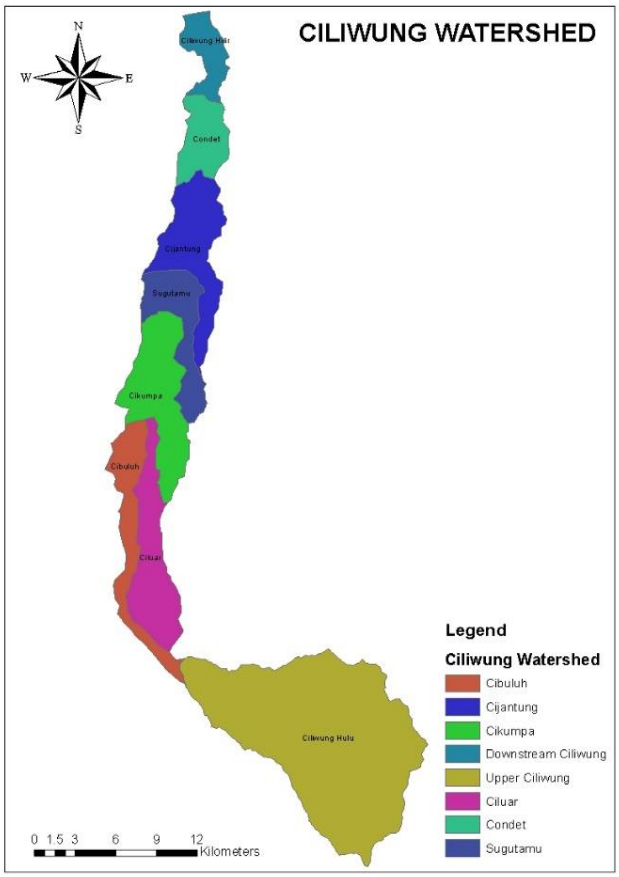

Figure 1. Ciliwung Watershed and Upper Ciliwung Discretization

B. Available Data Set

Daily rainfall data was collected from 3 (three) rainfall station, Gunung Mas, Cilember and Gadog for the past events (15 Feb 2017, 7 March 2017, 13 April 2017 and 5 Feb 2018). Automatic Water Level Recorder (AWLR) as an observation data was obtained from Katulampa Weir station. All collected data supported by Ciliwung Cisadane River Basin Agency. Analysis of land cover at Upper Ciliwung Watershed was used landsat 8 digitation on 2017 over the catchment. CN grid map that represent the land cover at its catchment present at figure 2.

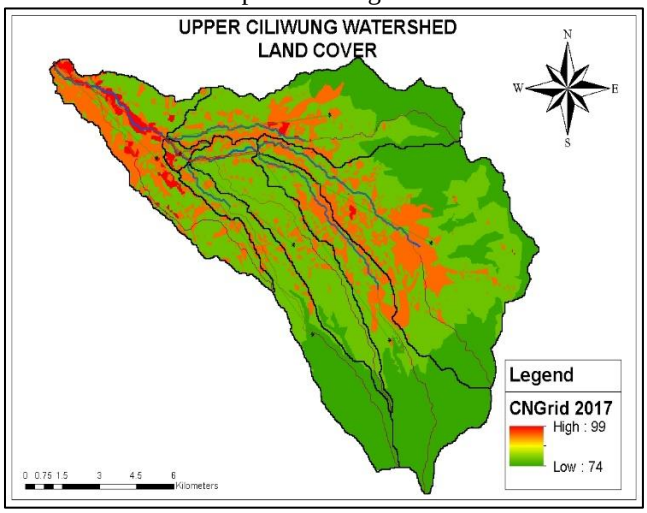

Figure 2. CN Grid at Upper Ciliwung Watershed

C.HEC-GEOHMS

"HEC-GeoHMS has been developed as a geospatial hydrology toolkit for engineers and hydrologists with limited GIS experience."[7]. This tool helps to analyze the digital terrain data, transforming to the drainage paths and watershed boundaries that represents the drainage network. The watershed delineation, and the spatial characteristic of its watershed ware proved by Geographical Information Systems (GIS). The spatial information of watershed characteristic and stream network in GIS is done by the interfaces of Arc-Hydro or HEC-Geo HMS. Schematic of Upper Ciliwung Watershed based on HEC-GeoHMS interface can be seen at the figure 3.

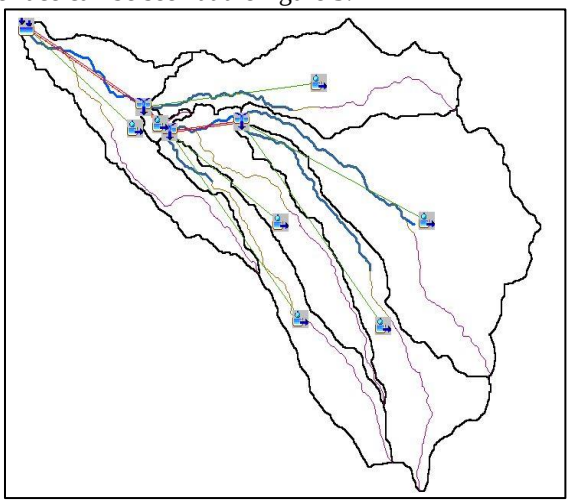

Figure 3. Schematic of Upper Ciliwung Watershed Using HEC-GeoHMS

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D. Hydrological model HMS

The U.S. Army Corps of Engineers is the organization which develop the Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS). This study used HEC-HMS version 4.0by interconnecting with HEC-GeoHMS. The purpose of this software is to simulate the hydrological process in a complete way of watershed system. The combination of meteorological data and watershed characteristic were combine in this model to simulate the hydrological response[8]. The meteorological parameter contains information about rainfall and snowfall. The control model contains information regarding the required simulation time period [7]. Several studies have been approved the performance of HEC-HMS either for gauge or ungauged watershed. HEC-HMS model adopted the Soil Conservation Service - Curve Number (SCS-CN) method for the production function. The representation of hydrological process at the watershed consider by it production function depends on the CN value, the soil characteristic and the 5 day-antecedent rainfall. The formulation of SCS-CN method presents at the equation 1-5[9]:

$$\frac{F_a}{S} = \frac{P_a}{P - I_a} \quad (1)$$

from the continuity principle

$$\boldsymbol{P = P_e + I_a + F_a} \quad (2)$$

$$\boldsymbol{P_e = \frac{(P - I_a)^2}{P - I_a + S}} \text{ Where as } \boldsymbol{I_a = 0.2S} \quad (3)$$

$$\boldsymbol{P_e = \frac{(P - 0.2S)^2}{P + 0.8S}} \quad (4)$$

Where P is the total rainfall, I_a is the initial abstraction, Q is direct runoff and S is the retention capacity of catchment area. Value of S depend on the value of Curve Number (CN) which is around 0 to 100.

$$S = 25.4\left(\frac{1000}{CN} - 10\right) \quad (5)$$

Table 1. Watershed Parameter

grid code	Shape Length (m)	Name	Slope (%)	CN III	CN III	Area (km^2)	S CN II (mm)	S CN III (mm)	Ia CN II (mm)	Ia CN III (mm)	Percent Impervious (%)
1	42780	W80	9.74	74	85.7	20.81	3.57	1.67	0.71	0.33	61.9
2	38220	W90	26.90	64	79.5	25.67	5.72	2.58	1.14	0.52	47.1
3	7920	W100	13.20	74	85.8	1.10	3.50	1.66	0.70	0.33	47.1
4	45780	W110	27.27	64	79.8	48.86	5.63	2.53	1.13	0.51	40
5	38520	W120	19.24	64	79.6	16.28	5.72	2.56	1.14	0.51	37
6	45540	W130	35.58	62	78.3	23.16	6.21	2.77	1.24	0.55	57
7	41160	W140	39.64	60	76.9	16.97	8.87	3.00	1.77	0.60	5

E. Model Simulation and Calibration

Upper Ciliwung watershed was used to calibrate the model. Daily rainfall data for 4 (four) events and land cover in 2017 over the watershed was inserted to the model. First simulation was done by the CN value type II that usually used based on the CN table. Second simulation was considered the 5 days antecedent rainfall condition before the event. Last simulation (Simulation III) was calculated by take into account the 5 days antecedent rainfall, soil abstraction and percent impervious over each sub watershed.

The Nash-Sutcliffe Efficiency (NSE) method was used to define the comparison between relative values of residual variance with the measured data variance [10].

$$E = 1 - \frac{\sum_{i=1}^{n}(O_i - P_i)^2}{\sum_{i=1}^{n}(O_i - \bar{O})^2} \quad (6)$$

It gives indication of how well the observed data versus simulated data fits the linear regression (1:1). The value ranges from-∞ to 1.0. The closer value is to 1, means that the simulation close to the observation value.

III. RESULT AND DISCUSSION

The objective of this step is to verify the coherence of the hydrological model HEC-HMS. For this step, a comparison of the modeled hydrographs and the measured hydrographs at the outlet (Katulampa Weir) of 7 sub-watersheds has been done for 4 events and 3 Simulation.

Using HEC-HMS we can simulate the rainfall-runoff processes in watershed for varied purposes such as water supply scheme, flood forecasting and so on. To develop a hydrological model, we use a project name to identify the project. A project has three models, basin, meteorological, and run control.

More than 30% land cover at Upper Ciliwung watershed is a buildup area (See Figure 2). For computation using HEC-HMS, the Upper Ciliwung watershed is divided into 7 sub-watersheds (Figure 3) by HEC-GeoHMS tools. The distribution of sub-watershed parameter, HEC-HMS input data, can be seen at the table 1.

The meteorological model obtained of 3 rainfall stations represent by Thiessen Polygon for area rainfall. This proses represent the semi distributed method of hydrological modeling.

The result of HEC-HMS model for 4 events present at the figure 4a to 4d bellow.

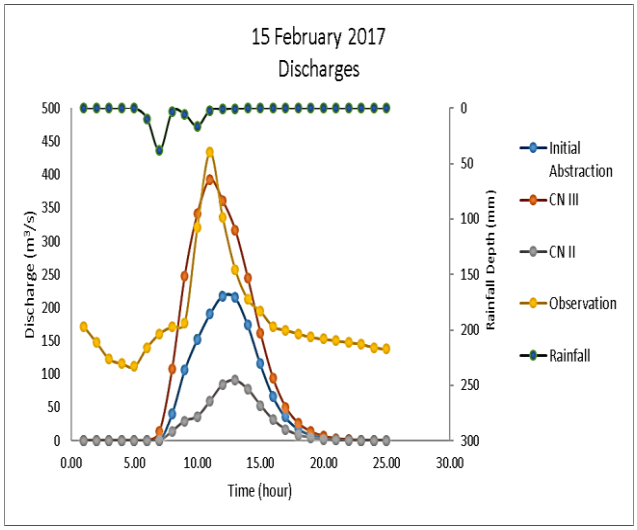

Figure.4a. Simulation and Observation hydrographs at 15 February 2017.

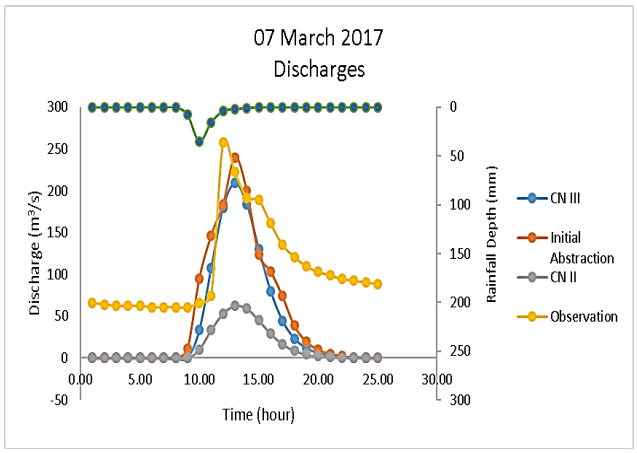

Figure.4b. Simulation and Observation hydrographs at 7 March 2017.

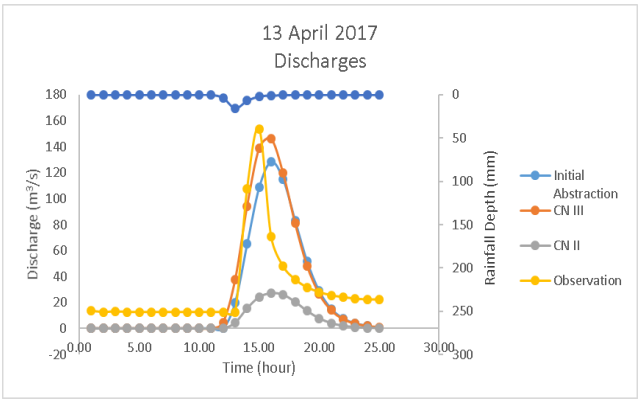

Figure.4c. Simulation and Observation hydrographs at 13 April 2017.

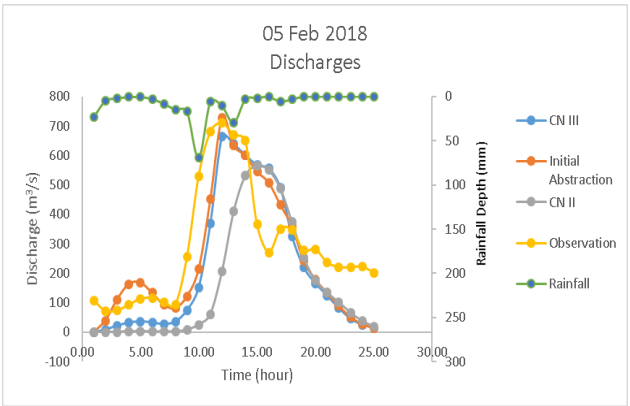

Figure.4d. Simulation and Observation hydrographs at 5 February 2018.

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Table 2. Simulation Result Summary

Events	Simulation (Peak Discharge (m^3/s))			Obs	Nash Coefficient		
	I	II	III	m^3/s	I	II	III
15-Feb-17	90.8	217.7	392.7	433.7	0.375	0.752	0.991
7-Mar-17	62.5	209.6	239.2	257.7	0.426	0.965	0.995
13-Apr-17	27	128.4	146.2	153.6	0.321	0.973	0.998
5-Feb-18	566	664.1	727.5	710.2	0.959	0.996	0.999

The summary result of the three (3) simulations are presented table 2 above. The result shown the magnitude peak discharge between 3 simulations. Furthermore, the simulation III obtain the nearby magnitude of peak discharge and the Nash value close to 1for all events. Its mean that the more optimal result is produced by the model.

CONCLUSIONs

This paper presented the watershed properties at Upper Ciliwung Watershed using HEC-GeoHMS tools in Arc.GIS. The results indicate the good performance of HEC-GeoHMS at Upper Ciliwung watershed for watershed parameter identification. HEC-HMS shown a good performance also for the third simulation that take into account to the rainfall, land cover, soil moisture, and initial abstraction. For that simulation, Nash value are close to 1. The watershed parameter interaction between the rainfall and other spatial watershed characteristic distribution, like soil properties, land cover and initial abstraction will make a better analysis of the watershed response [11].

V. ACKNOWLEDGEMENT

We would like to address our gratitude to Universitas Indonesia for giving financial support through the PITTA 2018 funding scheme number 2423/UN2.R3.1/HKP.05.00/2018. Also thanks to Ministry of Public Work for all supporting data.

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Service Index Modelling of Urban Drainage Network

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***Abstract*:-- This research objective is to develop an index to determine the condition of infrastructure service of urban drainage network based on the technical and non-technical aspect. This index developed by elaborate the variable and indicator which gives the values to each aspect both the technical and non-technical one. The three variables that give the important aspect to the technical aspect namely system capacity, puddle problems and drainage patterns, each indicated by an indicator. Non-technical aspects influenced by five variables are institutional management, legal and regulatory aspects, socio-cultural and economic, public and private roles and flood losses. The research conducts in the Citepus drainage network that has 16 primary channels. Collecting data from the technical aspects is carried out by the direct site visit measurements as well as the secondary data collection. The non-technical aspects use questionnaire as the qualitative data that converted to the quantitative one. Furthermore, an analysis using the GRG-Generalized Reduced Gradient method is used by allowing the non-linier constraints and arbitrary bounds on the variables. The result of this research is "Suprayogi" index model, with regard of the urban drainage index model that is developed using the technical and non-technical aspects involving the variables and indicators affecting the service level of the drainage network. The result shows, for the technical aspect: capacity system has the largest influence with the determinant coefficient of 0.853, followed by the puddle problems (0.127), and the drainage patterns (0.07). For the non-technical aspects: socio-cultural and economic aspect has the greatest influence with the determinant coefficient of 0.47, followed by flood losses (0.604), legal and regulatory aspect (0.306), the institutional management (0.087), the public and private roles (0.0026).**

KEYWORDS: Capacity System, Generalized Reduced Gradient (GRG) Methods, Optimal, Service Index, Technical and Non-Technical Aspect, Urban Drainage.

I. INTRODUCTION

The rapid urban sprawl brings the significant landscape modifications, of which the most pervasive hallmark is considered to be the transformation from the natural lands to the imperviousness [1]-[2]. This alteration leads to the negative hydrologic impacts that result in the enhanced hydraulic efficiency and it can increase the stormwater runoff volumes, the flow rates and the peak flows and the flow-time reductions in the urban catchments [3]-[4]. While the climate change predictions are inherently uncertain, the predictions of the future changes in the precipitation patterns seem fairly robust [5].

The anticipated climate change will increase the extremes precipitation, leading to an increase in the design intensities of at least 20 % [6]-[7]. This poses a challenge to the urban drainage design as the future drainage systems will have to deal with the increased frequency and the volume of the stormwater flows. As a result, the urban drainage capacity needs to be significantly increased in many parts [8], including the case area in Indonesia addressed in this study. However, there are the increased concerns that expanding the underground pipe system is not a sustainable solution for the climate adaptation in the long term or that the attractive alternatives exist [9]-[11].
Due to the global climate change and intensive urban construction, although the increasing efforts have been made in the urban infrastructure construction including the drainage system, the problem of the urban waterlogging is still serious. Therefore, an accurate assessment of the service performance of drainage system and simulation of its operation status have become an urgent problem [12]. To date, there has not been a service assessment system of the urban drainage that can be become as a reference. In addition, there has not been a network service index of the urban drainage too by considering the technical as well as the non-technical indicator that can be become as a reference in determining the priority of the handling as well as the maintenance. However, the condition of drainage network can also influence the water quality in the river [13].

It is unfortunate, remembering that the Indonesian government has made the reference of the irrigation network assessment in the General Work Ministry Rule No 01/PRT/M/2014 which is useful in the development and maintenance of irrigation network although it is not based

on the scientific approach; however, it is based on the agreement. The technical as well as the non-technical aspect has the important role. The both aspects integrate each other to support the water resources management in the future [14].

The technical aspect can be used to show the areas which are not underserved by the drainage network. Dewi et al. [15] has shown the channel capacity analysis in handling flood. However, Mefri [16] has studied the relation between the drainage system damage and the inundation and finding that both of them are very related. The presence of the unsure on the technical aspect (for example: legal and regulatory, society) in determining the index, will show the continuity of an urban drainage network. Andayani and Yuwono [17] try to see the influence of the two aspects without carrying out the detail discussion; however, the assessment is only based on the questionnaire that less can represent the actual condition, so it cannot be applied directly. Even though the research shows that there is the significant relation between the two aspects with the drainage service level.

Based on that description, the objective of this paper are to develop the service index of drainage network in the urban area in order to help the determination of handling and operational priority. The index has will able to represent the technical as well as the non-technical aspect in order to guarantee the integrity and the continuity of a drainage network performance.

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II. MATERIALS AND METHODS

Bandung city topographically is as highland and lowland on the Bandung Watershed with the average slope is around 0-30%. Based on the altitude, the study location is on the highland with the elevation 791 m MSL (Mean Sea Level).

The slope in the Bandung city is divided into two part as follow: 1) the area with the relative steep slope (more than 7%) in the northern; and 2) the area with the flat slope (less than 2%) in the southern side with. Therefore, the drainage flow pattern in the Bandung area is divided into two flow patterns based on the slope condition. Different gab of slope and also the bad condition of operational and maintenance caused the inundation in many area of the case study. Schematic of drainage system and the Discretization of Bandung City catchment area into sub catchment area present in the Figure 1.

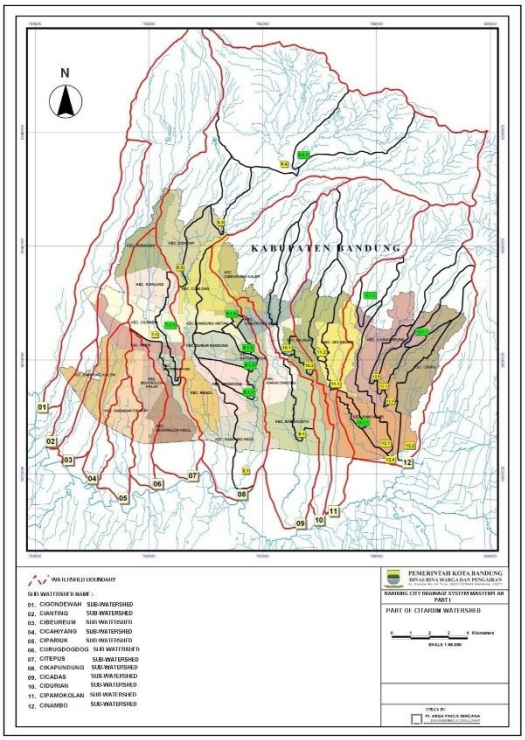

Figure 1. Schematic of Drainage System and Bandung City Discretization

A. The performance assessment of drainage network

Performance of drainage network system is success level of drainage system which has been developed for fulfilling the inundation problem. Based on the masterplan urban drainage network system preparation, the aspects which has to be attended in the design of drainage network system are the technical, operational, and management aspects [18]. Vadlon [19] suggested the assessment component of drainage network physical condition and the weighting value based on the assessment guidance of irrigation network condition which is issued by the Directorate General of Water Resource Management (Jakarta, 1999). The assessment of drainage network physical condition overall is obtained by analyzing the condition of outlet or estuary building (%), complementary building (%), facility building (%), and drainage channel (%) by using the formula as follow [19]:

$$KJD = Kbom + Kbp + Kbf + Ksd \quad (1)$$

Where:

KJD : condition of drainage network (%),
Kbom : condition of outlet/ estuary building (%),
Kbp : condition of complementary building (%),
Kbf : condition of facility building (%)
Ksd : condition of drainage channel (%)

B. The service level Indicator of urban drainage

The service level of urban drainage is a latent variable or a variable that cannot be measured directly (Unobserved variable). Based on the references and experiences, the variable consists of 3 technical dimensions of level-1 to 5 non-technical dimensions which is contributed on the service level of drainage [17]. The three variables (technical aspects) are as follow: 1) the system capacity, 2) the drainage pattern, and 3) the puddle problem. The five variables (non-technical aspects) are as follow: 1) the institutional management, 2) the public and private roles, 3) the aspects of legal and regulatory, 4) socio-cultural and economic, and 5) losses due to the inundation. Then, the three dimensions (technical aspect) and the five dimensions (non-technical aspect) of level-1can be described into the dimension of level-2 and more detail into 26 indicators which can be measured (observed indicator). Furthermore, the indicator is analyzed by using Structural Equation Model (SEM) with the help of Partial Least Square (PLS). The result of simulation model produces the weight factor of every indicator.

C. Technical aspect

The technical aspects are as follow:

1. The system capacity: the assessment is carried out to the condition of water building and the channel in the system. The hydraulic condition will influence the capacity of a drainage system.
2. The puddle problem: the assessment is carried out to the inundation scale that consists of the area or the height and duration. The puddle problem which is happened in the location will give the illustration on the drainage service of a system.
3. The drainage pattern: the assessment is carried out to the flow parameter that influences the hydrograph of drainage system. The flow parameter consists of the land cover and the time of flow.

D. Non-technical aspect

The non-technical aspects are as follow:

1. The institutional management: the presence of active institutional management with supporting by the adequate human resources will give support to the system drainage service.
2. The public and private roles: the public and private roles can follow to play an active role in maintaining and increasing the drainage service by forming the independent forum which can help the legal institution to increase the drainage service.
3. The aspects of legal and regulatory: the presence of law enforcement, the clear rule and it is obeyed, will increase and maintain the drainage service.\
4. Socio-cultural and economic: the socio-cultural condition of Indonesian will have the influence to the drainage service. For example: the garbage problem and the wild house are as the drainage problem which is generally appearing from the socio-cultural and economic factor.
5. Losses due to the inundation: the inundation will give the different losses. It is depended on the location of inundation. The good drainage service will minimize the losses due to the inundation in an area which on turn will give the feedback to the drainage network performance.

III. RESULT AND DISCUSSION

a. Assesment of Technical Criteria

The survey is conducted in the 16 main drainages that located at the Citepus watershed. The survey intends to obtain the value (score) from each variable and index of technical as well as non-technical criteria. The variables of technical criteria are as follow: 1) T1 – the system capacity consists of: $t_{1.1}$ –channel capacity, $t_{1'2}$ –channel age, $t_{1.3}$ – channel condition, $t_{1.4}$ –complementary building condition, $t_{1.5}$ –drainage density, $t_{1.6}$ –land use change rate; 2) T2 –the flow condition consists of: $t_{2.1}$ –time concentration, $t_{2.2}$ – land cover, $t_{2.3}$- drainage system; 3 T3 –the puddle problem consists of: $t_{3.1}$ –inundation area, $t_{3.2}$ –mean depth of inundation, $t_{3.3}$ –mean duration of inundation. However, the technical criteria have 3 sub-criteria which consists of 12 indicators.

The variables of non-technical criteria are as follow: 1) N1 –institutional management consists of: $n_{1.1}$ – organization committee, $n_{1.2}$ –human resources, $n_{1.3}$ – supervisor committee, $n_{1.4}$ –standard operational procedure, $n_{1.5}$ –master plan; 2) N2 –public and private roles consists of: $n_{2.1}$ –society forum which is involved, $n_{2.2}$ –the involving of society and private; 3) N3 –legal and regulatory consists of: $n_{3.1}$ –monitoring to the rule, $n_{3.2}$ –the effort of law enforcement, $n_{3.3}$ –reward to the society; 4) N4 –socio-culture and economy consist of: $n_{4.1}$ –boundary line condition, $n_{4.2}$ –education level, $n_{4.3}$ –operational cost, $n_{4.4}$ –maintenance cost. However, the non-technical criteria have 4 such-criteria which consists of 14 indicators.

Based on the second circle of structural model by using the SEM PARTIAL LEAST SQUARE (PLS), the relation between the technical variables (system capacity, flow pattern, and puddle problem) and the non-technical variables (institutional management, society and private role, legal aspect and regulatory, socio-culture and economy) has the significant influence to the drainage infrastructure service. It can be seen on the inner model number of technical variable is 4.241 and non-technical variable is 2.698. Each variable has the value more than 0.5. Based on the result of the SEM-PARTIAL LEAST SQUARE (PLS), there are 6 variables are almost not influencing the drainage service index such as: 1) technical aspect: $t_{1.2}$ –channel age, $t_{1.4}$ –complementary building condition, $t_{2.3}$ –drainage system, $t_{3.1}$ –area of inundation; 2) non-technical aspect: $n_{4.2}$ –education level, $n_{4.4}$ – maintenance cost. Therefore, the 6 variables are not used in the modelling. The questionnaire result about the selected

variables due to the result of the SEM PARTIAL LEAST SQUARE (PLS) is presented as in Table 1 and 2, each for technical and non-technical aspect.

Table 1. The selected criteria assessment and coefficient value of technical aspect

No.	Name of primary channel	T1				T2		T3		t calc.
		0.853				0.127		0.021		
		t_{11}	t_{13}	t_{15}	t_{16}	t_{21}	t_{22}	t_{32}	t_{33}	
		0.188	0.429	0.493	0.144	0.246	0.190	0.090	0.389	0.73
1	Cipedes hilir	5	3	2	5	1	1	1	3	3.437
2	Sarijadi	5	4	2	5	1	1	5	4	3.819
3	Cibogo	5	4	1	5	1	1	3	4	3.395
4	Citepus	4	3	2	5	1	1	1	4	3.285
5	Supadio	5	4	2	5	1	2	5	4	3.843
6	Cikakak	5	3	2	4	1	1	1	4	3.322
7	Cilimus	5	4	2	4	1	1	1	4	3.688
8	Waringin	4	3	2	4	2	1	5	4	3.200
9	Ciroyom	4	4	2	5	1	1	1	4	3.651
10	Babakan Tarogong	3	4	2	4	3	2	5	5	3.469
11	Arjuna	3	3	2	4	1	2	5	5	3.041
12	Otista	5	2	3	4	2	1	1	4	3.408
13	Leuwisari	3	4	2	4	2	1	5	5	3.414
14	Kurdi	4	3	2	5	2	1	5	5	3.332
15	Muara	4	3	2	5	1	1	5	5	3.300
16	Curug Candung	3	4	2	5	4	1	5	5	3.599

Source: own study

Table 2. The selected criteria assessment and coefficient value of non-technical aspect

No.	Name of primary channel	N1					N2		N3			N4		NT calc.
		0.6046					0.0026		0.0868			0.3060		
		n11	n12	n13	n14	n15	n21	n22	n31	n32	n33	n41	n43	
		0.33	0.29	0.06	0.06	0.26	0.21	0.17	0.16	0.19	0.28	0.34	0.27	0.27
1	Cipedes hilir	3	2	1	1	1	1	1	3	2	1	4	1	1.719
2	Sarijadi	1	1	1	1	1	2	1	1	2	1	4	1	1.116
3	Cibogo	3	2	1	1	1	1	1	3	2	1	5	1	1.825
4	Citepus	3	2	1	1	1	1	1	3	2	1	5	1	1.825
5	Supadio	3	2	1	1	1	1	2	3	2	1	3	2	1.696
6	Cikakak	3	2	1	1	1	1	2	3	2	1	3	2	1.696
7	Cilimus	1	1	1	1	1	1	1	1	2	1	3	2	1.092
8	Waringin	3	2	1	1	1	1	1	1	2	1	3	2	1.668
9	Ciroyom	1	1	1	1	1	1	1	1	2	1	3	1	1.010
10	Babakan Tarogong	2	4	1	1	1	2	1	1	1	4	2	1	1.695
11	Arjuna	3	4	5	5	5	2	2	4	3	1	5	1	2.902
12	Otista	4	2	1	1	3	1	1	4	1	1	5	1	2.340
13	Leuwisari	3	2	1	1	1	1	1	3	2	1	5	1	1.825
14	Kurdi	3	4	5	5	1	2	2	5	5	1	5	1	2.311
15	Muara	3	4	5	5	1	2	2	3	4	1	3	1	2.056
16	Curug Candung	3	2	1	1	1	2	5	4	3	1	3	1	1.647

Source: own study

Explanation:
1) N1 –institutional management consists of: n1.1 –organization committee, n1.2 –human resources, n1.3 –supervisor committee, n1.4 –standard operational procedure, n1.5 –master plan; 2) N2 –public and private roles consists of: n2.1 –society forum which is invilved, n2.2 –the involving of society and private; 3) N3 –legal and regulatory consists of: n3.1 –monitoring to the rule, n3.2 –the effort of law enforcement, n3.3 –reward to the society; 4) N4 –socio-culture and economy consist of: n4.1 –boundary line condition, n4.3 –operational cost.

The formula of technical urban drainage service is as follow:

ILtechnical = a1.T1 + a2.T2 + a3.T3

Where as : ILtechnical = technical urban drainage service, T1 = flow pattern index, T2 = puddle problem index, T3 = system capacity index, an = weight index.

The formula of non-technical urban drainage service is as follow:
ILnon-technical = b1.N1 + b2.N2 + b3.N3 + b4.N4
Where as: ILnon-technical = non-technical urban drainage, N1 = institutional management index, N2 = legal aspect and regulatory index, N3 = socio-cultural and economic index, N4 = society and private role, N5 = losses due to the inundation index. Bn = weight index.
However, based on the data as presented in the Table 1 and 2, the formula of technical and non-technical urban drainage service is as follow:

ILtechnical = 0.853 T1 + 0.127 T2 + 0.021 T3
T1 = 0.188 t11 + 0.429 t13 + 0.493 t15 + 0.144 t16
T2 = 0.246 t21 + 0.190 t22
T3 = 0.090 t32 + 0.389 t33

ILnon-technical = 0.6046 N1 + 0.0026 N2 + 0.0868 N3 + 0.3060 N4
N1 = 0.33 n11 + 0.29 n12 + 0.06 n13 + 0.06 n14 + 0.26 n15
N2 = 0.21 n21 + 0.19 n32 + 0.28 n33
N4 = 0.34 n41 + 0.27 n43

The index value of 16 primary drainage channels for technical and non-technical aspect is as follow:
ILtechnical = 0.853 T1 + 0.127 T2 + 0.021 T3
ILnon-technical = 0.6046 N1 + 0.0026 N2 + 0.0868 N3 + 0.3060 N4
The weight index is analyzed by using the Generalized Reduced Gradient (GRG), the results is as follow:
IL = α ILtechnical + β ILnon-technical
IL = 0.73 ILtechnical + 0.27 ILnon-technical
The comparison of urban drainage service index due to the formula (modelling) and observation is presented as in the Table 3.

Table 3. The comparison of $IL_{modelling}$ and $IL_{observation}$

No	Name of primary channel	$IL_{modelling}$	$ILD_{observation}$	Relative error (%)
1	Cipedes hilir	2.975	3	0.05
2	Sarijadi	3.091	3	0.83
3	Cibogo	2.972	3	0.08
4	Citepus	2.892	3	1.17
5	Supadio	3.265	3	7.01
6	Cikakak	2.884	3	1.34
7	Kopo	2.989	3	0.01
8	Waringin	2.788	3	4.51
9	Ciroyom	2.940	3	0.36
10	Babakan Tarogong	2.991	3	0.01
11	Arjuna	3.003	3	0.00
12	Otista	3.120	3	1.44
13	Leuwisari	2.986	3	0.02
14	Kurdi	3.057	3	0.32
15	Muara	2.965	3	0.12
16	Curug Candung	3.073	3	0.54

Source: own study

The maximum standard relative error in this study is 10%, so the analysis as above can be accepted. The maximum error as presented in the Table 3 is 7.01% (< 10%) such as in the SP Supadio and the minimum error is 0.02% (< 10%) such as in the SP Leuwisari. It indicates that the indicator coefficient of SP Leuwisari is more suitable than SP Supadio.

IV. CONCLUSION

Based on the analysis as above, the conclusion of this study is as follow:
1. The service mean assessment of an urban drainage network due to the technical aspect is as follow: the system capacity is 3.55 (good), the flow pattern is 1.375 (bad), and the puddle problem is 3.844 (good). However, for the non-technical aspect is as follow: the institutional management is 2 (less), the society and private roles is 1 (bad), the legal aspect and regulatory is 1.95 (less), and the socio-culture and economy is 3 (moderate).
2. Based on the analysis by using Partial Least Square (PARTIAL LEAST SQUARE (PLS)), the 8 technical and non-technical variables which consist of 26 indicators is filtered into as follow:
a. The technical aspect: in the beginning has 3 variables which consist of 12 indicators, however, the PARTIAL LEAST SQUARE (PLS) result becomes into 3 variables which consist of 8 indicators as follow: 1) variable-1: system capacity consist of channel capacity, channel condition, drainage density, and land use change rate; 2) Variable-2: flow pattern consist of time concentration and land cover; and 3) variable-3: puddle problem consist of mean depth of inundation and mean duration of inundation.
b. The non-technical aspect: in the beginning has 5 variables which consist of 14 indicators, however, the Partial Least Square (PLS) result become into 4 variables which consist of 10 indicators as follow: 1) variable-1: institutional management consist of organization committee, human resources, supervisor committee, standard operational procedure, and master plan; 2) variable-2: society and private role consist of society forum which is involved, the involving of society and private; 3) variable-3: legal aspect and regulatory consist of monitoring to the rule, the effort of legal ascendance, reward to society; and 4) variable-4: socio-culture and economy consist of boundary line condition and economic activity.
3. Based on the analysis by using the Partial Least Square (PLS), the result of service index modeling of the urban drainage is as follow:
a. ILtechnical = 0.853 T1 + 0.127 T2 + 0.021 T3
T1 = 0.188 t11 + 0.429 t13 + 0.493 t15 + 0.144 t16

T2 = 0.246 t21 + 0.190 t22
T3 = 0.090 t32 + 0.389 t33
b. ILnon-technical = 0.6046 N1 + 0.0026 N2 + 0.0868 N3 + 0.3060 N4
N1 = 0.33 n11 + 0.29 n12 + 0.06 n13 + 0.06 n14 + 0.26 n15
N2 = 0.21 n21 + 0.19 n32 + 0.28 n33
N4 = 0.34 n41 + 0.27 n43
Based on the Generalized Reduced Gradient (GRG), the weight index for the service index modeling of urban drainage is as follow: IL = 0,73*Iteknis + 0,27*Inon-teknis and it can be concluded that the technical as well as non-technical aspect have contribution to the service index of urban drainage.

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Mitigating Risk of Revenue Leakages on the Customer and Vendor side in Ecommerce Sector

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***Abstract*:-- E-commerce is one of the rapidly booming sectors in India today, thanks to the rising internet user base and faster mobile penetration. The E-commerce industry is a complex ecosystem as it involves huge transaction volumes, complex procurement and logistics systems and reliance on new technologies for customer access and payment transactions. This complexity has given rise to frauds and revenue leakages which is impacting the revenue for the ecommerce companies. Hence the major concern facing the Ecommerce sector today is how to mitigate the revenue loss. Very few studies have been done in academic literature in this area hence the objective of this study is to understand the sources of revenue leakage in the ecommerce sector and propose solutions for mitigating these revenue leakages. The study focusses on 2 major areas of revenue leakage viz. Customer side, Vendor side. The proposed revenue assurance model will be helpful to Ecommerce companies for detecting the sources of revenue leakages in the abovementioned areas and plugging the same thereby reducing losses. The study can also be helpful for consulting companies who are in the business of revenue assurance and fraud management for the ecommerce companies.**

KEYWORDS: Ecommerce, Revenue Assurance, Revenue leakages, Customer side, Vendor side.

I. INTRODUCTION

The rapid urban sprawl brings the significant landscape E-commerce is one of the many industries which have observed an exponential growth since its inception. Along with skyrocketing growth rate, the competition in this sector has also become immensely intense. With every new entrant, a new technology comes into the industry and so does the pressure to be on par. The E-commerce ecosystem comes with its own set of complexities and challenges. Owing to the complexity of the organization processes, there is a likelihood that revenue loss occurs due to inefficiency in the execution of conditions agreed upon by customers. It becomes impossible to track such revenue losses due to the massive volume of transactions managed by E-commerce giants. The study of revenue assurance, particularly for E-commerce sector seems to be a daunting task. Many researchers recognized this gap and provided a foundation for fraud management and risk-mitigation. Duh, R. et al (2002) [1] presented a framework for analyzing control in online auction industry while using the control practices of eBay as an illustrative example. The paper covered three classes of risks prevalent in E-commerce – Privacy, Authentication and Denial-of-service attacks. In the article by EY (2016) [2], a detailed view of fraud-risk landscape of an e-commerce marketplace has been discussed. The paper has briefly provided solutions for such frauds by introducing their fraud investigation and Dispute services. The paper by Deloitte (2016) [3] on mitigating risk, has described a fraud-risk landscape of an E-commerce market place. The Ernst and Young (2015) [4] paper on revenue assurance discusses major areas of financial leakages and few revenue assurance strategies to curb them. The KPMG (2016) [5] paper, as a part of its E-commerce –Logistics research has identified challenges and major risk areas which can lead to revenue losses. A study by EKN (2017) [6] has identified some of the financial implications of E-commerce Frauds. Leyde, J. [7] in her book on Ecommerce fraud gives a detailed analysis of E-commerce Frauds like phishing, account takeover, malware etc.

Objective of research: It was observed in the literature review that there was a dearth of literature available in the Ecommerce sector pertaining to sources of revenue leakage and solutions for revenue assurance regarding the same. Hence the objective of this study is to understand the sources of revenue leakage in the ecommerce sector in the areas of customer side and vendor side and propose a conceptual Revenue Assurance model to curtail these revenue leakages in these areas.

II. LITERATURE REVIEW

2.1) Revenue Assurance:

As defined by Gartner IT Glossary [8], revenue assurance is "the application of a process or software solution that

enables a communications service provider (CSP) to accurately capture revenue for all services rendered." As per Deloitte (2017) [9], "Revenue Assurance as a continuous endeavor aims at improving operational efficiency and ensuring that all possible revenue is collected". It helps in minimizing enterprise risk, optimizes operational performance while assuring revenue for services provided and future leakages. As mentioned by Pantigoso P and José B (2016) [10], the term Revenue Assurance, developed in mid-1990s, was coined in prospect to telecommunications companies. The simple idea behind revenue assurance was to "charge the client correctly". There seemed a lot of revenue wastage happening between the defined way and the actual charging of the billing system. Baamann K. (2007) [11] explains the term revenue assurance as a set of different techniques and methodologies used to identify and repair revenue losses thereby improving profits, revenues and cash flow without hampering the actual demand. A revenue assurance project can also increase efficiency by detecting un-billed or mis-billed customers and thereby maintaining revenue as mentioned in the report by Sjölin, M., Damjanovic, I. and Burman. (2010) [12]. Tele Management Forum has defined revenue assurance as a branch, grouped under enterprise risk management along with processes to ensure business continuity, security, fraud, audit and insurance.

2.2 Importance of revenue assurance in the ecommerce sector.

As per the report by IBEF (2017) [13], India happens to be the fastest growing market with respect to Ecommerce sector with an expected growth rate of 44.7% for the years 2016-2020. One of the major reasons for this growth is the rising internet penetration amongst the Indian population. Because of the increase in number of users online, the task of security and fraud management has become very cumbersome. Expanding ecommerce market, higher flow of money online, and increasing online data transactions has raised the stakes of fraud at even higher rate which ultimately leads to revenue loss. Revenue maximization has always been the primary objective of any organization. The growth of the company is directly proportional to the quantum of revenue it converts. The ecommerce players face a different set of problems when it comes to revenue maximization. Absolute dependence on technologies, which keeps on evolving year on year have brought about barrage of gaps which has become the source of revenue leakages. As mentioned in the article by Bishnoi, A. (2017) [14], recent surveys indicate that because of fraud, businesses in North America expect to lose about 0.8% of their total revenue. In India the revenue loss due to frauds is comparatively lower in the range of 4-5%. As per the report of Global Fraud Index 2017 [15], there was an increase of 5.5% in total E-commerce frauds from quarter two of year 2016 to quarter two of year 2017. The same report also indicates that in quarter two of year 2017 alone, account takeover fraud rose by 45 percent, costing retailers $3.3 billion in losses. Businesses have recognized the need to curtail frauds while meeting ends with customers' expectations. As the market evolves, e-commerce companies will be the soft-target of intricate attacks. The attackers might be individuals, or could be a group. The industry competition will further worsen the scenario as new entrants might fight to get market leadership and may also resolve to create frauds for their competition. Hence, we feel there is need to understand in detail the revenue leakage in Ecommerce sector. Following research questions were formulated:

1) What are the sources of revenue leakage in the Ecommerce sector in the areas of customer and vendor side?
2) What is the impact of these revenue leakages on the ecommerce companies?
3) What are the probable solutions to Revenue Leakage in Ecommerce in the abovementioned areas?

III. SOURCES/AREAS OF REVENUE LEAKAGE IN THE ECOMMERCE COMPANIES

This section deals extensively with the sources of revenue leakages in the Ecommerce companies, uses cases, impact of such revenue leakages on the company and probable solutions for mitigating such revenue losses. There may be many sources of revenue leakages as far as ecommerce companies are concerned. This study concentrates on the two major sources of revenue leakage in the following areas: (1) Customer side (2) Vendor side.

3.1. REVENUE LEAKAGE ON CUSTOME SIDE:

This sub section deals with four major sources of revenue leakage on the Customer side, viz Customer Acquisition, Order placement, Returns & Refunds and Payments, use cases, impact of such leakages to the company and probable solutions for resolving the same:

3.1.1: Customer Acquisition:

Use case 1: Poor conversion rates:

Wayfair, a home goods and furnishing merchant, considers customer acquisition over retention. As per Daniel McCarthy and Peter Fader (2018), Wayfair's customer acquisition cost is nearly $69 which is double than its competitor Overstock (online home goods retailer) which spends nearly $38 on customer acquisition. Overstock earns approximately $9 per customer acquired whereas Wayfair incurred a loss of approximately $10 per customer for 2017 Q1. [16].

Impact: As per analysis by McCarthy and Fader (2018), Wayfair loses approximately $10 for every new customer it acquires. The company is considered unprofitable as it lost approximately $200 million in 2016 due to customer

acquisition cost leading to reduced overall company valuation. (Morell Alex, 2017) [17].

Probable Solution: To increase conversion rates, investments in customer retention should be increased with the help of loyalty programs which can increase the number of purchases from existing customers thereby saving expense on acquiring new customers. Loyalty programs is a method of encouraging existing loyal customers to return to shops by offering them personalized incentives like discounts, sample products, cashback etc. (Investopedia, 2018) [18].

Use case 2: Low repeat customer count:
Flipkart and Amazon, e-commerce merchants, spend Rs.845 per transaction as operational cost for which they receive mere Rs.175 net revenue per transaction per month. (Krishna, V. 2017). [19].

Impact: E-commerce giants like Flipkart and Amazon, lost Rs 2,306 crore and Rs 3,572 crore respectively, mostly because of the amount they spend on customer acquisition.
Probable Solution: To reduce the customer acquisition cost and increase count of repeat customers, retargeting method can be used. Retargeting also known as remarketing is a technology which uses cookies to anonymously follow the customers, once they visit the site. This cookie can capture the customer browser data like his searches, his browsing pattern etc. and help the marketer to push specific advertisements to these customers. (ReTargeter, 2018). [20].

3.1.2: Order placement:
Customers today are baffled by the number of choices for a single product category and number of sites offering variety of products. The impulse buying behavior is also very much prevalent in the web environment (Zhang et al, 2016). [21]. This impulse buying behavior of consumers is targeted by catering clustered product selection.

Use Case 1: Shopping cart Abandonment/Order processed in cart but not purchased:
Customers tend to save products in cart assuming this might save time whenever they wish to purchase that product. Customers also do not complete the purchase because of slow/non-dynamic shopping cart button, compulsory registration process, high shipping cost etc. (Corr James, 2015). [22]. According to a Statista, average cart abandonment rate for the year 2006 was 59.8% and it increased to 69.23% in 2017(Statista (2018). [23]
Impact: Companies lost over $4 trillion worth of products abandoned in 2017 and every year companies lose nearly $18 billion of sales because of cart abandonment (Digital Marketing Depot, 2017). [24]
Probable Solution: To reduce shopping cart abandonment, all charges/fees on shipping must be mentioned clearly on the product pages itself as surprise charges during checkouts is considered the major reason for cart abandonment.

Use case 2: Extensive use of expired promotion codes:
An expired promotional code gives same experience as fake code which leads to customer dissatisfaction. Similar customer will have a negative image about the brand from such an instance (Brandversity, 2017). [25]

Impacts: Customers dissatisfied from promo code offered can resort to complaining about the brand on different mediums which might indirectly turn up to loss in sales. Whilst offering a promo code or discount may drive customers to the site, but this kind of tactic indirectly reduces the margins of E-commerce owners. Further this may condition customers to never pay full again (Bustos Linda, 2018). [26]

Probable Solutions: To reduce use of expired promotion codes, an accurate database of coupon codes must be maintained. Creating your own company coupon landing page is another solution. Another solution is to disallow the coupon entry unless they do it through affiliate page or email campaign. Private promo codes can be issued to specific individual customers instead of sharing it with affiliates, on social networks etc. (Bustos Linda, 2018). [26]

3.1.3 Returns and Refunds:
A large margin of revenue loss for E-Commerce companies occurs due to Returns and Refunds. The cost involved in the entire process of returning the product and refunding the product price include delivery cost, seller's commission, payment fees depending on mode of payment etc. Returns and Refunds ensure customer loyalty but on the contrary it misses out Sellers Hygiene. As per Statistics by Invesp, 30% online products are returned as compared to traditional brick-and-mortar stores contributing only 8.89% product returns (Saleh, Khalid, 2018). [27] The cost of returns of delivery pushes the average cost by nearly 50 % because of two-way courier charges which is usually INR35 to 50 higher than forward logistics (Tanwar, P. and Doger, K, 2016). [28].

Use Case 1: Counterfeit product returns:
Customers can resolve to frauds by returning counterfeit products in lieu of original product by falsely claiming it as fake or defective. An Indian fashion retailer encountered such a case when some engineering students from Kanpur claimed for multiple refunds. They would replace original branded clothes with local replicas by simply stitching brand labels and then claim for refund form the retailer (Bansal, V. 2018). [29]

Impact: Such frauds account for 10% of the product returns and only 1% of returned products from customers are Genuine. (Bansal, V. 2018) [29]

Probable solution: Offer longer return deadlines as it would reduce the chances of customer returning the product. Typically, retailers allow returns within the period of 28-30 days of purchase. This creates a pressure on customers to initiate the return but if the return window is increased to 45-90 days customers tend to be attached to the product and would even cancel the return. A longer returning period increases leniency thus lead to fewer returns (Janakiraman, 2012). [30] Artificial intelligence and advanced technologies can be used for example some companies are using machine learning tools to predict user intent and to detect fraudulent /invalid addresses. Some companies are using 3D modelling systems for making size recommendations to customers. (Bansal, V. 2018). [29]

Use Case 2: Customer chargebacks /false claims:
Flipkart was duped by two Engineering students in Kota, Rajasthan for acquiring 152 expensive mobile phones by falsely claiming that they received empty boxes delivered (Livemint Epaper, 2016). [31]

Impact: Flipkart lost Rs.1.05 crore and 152 high-end mobile phones in the fraud case.
Probable Solutions: To reduce chargebacks, involving customers to leave a product review has also been beneficial. Review creates a perception about the product which increases the credibility of the brand. Many times, product reviews from informed customers provides in-depth detail about the product features (Mo Tanveer, 2017). [32]

Use case 3: Used Product Return/Wardrobing:
Customers return the product after using it temporarily even if the item was not defective. The customers claim for a full refund on such used products incurring extra cost of delivery and product maintenance to e-commerce merchants. According to an Amazon seller, the used products /duplicate product returned from customer's cause's major loss to sellers (Amazon Services Sellers Forum, 2015). [33]

Impact: Flipkart estimates a 15-20% product return rate, specifically in fashion category. In online fashion industry, damaged product frauds account up to 10% of total product returns.

Probable solution: To reduce used product returns, e-commerce merchants should invest in AR/VR technology and provide an online trial room experience by 3D virtual assistance. Amazon, went ahead to acquire artificial intelligence (AI) 3-D body scanning startup Body Labs. This approach will create 3-D human body models which shall offer trying on virtual clothes (PYMNTS.com, 2018). [34]

Use case 4: Absence of customer during delivery:
According to a discussion on Amazon Services (Amazon's seller forum), an Amazon seller has complained about extra shipping charges incurred in case of redelivery of product, due to absence of customer at the given location (Amazon Services Sellers Forum 2015). [35]
Impact: For Voonik (an Indian ethnic-wear online store), non-delivered products account nearly 15% of all orders. As per estimates, E-commerce companies pay 40% extra cost for the additional attempt for delivery as the single delivery attempt takes multiple rounds because of absence of customer at the provided delivery address (Livemint Ambre, A., 2016). [36].
Probable Solutions: To reduce returns based on delivery, the concept of lockers can be implemented. E-commerce majors outside India have their own lockers from where users can pick and drop deliveries. These lockers are set up at specific residential areas and corporate parks. The order is gathered at the nearest locker to customer's area and as it is delivered the customer is notified by an OTP.

3.1.4 Payments:
Payment remains the most vulnerable aspect in e-commerce. The economy of e-commerce relies on electronic transactions to charge customers for products and services. Payment methods are divided into 2 as online and offline. Online payments can be made via credit card, debit card, payment gateway, e-wallets, 3rd party payment processors etc. Offline payments are majorly through Cash on Delivery (COD).

Use Case 1: Cash on Delivery (COD):
E-commerce industry in India is highly dependent on Cash-on-Delivery method of payment. According to Statista, Cash-on-Delivery totaled to 57% of all online shopping transactions in 2015. Even after digital movement and demonetization in India, the estimated number has just lowered down to 45% for 2020 (Statista, 2018). [37]

Impact: COD restricts the working capital flow. The cash takes a long time to reach the seller and longer in case of returns/refunds. Further the courier companies charge extra on COD orders. These reasons cumulatively increase expenses and lower down returns (Tanwar, P. and Doger, K, 2016) [28]

Probable solution: To reduce COD based payments, merchants should start capitalizing on orders for high involvement products like electronics, smartphones etc.

This way customer will be encouraged to use digital payment method rather than Cash-on-Delivery.

Use Case 2: Friendly fraud:
Customers claim that they never made a purchase or that they did not receive the product or they received a damaged product. The customer resolves to chargeback request to customer service associate and his request is resolved immediately. The customer keeps the purchased product and even gets a refund for it.

Impact: According to a survey, $6.7 billion revenue was lost in 2016 due to chargebacks out of which 71% losses were due to friendly frauds owing to $4.8 billion for e-commerce industry (Shukairy, A, 2016). [38]

Probable solution: To reduce Friendly Frauds, 3D secure authentication should be enabled.3D secure (3 Domain Server) involves 3 parties (ecommerce merchant, bank of the merchant, card issuers like VISA and MasterCard) during the verification. The buyer creates a password for his card and while making a payment the card is verified at Domain of all the 3 parties involved, hence providing an extra layer of verification and secure payment (Sage Pay 2016). [39]

3.2 REVENUE LEAKAGES ON VENDOR SIDE:

This sub section deals with four major sources of revenue leakage on the vendor side, use cases, impact of such leakages to the company and probable solutions for resolving the same. The four major sources discussed in this section are (a) Delivery/logistics (b) Drop shipping Vendors, (c) Fraudulent vendors (d) Legal constraints.
Use cases, Impact and probable solutions of revenue leakages on vendor side:

3.2.1: Delivery/Logistics:

A major chunk of revenue is lost in the delivery of products by vendors and retailers. The cost of delivering to specific locations may sometimes be even more than the product cost which might go unnoticed and over a long period lead to major revenue losses.

Use case 1: Product intentionally not delivered / misplaced.
Amazon encounters threats from its new sellers. A fraudulent seller would sign up on Amazon seller account using false identity. These sellers create a product listing of high relevance and offer those products for sale. Customer places the order and is promised to receive the product in few weeks. The fraud seller has already received the money and would not deliver the product to customer. In this case Amazon had to pay the refund cost (Mann, S. 2017). [40]

Impact: The merchant bears the cost of refunds in case of fraud sellers as they do not deliver the product but have already received cost of product from the buyer.
Probable Solution: Implement a central system to carry out real-time stock management which ensures maintenance and safety of products.

Use case 2: Delivery of defective/fake products:
E-commerce vendors resort to selling fake or counterfeit products and pose legal issues for merchants. Like Flipkart and its sellers were charged by US based athletic footwear brand Skechers, for selling fake products. This came out after raids on warehouses of sellers in Delhi and Ahmedabad found more than 15000 pairs of fake shoes. Also, Snap deal's authorized vendor was arrested for selling fake HP Cartridges (Mukherjee, S. 2017) [41]
Impact: Fake or defective product create a dent in Brand image of the e-commerce merchant selling the product and the manufacturer.
Probable solution: To guarantee that a reliable vendor is associated with the company, an all-round vendor background check should be done. Any fraudulent activity linked in past to a vendor must not be ignored.

Use case 3: Theft of goods from warehouses:
Inefficient security and product maintenance at warehouses and retailer stores also lead to theft of products causing an unwanted risk and revenue leak. High involvement products are the most vulnerable. Sometimes the theft is attempted by internal employees of the sellers' company (DMS 2015). [42]
Impact: In case of theft of goods from warehouses, e-commerce Company and the seller both bear the losses. This creates an imbalance in inventory if the theft goes unnoticed.
Probable solution: Implement a Blockchain based tracing of goods to ensure right product reaches the customer. Each product is given a tag and is tracked along the delivery process so there is no misplacement of product even by the vendor or the delivery man (Uhlmann, Sacha. 2017). [43] Merchandising audits can be done at regular intervals in the warehouses by using bar codes and other technology (DMS, 2015) [42]

3.2.2 Drop shipping vendors:

Use case: Drop shipping vendors allow retailers to take orders from customers over their website and vendor would directly deliver the product to the customer. These vendors could deliver damaged products to meet the specified delivery time; this might also lead to wrong product delivery. Further, some vendors create legitimate sites and offer 1-2 months free services later as their products are listed they would intentionally deny commission to the retailer (Husak, S. 2014) [44]

Impact: Drop shipping can offer lesser margins. The quality of products may be compromised as owner is not involved in the warehousing and fulfilment of products.
Probable Solution: The best way to reduce expenses on drop shipping vendors is to implement in-house logistics and supply-chain system which will ensure higher margins and higher customer satisfaction.

3.2.3 Fraudulent vendors:
Vendors target festive seasons to earn extra by duping the e-commerce merchants. They resolve to product replacement, falsely raise prices on products and even initiate return on behalf of customer.

Use case 1: Inadequate vendor background check:
Use case: Ramesh Kumar, Bengaluru, fraudulently claimed Rs. 1.5 lakh from Flipkart as a vendor by ordering items at fake addresses and replacing the products with its replicas and later returned the fake product claiming the customers have provided wrong address (The Times of India, 2015) [45].
Impact: Flipkart initially paid the amount claimed by Ramesh to the settle the issue. The Brands image was at stake as its seller was involved in Fraud which compromised on Company Policies. Loss of Rs.1.5 Lakh was noted in this case.
Probable Solutions: To identify fraudulent activities by vendors, conduct surprise checks to evaluate the warehouse conditions and stock maintenance. This kind of physical checks can help in predicting any fraudulent practices by the vendor (Deloitte whitepaper 2016). [46]

3.2.4 Legal constraints:
E-commerce stores must abide by the compliances of area and regions. These constraints sometimes limit the approaches thereby reducing sales turnover.

Use case: UP and Uttarakhand Government in 2015 limited the selling of smartphones over 5000 in value from the E-commerce majors delivering the product from different states (Bailay, R., Sikarwar, D.2015). [47]
Impact: Loss of sales owing to large population in UP and Uttarakhand.
Probable Solution: To reduce hassles of restrictions by government in case of interstate shipments, the e-commerce companies can build their own warehouses and suppliers in such states and fulfil the orders.
1V. Conclusion:
The objective of this study was to understand the sources of revenue leakage in the ecommerce sector and propose a conceptual Revenue Assurance model to curtail these revenue leakages. The study focusses on 2 major areas of revenue leakage viz. Customer side, Vendor side. The paper discusses the use cases of revenue leakages in the abovementioned areas, impact of such leakages to the company and probable solutions for resolving the same.

This study will be beneficial to the Ecommerce companies to identify areas of revenue leakage in their company and how it can be resolved. Secondly it can be beneficial to consulting companies to understand the sources of revenue leakages and fraud management in Ecommerce companies who can be part of their clientele. The paper can also be useful to solution developing companies who are into Artificial intelligence, fraud management solutions etc. to develop solutions to the various revenue leakage problems faced by the Ecommerce companies.

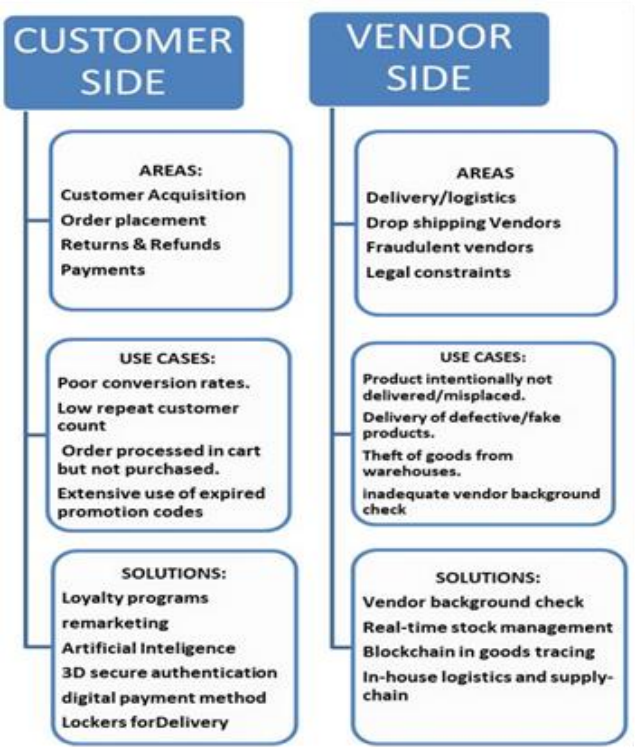

Figure 1: Revenue Assurance Model for the Ecommerce Industry: Sources of revenue leakage Areas of Customer side and Vendor side, Use cases and the probable solutions for the same

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A Novel Approach to Identify the Best Practices of Quality Management in SMEs Based on Critical Success Factors using Interpretive Structural Modeling (ISM)

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***Abstract*:-- In recent years, most small and medium scale enterprises (SMEs) worldwide looking for improvement in their business practices in order to gain competitive advantage and total quality management(TQM) as a means by which SMEs could achieve the desired result. The objective of this study is to discover the critical success factors that are affecting the quality management practices in SMEs. In this work eight factors were identified through the literature review and experts from academic as well as industries. The factors are commitment to quality, employee involvement, customer focus, information technology, improved production planning and control, recognition system, supplier quality management, and management vision and mission. Interpretive structural modeling(ISM) is used to understand the complex relationships among the factors and classify the factors into various categories as per the driving and the dependence capacity. The result shows that information technology (IT) is a key success factor for implementing TQM in SMEs. It is observed that SMEs have to increase the use of IT to improve the quality of the product and productivity.**

KEYWORDS: Total Quality Management, SME, IT, Critical Success Factor

I. INTRODUCTION

In recent years the demand of the small and medium scale enterprises touched to a new height because of the development of technology that makes it easier to connect to the big industries which indirectly increase the amount of contribution towards the economy across the world. According to the latest report of 2017 Indian SMEs contributes around 45% towards the total manufacturing output,40% towards the export, and 8% towards GDP of the country [1].

The effect of globalization changes the perspective of total quality management in such a way that every industry would like implement total quality management to improve the performance across sectors in SMEs as well as in big industries [2]. Indian Cement Industry has shown positive effect because of effective implementation of the TQM [3].

It is important to understand the significance of critical factors of TQM for the success of Indian automobile industries. The failure of TQM practices happens because of deficiency of understanding of the complex relationships among the key factors [4]. The implementation level of TQM in Indian manufacturing industries is low, but the level of awareness is high [5].

Implementation of TQM has shown positive impact on Indian service Industries [6]. ISM is easy to use and widely used approach for most of the complex situation [7]. The structure of the paper is as follows: Section 2 represents the past work related to the factors affecting TQM in a tabular form and Section 3 describes about the methodology.

The Questionnaire survey has been discussed in Section 4 and Section 5 focuses Interpretive Structural Modeling Approach. MICMAC analysis has been carried out in Section 6 and section 7 presents the ISM model. Section 8 and 9 discusses the results of MICMAC analysis and conclusion drawn based on ISM respectively.

II. LITERATURE REVIEW

The critical success factors are identified from the previous literature and presented in Table 1.

Table 1: Critical Success Factors for TQM identified by previous researchers

Critical Success Factors	Authors
Top Management Commitment	Crossby,1979; Deming, 1982; Garvin, 1986; Brown et al., 1994;Siam et al,2012; Siddiqui and Rahman, 2006; Jórgensen, K.B., Nielsen, A.F.(2013)
Employee Involvement	Raiborn and Payne, 1996; Juran and Gryna, 1993; Zhang, 1999
Customer Focus	Ishikawa, 1985; Karuppusami & Gandhinathan, 2006; Saravanan & Rao, 2006; Rahman and Bullock, 2005; Jórgensen, K.B., Nielsen, A.F.(2013)
Information Technology	Pearson et al., 1995; Matta et al., 1998; Ang et al, 2000; Brah and Lim, 2006;Khanam et al 2013
Improved Production Planning and Control	Porter and Parker, 1993; Zhang, 1999; Kanji, 2002; Jórgensen, K.B., Nielsen, A.F.(2013)
Recognition System	Dale and Plunkett, 1990; Brown et al., 1994; Zhang, 1999
Management Vision and Mission	Zhang, 1999 ; Mallur & Hiregoudar, 2010
Supplier Quality Management	Saraph et al., 1989; Flynn et al., 1995; Demirbag, 2006; Turkyilmaz et al., 2010; Jórgensen, K.B., Nielsen, A.F.(2013)

III. METHODOLOGY

The flowchart of the methodology is shown in Figure 1

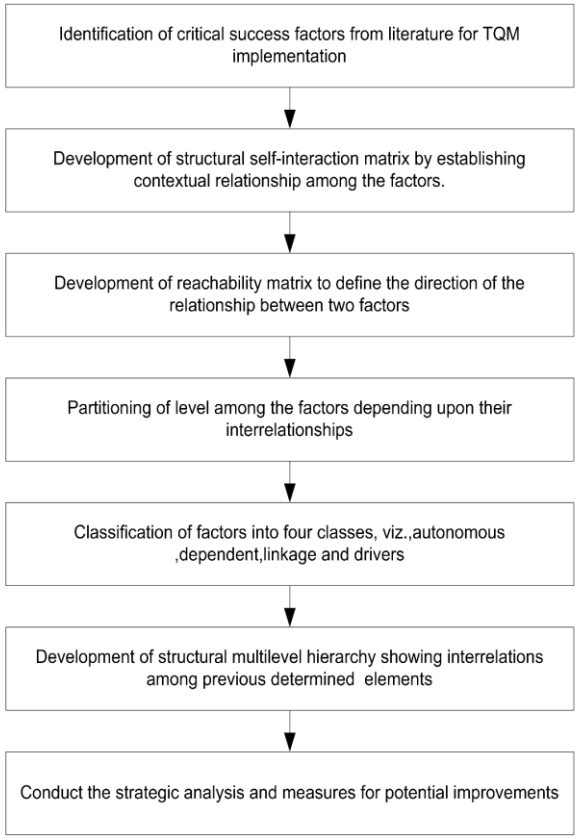

Figure 1: Flow chart of Methodology

IV. QUESTIONNAIRE SURVEY

The analysis of the profiles of the correspondents reveals that 35 selected SMEs from different parts of India participated in the questionnaire survey, those having quality control departments. All the firms belonged to the private sector and mainly from the automobile part manufacturing sector. The characteristics of the manufacturing firms, which are represented by the respondents, are summarized in Figure 2.

Out of all the firms surveyed, 45.71% had a workforce less than 50, 42.86% had a workforce in between 50 and 200 and the remaining 11.43% firms had a workforce of more than 200. Referring to the employees who filled up the questionnaire, 17.14% had a diploma degree, 42.86% held undergraduate degree, and 40% had a post graduate degree to add to their accolade. As far as their industrial experience is concerned, 11.43% had an experience below 3 years, 8.57% had 3-6 year's experience, 17.14% had 6-12 year's experience, 37.14% had 12-18 year's experience and 25.74% had more than 18 years of industrial experience to decorate their arsenal. Talking in terms of the turnover of these SMEs, 34.28% earned revenue of less than 5 crore. per annum, 51.42% earned in between 5 and 50 crores, and 14.28% of the firms had revenue exceeding 50 crores.

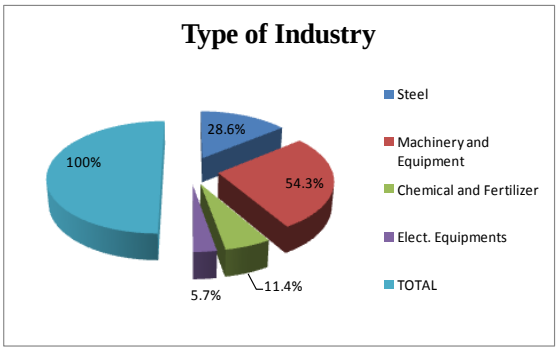

Figure 2: Respondents based on type of Industry

V. ISM APPROACH

Identification of the structure within a complex system is of great value in dealing efficiently and effectively with the system and better decision making. Interpretive structural modelling (ISM) is an approach that can be used in any situation, regardless of its content. A set of elements should be identifiable and an appropriate contextual relation must be established. The set of elements may be measurable in ordinary scale of measurement or even beyond it. So, we can say that ISM is more flexible compared to other modeling approaches that works only on the quantitative data. Hence, ISM extends a qualitative

modeling approach enabling the users to build a structural model to map their thought on an issue after going through a process of taking expert opinion. Eight factors have been identified by early literature review and it is essential to develop a structure of interrelationship among the identified critical success factor using an interpretive structural model. The steps are 1) Structural self-interaction matrix 2) Framing of reachability matrix 3) Drawing out level partitions 4) Classification of factors 5) ISM formation. The MICMAC analysis is done using the diagram shown in the figure 3.

VI. MICMAC ANALYSIS

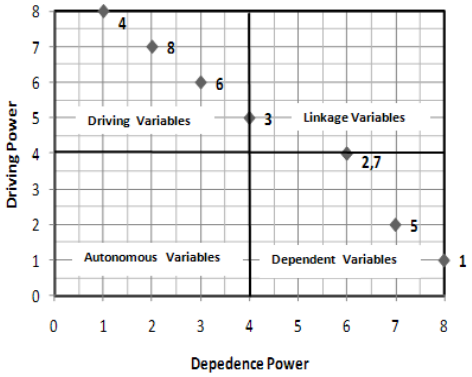

Figure 3: Classification of factors for implementing TQM in SMEs

VII. ISM MODEL FORMATION

The structural relationships among the different CSFs are represented in the Interpretive Structural Modeling shown in the figure 4

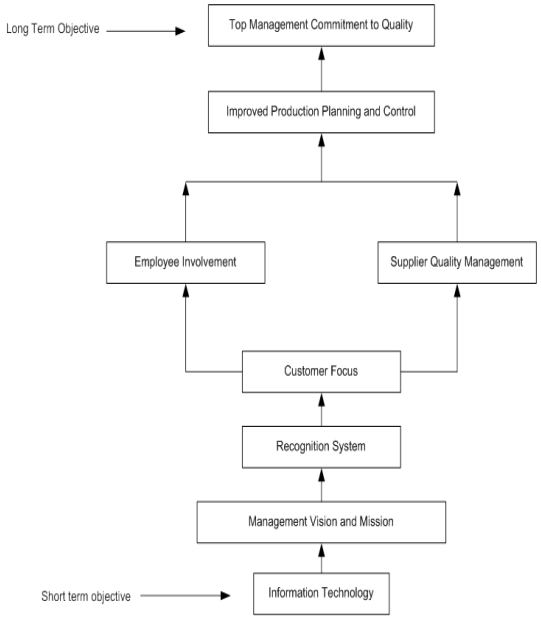

Figure 4: ISM model of factors for implementing TQM in SMEs

VIII. RESULTS AND DISCUSSION

In the present study, eight critical factors have been identified for implementing the TQM in Indian SMEs. The different hierarchy shows the classification and categorization of different critical success factors. The important findings of this research are as follows.1) There is no autonomous variable. Autonomous variables are unfocussed and disconnected from the system due to their weak dependencies and weak driving powers. So, selected eight factors are rightly significant for Indian SMEs.2) There are four factors such as Top Management Commitment to Quality, Improved Production Planning and Control, Employee Involvement, and Supplier Quality Management (figure 3), appear at the top level of the ISM hierarchy (figure 4) come under dependent category as the desired long-term objectives of the Indian SMEs. Out of these factors, Employee Involvement, Supplier Quality Management factors are slightly unbalanced because of its closeness towards the linkage factor and it should be more focused by the managers of Indian SMEs for a better TQM structure. The ISM model shows that Top Management Commitment to Quality and Improved Production Planning and Control depend on the other factors.3) Linkage factors are unstable due to strong driving powers and dependencies. In this paper all the selected eight factors are stable because there are no linkage factors (figure 3).4) In the ISM model (figure 3), four factors such as Information Technology, Management Mission and Vision, Recognition System, and Customer Focus are classified as drivers due to their high driving powers and less dependency and they are appeared at the bottom of the hierarchy. These factors are considered as independent and the key drivers to achieve the organizational objectives. So, the decision makers should emphasize more weightage to information technology, so that it influences Management Mission and Vision and finally persuades other factors.

CONCLUSION

In this research paper a detailed study has been carried out to identify the critical success factors for implementing quality management practices in Small and Medium Enterprises (SMEs). A hierarchical structure has been developed to find out the position of the critical success factors and the complex relationship among them using Interpretive Structural Modeling.

The study will assist the quality managers of SMEs to pay more focus to the above eight critical success factors for implementing TQM to enhance the efficiency and effectiveness of the organization. The research is a systematic approach to visualize the short term and long-

term objective of TQM and it establishes the interdependencies among the selected eight success factors. So, it is a strong road map for the managers of Indian SMEs to know the drivers and dependents from the complex relationship of different factors to move forward the organization in a right path. This research shows that information technology influences management vision and mission to achieve the top management commitment towards quality.

The proposed model has been tested with limited number of factors in the Indian SMEs, which are competitive in nature. In future, more factors can be added to get a better and transparent view of Indian SMEs in implementing TQM.

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Effectivity of Ciawi and Sukamahi Dam on Jakarta Flood Control

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***Abstract*:-- Various infrastructures such as flood levees, dams and reservoirs of flood control began to be developed in the 19th century to the 20th century. These buildings are very effective in controlling the flow of rivers and preventing flood waters from entering residential areas located in flood-prone areas. Flooding in urban areas has a huge impact, covering all aspects of life as well as on the landscape. Ciliwung is one of the rivers that allegedly contributed to the problem of flood in Jakarta, various engineering done on Ciliwung to help control flooding in Jakarta. One of the engineering done is the construction plan of Ciawi Reservoir and Sukamahi Reservoir. In this research, the writer performed the flood calculation using Nakayasu while method of flooding is calculated using the pool routine level method. The effectiveness of these two reservoirs can be determined by simulating floods in the existing condition and comparing them with the flood simulation after the construction of the dam. The final test of this research is to determine the effectiveness level of Ciawi and Sukamahi dam infrastructure in reducing flood volume in Jakarta.**

Keywords: Effectivity, Flood infrastructure, Flood simulation, Pool routing level

I. INTRODUCTION

Jakarta is the capital city of Indonesia, the city is located between 5 ° 19'12 " - 6 ° 23'54 "LS and 106 ° 22'42" - 106 ° 58'18 "East longitude with an average height of approximately 7 ASL (Above the sea level). Jakarta has an area of ± 664 km2 with a population of 9.6 million inhabitants who are in 2.2 million families in 2010[1]. As the administrative, governmental and economic center, Jakarta has developed very rapidly to the surrounding buffer zone. The Ciliwung River is one of 13 rivers that passes through Jakarta and empties into the Java Sea. In addition, this river is a very influential river in Jakarta. Ciliwung has a river length of 120 km, with a watershed area of 400 km2. The Ciliwung watershed is one of the watersheds in Indonesia that falls into the watershed category with critical condition [2]. This is due to the transfer of land function in the upstream area from its initial function is as a catchment area into tourist areas and settlements.

Of the 13 rivers flowing in DKI Jakarta, the Ciliwung River has the greatest impact during the rainy season as it flows across many villages, densely populated housing, and slums. From population statistics of DKI Jakarta, it is known that the people who live on the banks of the River Ciliwung for 350,000 people with the number of buildings as many as 70,000 units. The river is considered a river that suffered the worst damage compared to other rivers in Jakarta and has the potential to cause flooding in Jakarta.

Flood is one of the disaster that almost every year hit Jakarta. The largest floods that occurred in the last decade occurred in 2007. This flood inundated more than 40% of Jakarta City, 80 people died and 340,000 were displaced [3]. Various efforts have been made by the government in flood prevention, both structurally and non-structurally. Structurally flood control systems in the Ciliwung River include the creation of a number of flood gates or flood observation posts. In addition, prevention of flood flooding to certain heights with embankments, as well as lowering the flood water level with normalization, sludge, canal flood, and interconnection. The core concept of the canal flood is the control of water flow from upstream and regulate the volume of water entering Jakarta. In addition, the government is also working to minimize flood discharge with reservoirs, as well as to reduce puddles with polders, pumps and drainage systems.

The main problem in controlling rainfall runoff in urban areas generally consists of the need to control peak discharge and flow depth throughout the system, in order to avoid undesired puddles. Peak discharge is a commonly chosen alternative. These additives have the added benefit of allowing for infiltration and evaporation so that in addition to reducing peak discharge also minimizes runoff volume. Temporary in-situ or pool-like containers as well as a sediment container, can also serve as a means of controlling water quality.

Many studies and flood control efforts have been undertaken to reduce the flood loss occurring in Jakarta.

Ciawi and Sukamahi Dam is one of the infrastructure designed by the government to reduce the peak flood and increase the peak flood time in Jakarta. Dry Dam Ciawi and Sukamahi are the first dry dams built in Indonesia. Dry dams can be used to temporarily withstand excess water during floods and freely deliver during normal conditions [4]. The purpose of this study is to calculate the effectiveness of the construction of Ciawi and Sukamahi reservoirs as one of the infrastructures that will function as one of the means to reduce the flood peak in Jakarta.

II. STUDY AREA DESCRIPTION

Astronomically, the Ciliwung River is located at 6^{O}05'-6^{O}50 'LS and 106^{O}40'-107^{O}00' BT. The Ciliwung River Basin area is limited by the Cisadane River Basin on the west and the Citarum River Basin on the east. From population statistics of DKI Jakarta, it is known that the people who live on the banks of the River Ciliwung for 350,000 people with the number of buildings as many as 70,000 units. The river is considered a river that suffered the worst damage compared to other rivers that flow in Jakarta.

Administratively, the location of the Ciawi Dam is located in the upper part of the Ciliwung River in Ciawi Village, Megamendung Sub-district, Bogor Regency. The Sukamahi Dam is located on the Cisukabirus River in Sukatii Village, Megamendung Sub-district, Bogor Regency. Geographically, Ciawi Dam is located at 106º52'20 "East Longitude, 06º39'28" South Latitude, Sukamahi Dam is located at 106º52'20 "East Longitude, 06º40'12" South Latitude.

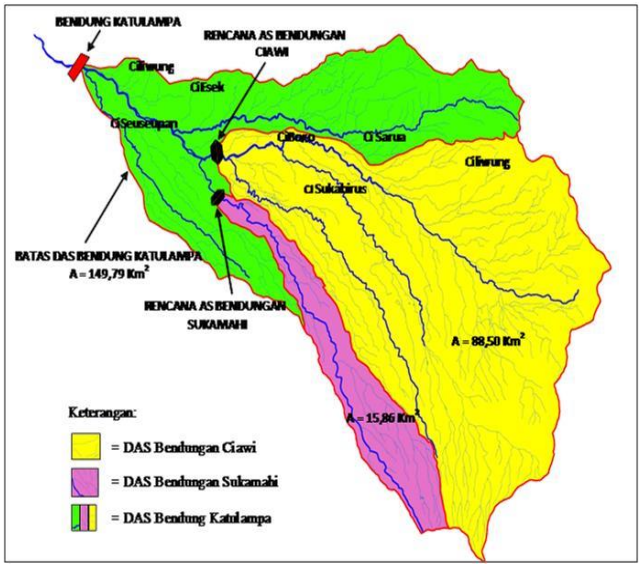

Fig. 1. Watershed division

III.BASIC THEORY

The use of HSS Nakayasu method requires some characteristics of the parameters of the stream region, as follows [5]:

$$R = 1 - (1 - P)^n \quad (1)$$

With P acting as time of peak, time lag, time base of hydrograph, watershed area, or length of longest channel. The formula to Nakayasu unit hydrograph is:

$$Q_p = \frac{C\,.A\,.\,R_0}{3.6\,(0.3T_p + T_{0.3})} \quad (2)$$

With

Q_p : Flood peak discharge (cms)
R_0 : Unit rainfall (mm)
T_p : Peak time (hour), formulated with $t_p = t_g + 0.8\,t_r$
$T_{0.3}$: Time required to reach 30% of peak flow (hour), formulated with $T_{0.3} = \alpha.t_g$
A : Drainage area (km^2)

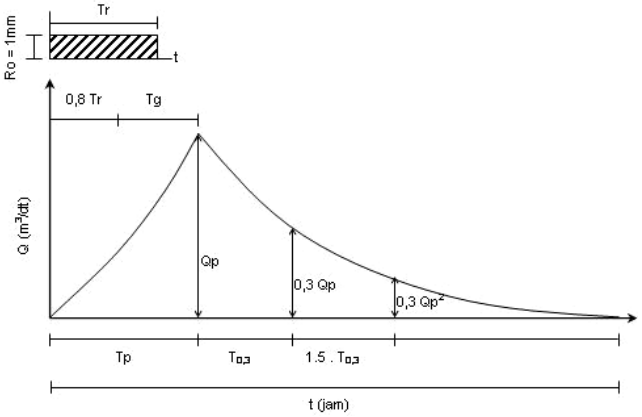

Fig. 2. Nakayasu unit hydrograph

Flood tracking through a reservoir is conducted to determine the effect of the discharge that enters the reservoir at a time against the discharge out through the reservoir at the same time. Water stored in a reservoir is removed through the reservoir through a spill system located on the dam body. The spill system on this dam may use a bottom outlet, a top weir system, or a combination of the two spill systems. Before performing flood tracking, a rating system of the spillway is firstly assessed to determine the relationship between the water level in the reservoir and the outflow through the spill system.

The level pool routing is a procedure for calculating the outflow hydrograph of a flat-faced reservoir, wherein the given inputs are inflow hydrograph and storage-outflow

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characteristics. Based on the following continuity equations [6]:

$$\frac{dS}{dt} = I(t) - Q(t) \quad (3)$$

If the variation of the inflow and outflow at an interval is estimated to be linear, then the change in storage at the interval, Sj + 1 - Sj, can be determined by rewriting the above equation to be:

$$S_{j+t} - S_j = \frac{I_j + I_{j+2}}{2}\Delta t - \frac{Q_j + Q_{j+1}}{2}\Delta t \quad (4)$$

In principle. the calculation used to approach the discharge going through the spill system is to use the principle of conservation of mass. The approximate formula for knowing the flowing discharge in this system at any water level is:

$$Q = C_d \,.\, A \,.\, V \quad (5)$$

Where:

Q : Discharge through bottom outlet (cms)
C_d : Discharge coefficient (0.6)
A : Intake area of bottom outlet (m^2)
V : Water velocity through bottom outlet (m/s)

The overflow system allows water to flow and to melt through the shrubs of a dam or dam. To know the relationship between water level with discharge discharge can be used formula:

$$Q = C_d \,.\, L \,.\, h^{3/2} \quad (6)$$

Where:

Q : Discharge over the weir (cms)
C_d : Discharge coefficient (1.28)
L : Weir width (m)
h : Water height above the weir (m)

IV. METHODOLOGY

As for the methodology used in this research, it will be explained here.
The first step to be done is to gather required data, such as thematic maps, especially that of upper Ciliwung area. The thematic maps should cover land use distribution, digital elevation model, river, and such. These maps are needed to determine the boundary of the watershed.

After determining the boundary, it is necessary to determine the properties of the watershed, such as slope, land use distribution, and area. Another information that should be gathered is the rainfall data from rainfall gages around the watershed which has influences over the watershed area. The combination of those data can produce the proper result for effectiveness calculation of Ciawi and Sukamahi Dam in Ciliwung River.

The complete steps for this research is in the following flowchart:

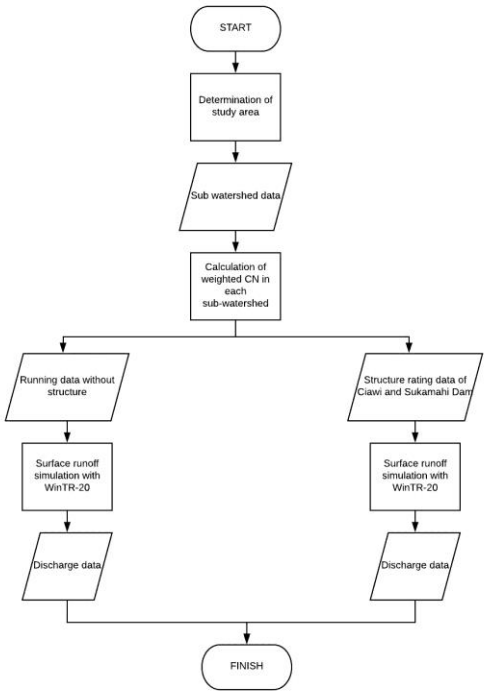

Fig. 3. Research flowchart

V. RESULTS AND DISCUSSIONS

From the results of flood calculations with return period of 100 years at 3 points ie Ciawi dam. as Sukamahi Dam and the water gate of katulampa. The resulting flood discharge on Ciawi Dam for 546.20 cms. Sukamahi Dam 143.22 cms and At Water Gate Katulampa of 734.51 cms.

	Discharge			
	Inflow (cms)	Outflow (cms)	Flood reduction (cms)	Effectivity (%)
Ciawi Dam	546.20	478.56	67.64	12.38
Sukamahi Dam	143.22	117.07	26.15	18.26
Katulampa Weir	734.51	664.32	70.19	9.56

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Hydrographs of flood tracking results at Katulampa gates that can show the effectiveness of the two infrastructures development can be seen in the following graph.

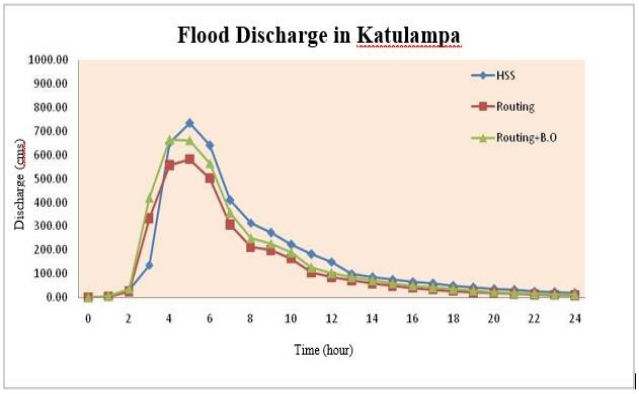

Fig. 4. Flood discharge in Katulampa

The maximum reduction rate of flood intensity that will occur in Jakarta area in Ciliwung watershed is 9%. Based on the terminology theory of Integrated Stormwater Management Plan (ISMP) [7] has been well recognized by local governments as well as by various agencies working in the environment agencies in British Columbia, Canada. ISMP is used as a tool for planning rainwater management and its runoff with a comprehensive and integrated approach as illustrated in the following diagram.

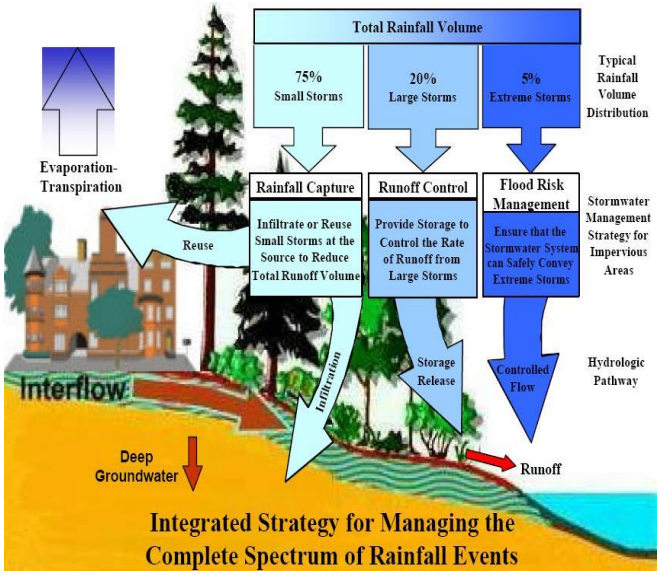

Fig. 5. Integrated strategy of stormwater management

Land development innovation and rainfall management, with catchment area-based ecosystem approach [8] is a new paradigm in rainfall management system that is expected to improve flood mitigation effectiveness. Appropriate as described in the following table:

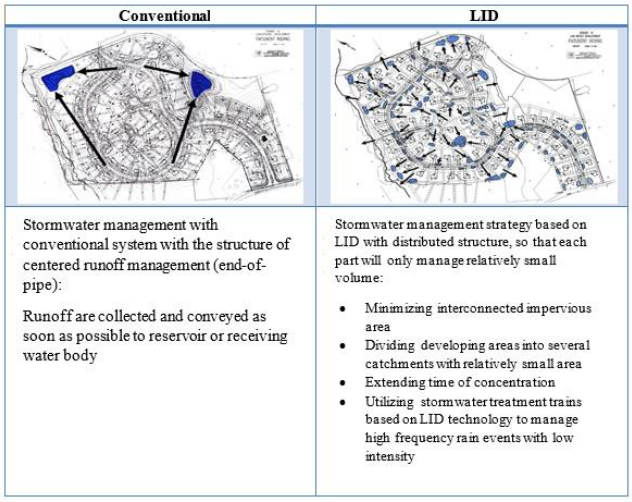

Fig. 6. LID concept

CONCLUSION

The above flood calculations are then routed with methods that generate outflow discharge at each dam is 478.56 cms at Ciawi and 117.07 cms on Sukamahi. Therefore. the effectiveness of the Dam to the Flood Debit with 100-year return period of 11.56% at the Ciawi Dam and 18.25% at the Sukamahi Dam.

After routing on both dams. then the flood discharge at the water gate Katulampa of 664.32 cms with flood reduction value 27.80 cms and the effectiveness 4.01%

Based on the results of this study, researchers will conduct further research that is by trying to apply the theory of integrated rainfall management using GIS (Geographic Information System) to map the spread of reservoirs in sub-sub areas. Planning of dam infrastructure with spatial distribution is expected to assist the process of flood reduction due to the placement of retention ponds in accordance with the basic concept of Low Impact Development.

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Wetland as Revitalization Pond at Urban Area Based on the Ecohydrology Concept

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***Abstract*:-- Universitas Indonesia (UI) has a campus in Depok with six ponds, five of which are artificial ponds and one of the catchment area that operates in the central Ciliwung Sub-watershed. The ponds (Kenanga, Agathis, Mahoni, Puspa, Ulin and Salam "KAMPUS") are designed as one of the catchment area, referring to Presidential Decree No. 32/1990 about the management of protected areas, ponds as catchment areas, flood controllers, and groundwater runoff. However, due to uncontrolled development in the catchment area of the UI pond system, KAMPUS cascade ponds transformed into a "toilet" which accommodates the liquid and solid waste of its catchment area. The mechanism designed for management in the KAMPUS cascade pond system is to utilize the cascade pond as a stabilization pond (improving water quality). One of them is utilizing Agathis cascade pond as a constructed stormwater wetland system, which is a pretreatment for the inflow to the KAMPUS pond system. This constructed wetland design is planned with several mechanisms: precipitation, filtering, chemical process by utilizing plants for absorption, nutrient transformation and eliminating pathogens. The result shows that this constructed wetland gives the water quality improvement percentage up to 87%. Water quality on effluent conforms with the water quality standards for irrigation and planting (grade 4) referring to Government Regulation No. 82/2001 about Water Quality Management and Pollution Control.**

Keywords: KAMPUS cascade pond; Constructed Wetland; Pond Management; water and environmental quality; Water Quality Standard.

I. INTRODUCTION

Universitas Indonesia (UI) is the only university in Indonesia ranked 79th of the top 100 best universities in Asia [1] and ranked 62nd of the best universities in the World by UI-Green Metric [2]. UI campuses are located in Salemba and Depok. UI campus in Depok has six cascade ponds, five of which are artificial cascade ponds. The six cascade ponds are named K.A.M.P.U.S which stands for Kenanga-Agathis-Mahoni-Puspa-Ulin-Salam, names of Indonesian endemic trees [3].

Fig. 1. UI Campus, Depok

Table 1. UI Depok Campus ponds

No.	Name	Area (m^2)	Established in the year
1.	Kenanga	28.000	1992
2.	Agathis	20.000	1995
3.	Mahoni	45.000	1996
4.	Puspa	20.000	1995
5.	Ulin	72.000	1998
6.	Salam	42.000	1998
	Total	227.000	

UI cascade pond system, established in the 90s, is designed as part of educational and recreational facilities, as well as water catchment area. As an educational facility, UI pond serves as a support tool for academic community research. As recreational facility, especially Salam and Kenanga cascade pond, they are often visited by both UI academic community and neighborhood. While as a water catchment area, referring to the Presidential Decree No.32/1990 about the management of protected areas, the ponds are acting as catchment areas, flood controllers, and groundwater runoff. After approximately twenty years since the cascade ponds were established along with the poorly planned development of Depok city, UI cascade pond is almost transformed into a massive garbage dump, with water quality continuously declining, and contaminated by various pollutants from its catchment area [3].

To improve the existing water condition on KAMPUS cascade pond, the collaborative rescue plan, water health audit has been conducted for water catchment area UI pond in 2016 and produced information of KAMPUS pond conditions. Assessment of water conditions based on recommendations from the Center for Watershed Protection, requires information of the percentage of impervious land cover.

Fig. 2. Catchment area of UI ponds and their surroundings

Based on the result of measurement of catchment area UI Depok Campus and impervious land cover map, it is known that the percentage of impervious land cover is 60%. The research from Center for Watershed Protection (CWP) in 2003 [4] indicates that the condition of catchment area KAMPUS pond is already in damaged condition with obvious decreasing water quality, especially in Agathis cascade pond, which is directly related to the sub-system outside UI Campus.

The purpose of this paper is to provide proposed management of cascade pond in urban area based on the ecohydrology concept by utilizing constructed wetland technology. The constructed wetland method will be applied to Agathis cascade pond with the aim of improving the water quality, restoring biotic integrity and making the landscape elements of UI Depok Campus.

II. METHODOLOGY

Wetland is an intermediate area between land and water bodies. Characteristics of wetland both natural and constructed according to United State Department of Agriculture (USDA, et al., 1995) is the availability of surface water in the area on a regular basis. Hydrologically, the stream present in wetlands is generally a stream with low velocity, shallow water and saturated soil conditions. Agathis cascade pond Constructed Wetlands are designed, planned, manufactured and operated to deliver various purposes. In accordance with its philosophy and approach, Constructed Wetlands are multi-purposely made, such as for waste treatment, provision of habitat and wildlife diversity, supporting recreational activities, storing water during the dry season, and adding aesthetic value to the environment [5].

Implementation of Constructed Wetland Technology has not been popular in Indonesia because the studies and publications are still lacking. Constructed Wetland is one of the water waste treatment solutions that rely on the roots of aquatic plants (swamp plants) for filtration, medium and bacteria to treat various water waste such as BOD, SS, pathogenic bacteria, nutrients and heavy metals. Constructed Wetland is an effective, inexpensive and easy maintenance technology [6].

Constructed wetland development on Agathis cascade pond is designed with more controlled treatment, by setting Hydraulic Retention Time (HRT) and Hydraulic Loading Rate (HLR) [7] to consider its dimensions. From the hydraulic aspect it can be classified into Constructed Wetlands with Free Water Surface (FWS) and Sub Surface Flow (SSF). Based on flow patterns, Constructed Wetlands can be classified according to horizontal and vertical flow directions [7].

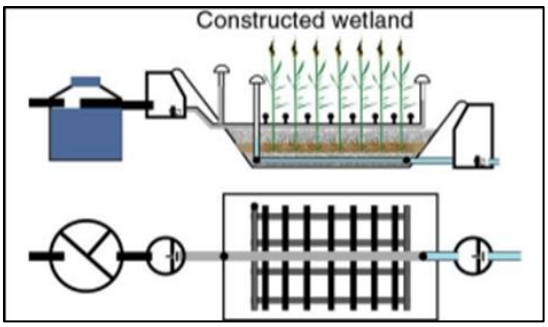

Fig. 3. Constructed wetland with horizontal flow pattern (HSSF)

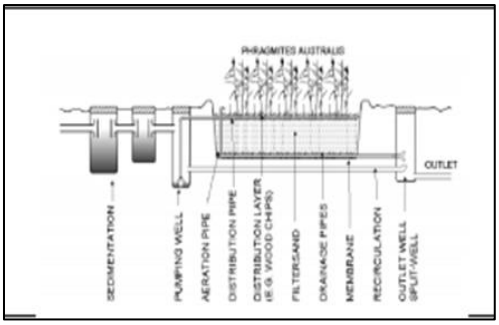

Fig. 4. Constructed wetland with vertical flow pattern (VSSF)

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The pollutant reduction mechanism designed in constructed wetland is carried out by physical, chemical and biological processes as listed in table below:

Table 2. Pollutants and their respective process in wetland

Pollutant	Process
• Organic Materials (measured through DO) • Organic Contaminant (pesticide) • Suspended Solid (TSS)	• Biological process, sedimentation, absorption by microbes • Adsorption, volatilization, photolysis, biotic/abiotic degradation • Sedimentation

Water management systems in this wetland system are affected by climate and weather, hydroperiod, hydraulic residence time, loading rate, groundwater exchange, and ET [8]. Wetland water balance calculations for FWS Constructed Wetland are shown in Equation below [9]:

$$\frac{dV_w}{dt} = Q_i + Q_c + Q_{sm} - Q_o - Q_b - Q_{gw} + (P - ET)\,A_w \quad (1)$$

Where V_w is the water volume or storage in wetland (m^3); t is time (day); Q_i is the level of water waste inflow (m^3/d); Q_c is the catchment area runoff discharge (m^3/d); Q_{sm} is melting snow discharge (m^3/ d); Q_0 is outflow discharge (m^3/d); Q_b is the berm loss rate (m^3/d); Q_{gw} is the soil infiltration (m^3/d); P is the rainfall (m/d); ET is the evapotranspiration (m/d); and A_w is the wetland water surface area (m2). In this design, groundwater, or discharge (Q_{gw}), berm loss rate (Q_b) and (Q_{sm}) melting snow discharge are negligible and the system is assumed to be steady state.

Water demand in wetlands are calculated by considering the dimensions of wetland, depth of design, porosity of soil medium and resident time. The water discharge demand to irrigate this wetland is 0.0043 m^3/s or about 4.3 liters/sec.

III.RESULTS

In the Agathis Constructed Wetland design, the water waste (gray water) enters the trash trap and sedimentation basin, so that the water is free of debris and the amount of incoming sediments has decreased significantly. Out of the sedimentation pool, water enters through the channel into Pool A. This pool serves as a controller for the discharge that enters the Wetland, and pool A also has a "by pass" channel to pass water in the rainy season. Based on the speed of water enters through the wetland, it can be known that the resident time in wetland is 10 days. Pollution removal is calculated based on the area of wetland, temperature, and flow rate in wetland using the following equation.

$$A_w = \left(\frac{0.0365\,.Q}{K_A}\right).\ln\left(\frac{c_1 - c^*}{c_e - c^*}\right) \quad (2)$$

where A_w is the required area (ha); Q is the water discharge; C_i is the inflow concentration (mg/L); c^* is the background concentration (mg/L) (1.0 BOD and TSS); and C_e is outflow concentration (mg/L); K_a is the first temperature-dependent constant of the first order of the area at temperature T. K_a can be calculated using the following equation.

$$K_A = K_{A,20}\,.\,\theta^{(T-20)} \quad (3)$$

Where $K_{A,20}$ is the first-order constant of the area at 20 ^oC, and θ is the design parameter.

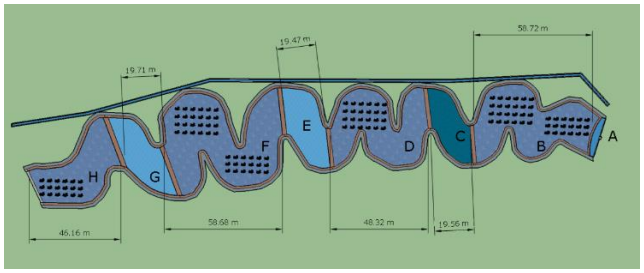

Fig. 5. Plan view of Agathis stormwater constructed wetland

In the calculation of Table 2, it can be seen that the effluent concentration of Agathis Stormwater Constructed Wetland conforms with the Class 4 Water Quality Standard.

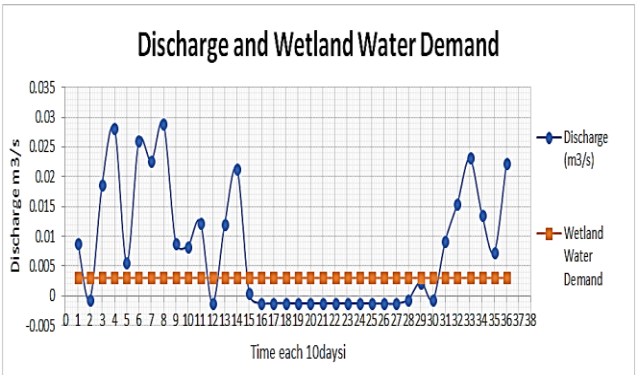

Fig. 6. Discharge and wetland water demand over the days

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Table 3. Pollutant removal of Agathis constructed wetland

Pollutant	Ci (ppm)	Ce (ppm)	Water Quality Standard (Grade 4)	% Removal	K_{20}	T (^oC)	θ	Ka	Qav (m^3/d)	A (ha)	A(m^2)
BOD	17.48	1.20	12	93.15	34	29	1	34	259.10	0.7455	7455.18
COD	50	3.43	100	93.15	34	29	1	34	259.10	0.7455	7455.18
TSS	96	0.39	400	99.60	70	29	1	70	259.10	0.7455	7455.18
Nitrat N	1	0.13	20	87.49	17	29	1.05	26.37	259.10	0.7455	7455.18
TP	12.8	4.97	5	61.17	12	29	1	12	259.10	0.7455	7455.18
Fecal Coli (cfu/100 ml)	2200	139.37	2000	93.67	35	29	1	35	259.10	0.7455	7455.18

CONCLUSION

This design demonstrates the feasibility of Stormwater Constructed Wetland for domestic (gray water) water waste treatment in Universitas Indonesia. This Wetland not only improves the quality of water waste but also stores large amounts of water that can be used for other purposes such as plant watering. The result shows that the level of pollutants in the water waste can be reduced to 61% after 10 days in the area of 0.745 ha of constructed wetland system.

Wetland needs water to continue throughout the year with a constant discharge of 0.0034 m3/s or about 3.4 liters/second including the calculation of water lost due to evapotranspiration.

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Theory of a quantum artificial neuron based on superconducting devices

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***Abstract*:-- An artificial neuron using superconducting devices, so-called rf SQUID, working at the quantum-mechanical domain is studied. It is shown that quantum rf SQUID regarded as flux qubit can act as an artificial neuron with sigmoid function generated by coherent quantum-mechanical transitions between wells in double well potential representing rf SQUID.**

Keywords: Artificial Neural Networks, Superconducting Quantum Interference Devices (Squid), Sigmoid Function, Superconducting Neurons.

I. INTRODUCTION

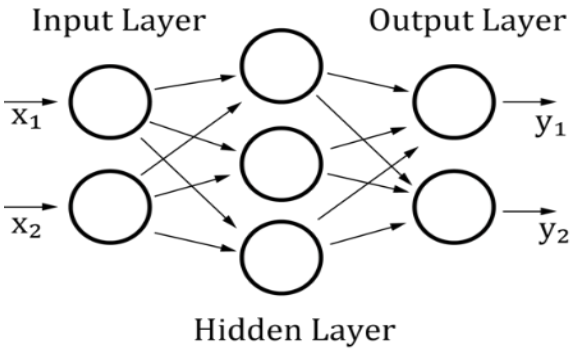
Artificial Intelligence has emerged as a practical technology, with successful applications in many fields like pattern recognition, especially when the underlying data relationship is unknown. An artificial neural network (ANN) inspired by biological nervous networks is a key technology to support artificial intelligence [1]. Basic building block of ANN is an artificial neuron with three simple sets of rules: multiplication, summation and activation. The typical ANN consists of huge number of interconnected such artificial neurons, which are stacked sequentially in rows that are known as layers as shown in Fig. 1 (a). An artificial neuron receives signals from other neurons through synapses located on the dendrites of the neuron and combines them and applies a nonlinear operation to the combined signal, in order to judge whether to activate the neuron for signaling the neurons in the subsequent layer. Therefore, the activation function is a heart of the artificial neuron.

So far, several activation functions suitable for each task have been considered. Among them, sigmoid or logistic functions are most effective for ANN on which the error backpropagation learning algorism is implemented [2] because of their simple mathematical handling, especially their differentiation.

The hardware implementation of sigmoid functions has been initially investigated using semiconductor integrated circuits. Later, superconducting circuits are considered to be an alternative candidate to overcome difficulties in semiconductors such as large power dissipation. In fact, ANN using superconducting circuits with their ultra-high-speed operation, ultra-low-power consumption and scalability enabled by nanotechnology has successfully been implemented in various ways [4]-[10]. However, the physical basis for generating the sigmoid function was not sufficient. In our previous paper [11], we clarified the physical basis for sigmoid function generation and applied it to artificial neurons based on superconducting quantum interference devices (SQUIDs).

Recent advances in nanotechnology have led the system size to nanoscale, where devices that have been operating on the principle of classical mechanics have to be dealt with quantum-mechanically.

(a)



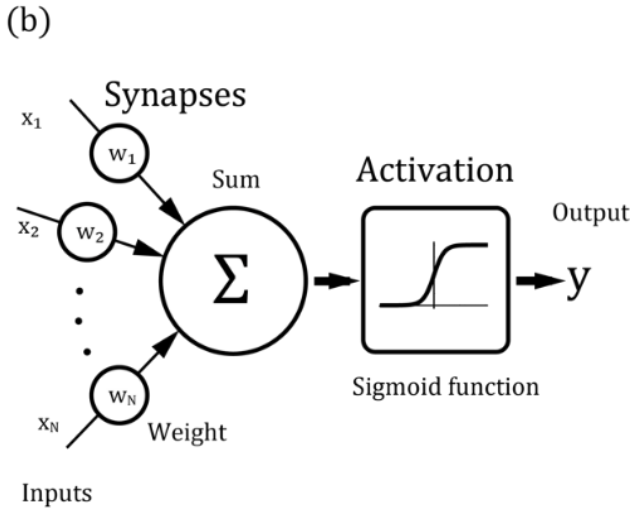


Figure 1 Schematic diagrams of (a) A typical three-layered feed-forward artificial neural network and (b) an artificial neuron.

In this paper, we reconsider the generation mechanism of the sigmoid function required for artificial neurons based on the principle of quantum mechanics and analyze SQUID-based artificial neurons which operate in quantum-mechanical domain.

II.CLASSICAL SQUID-BASED ARTIFICIAL NEURONS

Here we briefly review classical artificial neurons based on a radio frequency (rf) SQUID discussed in the previous paper [11] for the preparation to develop into neurons operating in quantum mechanical domain below.

A. Physical origin of sigmoid function generation

We showed that the physical origin of the sigmoid function generation was the transition processes between two states in double well potential. The probability of finding a particle in one of the two wells, p, in thermal equilibrium is derived from the rate equation on the transition between two states in the double well potential as shown in Fig. 2 as follows;

$$p = \frac{1}{1 + e^{-\Delta E/kT}} \ \#(1)$$

where ΔE is the energy difference between two states. k and T are the Boltzmann constant and temperature, respectively. This is the sigmoid function required for artificial neurons.

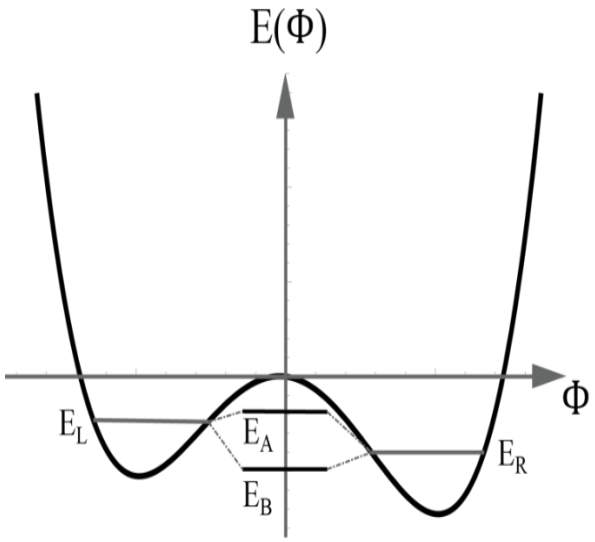


Figure 2 Schematic diagram of double well potential.

B. Classical SQUID-based artificial neurons

Based on the two-state transition scheme for generating the sigmoid function to artificial neurons, we analyzed an rf SQUID as a superconducting artificial neuron, which consists of a superconducting loop with the inductance L interrupted by a Josephson junction as shown in Fig. 3 (a).

The potential energy of rf-SQUID is given by

$$E = E_L\left(\hat{\Phi} - \hat{\Phi}_{ex}\right)^2 + E_J\{1 - \cos(2\pi\hat{\Phi})\} \#(2)$$

where $\hat{\Phi}$ and $\hat{\Phi}_{ex}$ are magnetic flux through the superconducting ring and an externally applied magnetic flux normalized by the quantum unit of magnetic flux $\Phi_0 = h/2e$ with h and e being Planck's constant and an elementary electric charge, respectively. The first term is magnetic energy accumulated in the loop with $E_L = \Phi_0^2/2L$. The second term expresses Josephson coupling energy given by $E_J = \hbar I_{C0}/2e$ with I_{C0} being the Josephson critical current. Fig. 3 (b) shows the potential profile as a function of $\hat{\Phi}$ with different applied magnetic flux values $\hat{\Phi}_{ex}$. The lowest two minima form a double well potential required to generate the sigmoid function.

The energy difference ΔE in (1) is given as

$$\Delta E\left(\hat{\Phi}_{ex}\right) \cong E_L\left[\frac{4\pi^2\alpha}{1 + 2\pi^2\alpha}\hat{\Phi}_{ex} + \text{const.}\right] \#(3)$$

where $\alpha = E_J/E_L$. Therefore, the rf SQUID generates a sigmoid function, where the external magnetic field as the integrated signal is an input determining the activity.

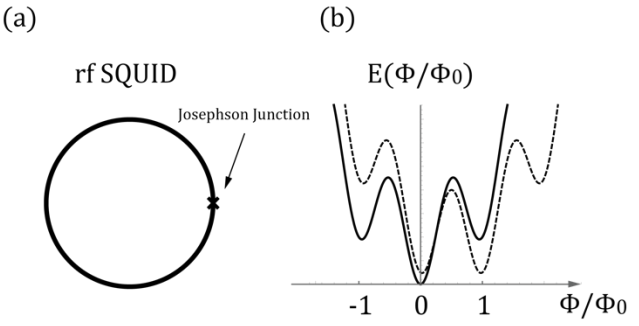


Figure 1 Schematic diagram of (a) an rf SQUID comprising of a superconducting loop interrupted by a Josephson junction and (b) its potential profile as a function of magnetic flux threading the rf-SQUID loop with $\widehat{\Phi}_{ex} = 0$ (solid line) and with $\widehat{\Phi}_{ex} = 0.5$ (dotted line).

III. QUANTUM SQUID-BASED ARTIFICIAL NEURONS

A. Quantum rf SQUID

Now let us consider a superconducting artificial neuron working at the quantum-mechanical domain, i.e., $E_J \leq E_c$ where $E_c = 4e^2/2C$. A conventional rf SQUID $(E_J > E_c)$ can be described by a classical particle moving in the potential in (2). Here, the junction capacitance C corresponds to the mass of the particle. Therefore, when the Josephson junctions are reduced by nanotechnology, the junction capacitance, equivalently the mass, becomes smaller, and as a result, the junctions behave quantum-mechanically. In the case of $E_J \leq E_c$, the rf SQUID behaves like a *quantum-mechanical* particle. As is well-known, mechanical variables are replaced by the corresponding operators in quantum mechanics, and commutation relations hold between conjugate operators, i.e., $[\theta, n] = i$ or $[\Phi, Q] = i\hbar$ where Q and n are the electric charge at the junction and the number of Cooper pair difference across the junction, respectively.

In the case that the barrier between wells in the potential (2) is much smaller than the Josephson coupling energy, the rf SQUID potential (2) can be approximated by the biased double well potential as

$$E \cong E_L\left[-(\alpha-1)\frac{\phi^2}{2}+\frac{\alpha}{24}\phi^4 - f\phi\right]\#(4)$$

where ϕ=Φˆ-0.5 and f=Φˆ_ex-0.5. As a further approximation, the whole Hilbert space of the full Hamiltonian can be mapped on to the subspace spanned by two levels. The resulting Hamiltonian is expressed as

$$H = -\frac{1}{2}(\epsilon\sigma_z + \Delta\sigma_x)\#(5)$$

where ϵ=E_L-E_R is the energy difference between energy levels in each well as shown in Fig. 2 and Δ stands for tunneling splitting. This Hamiltonian is nothing but qubit Hamiltonian that is a building block of quantum computer in quantum information science.

B.Sigmoid function in quantum rf SQUID

Now let us consider the sigmoid function required for artificial neurons in quantum rf SQUID. In the classical situation, the sigmoid function was originated from the two-state transition processes between states in double well potential. In quantum mechanical situations as well, the origin is assumed to be same as in the classical one. The probability of finding a particle in the left well of double well potential, p_L, is given by the coefficient of the left state $|L\rangle$ of the antibonding state $|A\rangle$

$$|A\rangle = \sqrt{p_L}|L\rangle - \sqrt{p_R}|R\rangle\#(6)$$

obtained by diagonalizing the qubit Hamiltonian (5) using unitary transformation

$$\widetilde{H} = D(\beta/2)HD(\beta/2)^{\dagger}\#(7)$$

and

$$D(\beta/2) = \exp\left[-i\frac{\beta}{2}\sigma_y\right]\#(8)$$

with $\beta = \tan^{-1}(\Delta/\epsilon)$. The energy spectrum of this diagonalized Hamiltonian is thus represented as

$$E_{B,A} = \mp\frac{1}{2}\sqrt{\epsilon^2+\Delta^2}\#(9)$$

as shown in Fig. 2. Here, $B(A)$ stands for bonding (antibonding). The bonding state is expressed as

$$|A\rangle = D(\beta/2)^{\dagger}|L\rangle = \cos(\beta/2)\,|L\rangle - \sin(\beta/2)\,|R\rangle.\#(10)$$

As a result, the desired probability is

$$p_L = \cos^2(\beta/2) = \frac{1}{2}\left[1+\frac{\epsilon}{\sqrt{\epsilon^2+\Delta^2}}\right].\#(11)$$

This can be approximated as

$$p_L \cong \frac{1}{1+\mathrm{e}^{-\epsilon/2\Delta}}\#(12)$$

within the second order of ϵ/Δ. Therefore, quantum rf SQUID also serves as an artificial neuron with the sigmoid function.

So far, we have discussed the sigmoid function generation of rf SQUID operating in the quantum

mechanical domain based on coherent quantum transition. In the case of incoherent quantum transition, the probability in (11) is reduced to

$$p_L \cong \frac{1}{1+e^{-\epsilon/2\Delta}} \approx 1 - e^{-\epsilon/2\Delta}. \#(13)$$

This has been already observed in early stage of qubit experiment [12].

CONCLUSION

We have presented an artificial neuron using rf SQUID working at the quantum-mechanical domain, i.e., quantum rf SQUID. We have showed that quantum rf SQUID serves as an artificial neuron with the sigmoid function based on the model of the coherent quantum transition between quantum states in double well potential. Quantum rf SQUID is nothing but flux qubit that is a building block of quantum computer. Therefore, it might be applicable to artificial neural networks in quantum-mechanical domain, so-called quantum neural networks.

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A Machine Learning Approach to Distinguish Parkinson's Disease (PD) Patient's with Shuffling Gait from Older Adults based on Gait signals using 3D Motion Analysis

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Abstract:-- **In recent times the adverse impact of Parkinson's disease (PD) getting worse and worse with the increasing rate of old age population through out the world. This disease is the second common neurological disorder and has a tremendous economical and social impact because the cost associated with the healthcare as well as service is extremely high. The diagnosis process of this disease mostly done by closely observing the patient in the clinic as well as using the rating scale. However, this kind of diagnosis is subjective in nature and usually takes long time and assessment of this disease is complicated and cannot replicated in other patients. This kind of diagnosis method is also not suitable for the early detection of the PD. So, with this shortcoming it is necessary to find a suitable method that can automate the process as well as useful in the initial phase of diagnosis of PD. Recently with the invention of motion capture equipment's and artificial intelligent technique, the feasibility of the objective nature-based diagnosis is getting lot of attention, especially the objective quantification of gait parameters. Shuffling of gait is one of the important characteristics of PD patients and it is usually defined y shorter stride length and low foot clearance. In this study a novel method is proposed to quantify the gait parameters using 3D motion captures and then various feature selection algorithm have used to select the effective features and finally machine learning based techniques were implemented to automate the classification process of two groups composed of PD patients as well as older adults. We have found maximum accuracy of 98.54 %by using support vector machine (SVM) classifier with radial basis function coupled with minimum redundancy and maximum relevance (MRMR) algorithm-based feature set. Our result showed that the proposed method can help the clinicians to distinguish PD patients from the older adults. This method helps to detect the PD at early stage.**

Keywords: Shuffling gait, feature selection, machine learning, Parkinson's disease, wearable sensor

I. INTRODUCTION

Parkinson's disease is the second most common neurological disorder and around 7 to 10 million people have been affected by this disease [1]. It is one of the disease that affects the brain cell and that indirectly affect the movement, speech and other cognitive parts of the brain [2]. The number of undiagnosed people affected with PD is around 20% [3]. At the same time, it is very difficult for the clinician to clinically distinguish the PD patients with the older adults because some of the characteristics are observed among old people those are also associated with PD [4]. Gait analysis is treated as one of the important tool for the assessment of PD [5]. It was observed that the spatiotemporal parameters related to gait dynamics helps in objective assessment of PD because those parameters are one dimensional and the analysis can be observed in different dimension [6]. The objective of the feature selection method in the medical field is to identify the most important factor that is associated with the result and also remove the redundant features that provides better and quicker result at quick time [7]. Many researchers used different classifiers for prediction of disease to get good outputs while prediction coupled with good accuracy [8-10].

In this paper spatiotemporal parameter-based gait analysis is carried out using 3D motion captures for objective measurement of gait parameters and then feature selection algorithms are implemented to know the importance of the features. A performance comparison analysis is carried out with different classification techniques coupled with different feature sets obtained from various feature selection algorithm to clearly distinguish the PD patients with shuffling gait and older adults.

The structure of the paper is organized as follows: Section 2 presents the background. Section 3 describes about the

methodology. Section 4 describes about the result and discussions. Section 5 describes about conclusion.

II. RELATED WORK

In the past different researchers have used wearable devices as well machine learning techniques for the prediction of the chronic diseases. Some of the works are as follows. An inertial measurement units (IMU) which consists of gyroscope and accelerometer were used to do the gait analysis of healthy subjects and PD patients. The proposed algorithm was able to estimate the stride length from the data collected from the IMU. The results were validated by measuring the stride length using GAITrite walkway system data, which is mentioned as gold standard. The comparison has done with the algorithm and GAITRite system and it was found that the mean error over all the stride lengths were about 6 % for healthy subjects and around 10.3% for PD patients [11]. A novel method is proposed to measure the spatiotemporal gait parameters of children's those are suffered with cerebral palsy using wearable sensors. The signal processing algorithm is used to quantify the gait parameters from the data collected from the wearable devices and validated the result with optoelectronic system which is served as a gold standard. It was found that the wearable device-based method able to provide good result and having a good level of agreement between the two methods has given an assurance to the clinicians to recommend it in practical life [12]. A method is proposed that used ANN and SVM for distinguishing the walk pattern during the speed walking of PD patients. Three different parameters namely spatiotemporal, kinematic and kinetic were used to distinguish the pattern among PD patients. It was observed that spatiotemporal parameter used as feature vector contributed perfect classification using ANN and SVM classifier [13]. A method is proposed for automatic recognition of health problem using gait data with machine learning techniques. The method used neural network and k nearest neighbor classifier based on the gait data of people related to five different condition such as normal, with hemiplegic, with Parkinson's disease, with pain in the back and with pain in the leg. semantic features were used in their approach. It was found the classification accuracies ranging from 99% to 100 % by using the neural networks and k nearest neighbor classifier [14]. A method is proposed for the diagnosis of PD based on the characteristics features of a person's voice. The approach used decision tree-based classification approach using the threshold value. It also used mixed classification approach for the prediction of the Parkinson's disease using nonlinear classifiers and found classification accuracy of 90% [15]. The above past work motivated us to develop the current approach described in the later part of the paper.

III. METHODOLOGY

The study comprised of 40 individuals from both the groups. 20 patients from PD group with shuffling gait and 20 older adults mentioned as control group. 3D motion Analysis system is used to quantify the spatiotemporal gait parameters at Inje Paik hospital, Busan, South Korea. We have collected 12 features by measuring the spatiotemporal parameters. We have used four feature selection methods in this study such as minimum redundancy maximum relevance(MRMR), Fisher's score(FS) method, sequential forward selection(SFS) method and Principal Component Analysis (PCA) method. After feature selection methods each of feature sets is implemented in different classification technique such as support vector machine(SVM), random forest(RF), and Naïve Bayes(NB) for performance comparison. The performance measures those are included in this study are accuracy, sensitivity, specificity, positive predictive value(PPV), negative predictive value(NPV). Fig 1 shows the flow chart of the proposed methodology.

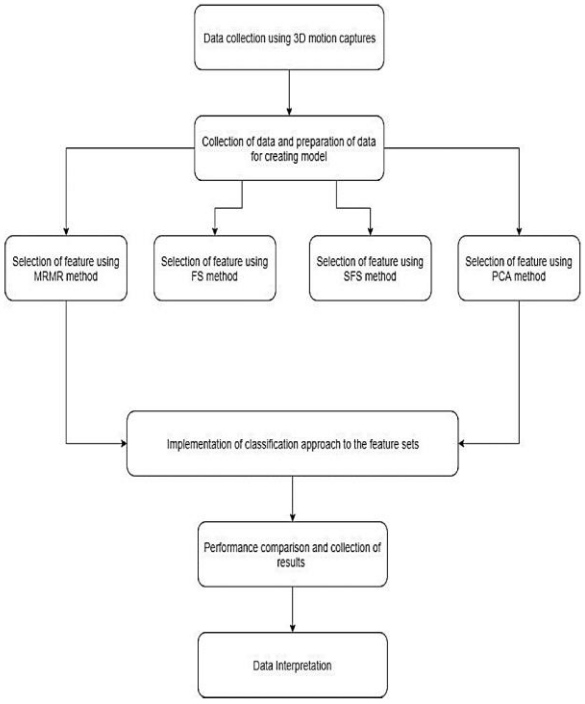

Figure 1: Flow chart of proposed methodology

IV. RESULTS AND DISCUSSION

In this study we have implemented different feature selection algorithm and we found MRMR feature selection algorithm performed well with different classifiers. We have used 80% of the data for training set and 20% of the data as test set. The comparison of accuracy with different feature sets are shown in the fig 2.

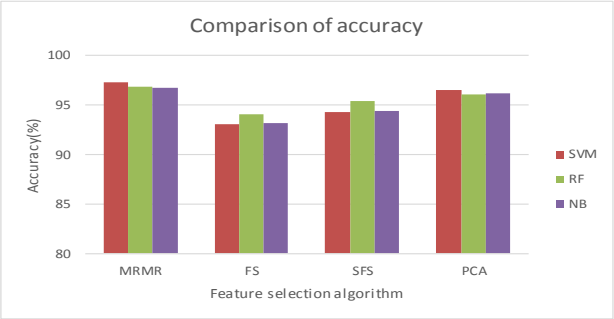

Figure 2: Accuracy of the MRMR, FS, SFS and PCA results.

In the above figure it is shown that the accuracy of SVM classifier with rbf kernel function coupled with MRMR feature sets has the highest accuracy of 98.54% followed random forest classifier and Naïve Bayes classifier with the accuracy of 96.89%, and 96.75% respectively. MRMR feature sets perform better compared to all other feature sets mentioned in our approach.

The comparison of sensitivity of different feature sets coupled with classifiers is shown in the figure 3.

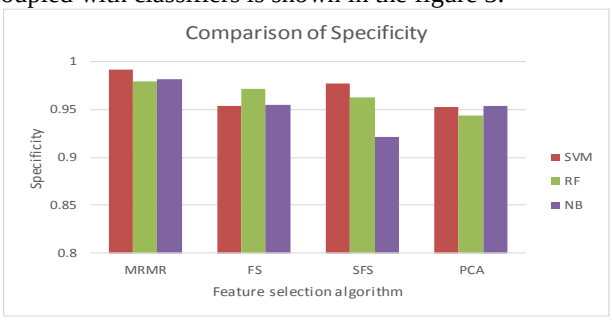

Figure 3: Sensitivity of the MRMR, FS, SFS and PCA results.

The figure 3 showed that the sensitivity of SVM classifier with rbf kernel function coupled with MRMR feature sets has the highest sensitivity of 0.9891 followed random forest classifier and Naïve Bayes classifier with the sensitivity of 0.9844 and 0.9722 respectively.

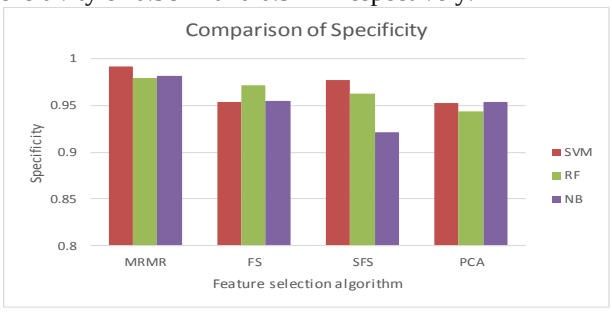

Figure 4: Specificity of the MRMR, FS, SFS and PCA results.

The figure 4 showed that the specificity of SVM classifier with rbf kernel function coupled with MRMR feature sets has the highest specificity of 0.9912 followed Naïve Bayes classifier and random forest classifier with the specificity of 0.9811 and 0.9789 respectively.

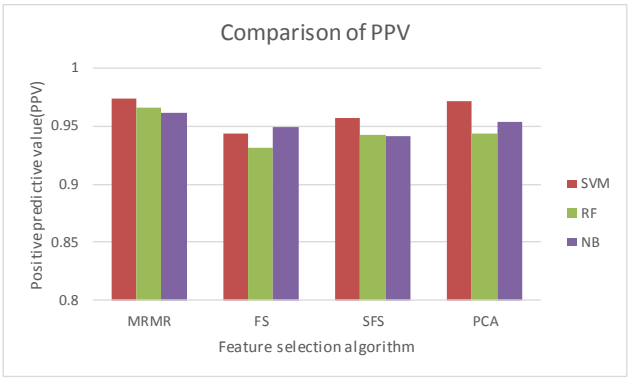

Figure 5: PPV of the MRMR, FS, SFS and PCA results.

The figure 5 showed that the positive predictive value(PPV) of SVM classifier with rbf kernel function coupled with MRMR feature sets has the highest PPV of 0.9734 followed random forest classifier and Naïve Bayes classifier with the PPV of 0.9654 and 0.9611 respectively.

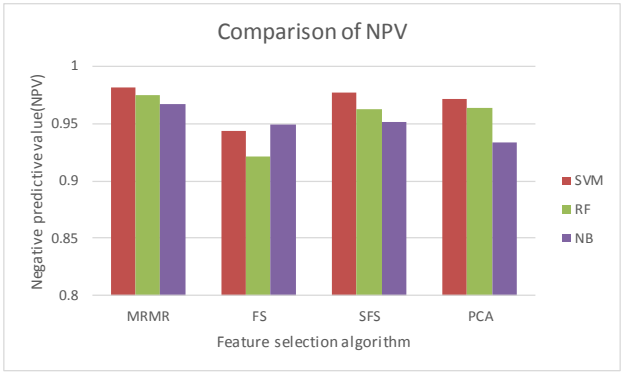

Figure 6: NPV of the MRMR, FS, SFS and PCA results.

The figure 6 showed that the negative predictive value (NPV) of SVM classifier with rbf kernel function coupled with MRMR feature sets has the highest NPV of 0.9815 followed random forest classifier and Naïve Bayes classifier with the NPV of 0.9754 and 0.9667 respectively.

From the above observation it was found that feature selection method has an important role to play that ultimately provide better result at quick time. It also removed the redundant features that will help clinicians to focus on important features during diagnosis of PD. Our proposed method has carried out a performance comparison-based study by using different classification

technique based on different feature sets. The performance measures help to identify the potential of each classifier as well as automatize the classification process that will help the clinicians to clearly distinguish between two groups. Our proposed study provides an accuracy of 98.54%, compared to the previous studies. One of the previous study used fuzzy c means clustering based feature weighting and KNN and found accuracy of 97.93% [16] and other study used particle swarm optimization and KNN and found accuracy of 97.47% [17]. In summary our proposed method has better accuracy and can be recommended for clinical trials.

CONCLUSION AND FUTURE WORK

This paper discussed about different feature selection algorithm as well as different classification techniques as well as their performance for better accuracy as well as for getting quicker results. Among the implemented feature selection algorithm and classification techniques MRMR algorithm coupled with SVM with rbf produced an accuracy of 98.54%. This development will help the clinicians and doctors to automate the whole process with short time and will help them to detect the Parkinson's disease at early stage and assess the patient's condition at different stages.

In the future we will develop the algorithm to quantify the spatiotemporal gait parameters from the data collected from the wearable sensors and then implement the same feature selection algorithm as well as classification technique to compare the difference between the two methods as well as to check the feasibility of the wearable sensors for objective quantification of gait parameters.

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Problems of Farmers in connection with the status of Modern Technological inputs in Agricultural Sector: A special reference to Chiwaula Sub-area in Mangochi District of Malawi.

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***Abstract*:-- This paper focuses on the "Problems of Farmers in connection with the status of Modern Technological inputs in Agricultural Sector. Generally, the poverty and seasonal agricultural un-employment are the major problems of this study area in Mangochi District of Malawi. Even though, most of the people who have fertilized the agricultural land, sufficient water resources and also cultivate some agricultural products such as corn, sugarcane, cotton, potatoes, tomato etc. But, there is no sufficient growth in agriculture, due to lack of modern technological inputs in Agriculture; especially there is no scientific method of cultivation and lack of irrigation facilities.**

RESEARCH METHODOLOGY

The Universe of the study consists farmers in eight villages of Chiwaula Sub-area in Mangochi District. This study was conducted with the following objectives i) To describe the Socio- economic background of the farmers in these villages, ii) To explore the nature and type of cultivation in their agricultural field without modern inputs iii) To understand the problems of farmers with respect to in-adequate Irrigation system and scientific method of cultivation in agriculture iv) To suggest the implementation of modern technology and Scientific method of cultivation in Agriculture for economic sufficient and green revolution

A sample size 40 was achieved through adopting the non-probability /purposive sampling method with a decision of selecting 5 farmers from each village, to collect the pertinent primary data. Relevant secondary data were collected from the library books, Journals, newspapers, magazines, and websites. The primary data were collected through Interview and unstructured observations to understand the socio-economic background of the farmers, nature and type of cultivation in their agricultural field without modern technological inputs, and problems faced by farmers especially of an in-adequate scientific method of cultivation. The reference period for data collection was 1-29 June 2017.

Results show that most, farmers are very poor as a lack of the scientific method of cultivation and irrigation facilities in agriculture, lack of access to development, and require competency to market their Agricultural products. Farmers require more awareness on adopting modern technological inputs such as modern machinery, seeds, fertilizers, Pesticides and efficient irrigation management in the Agricultural sector. As the rain -fed agriculture is vulnerable to changes, irrigation agriculture to be intensified in Mangochi district through increased awareness on land and irrigation management with the help of technological development. Policies and funding should be properly implemented.

INTRODUCTION

This paper focuses on the Problems of farmers in connection with the Modern Technological inputs in the Agricultural sector: A special reference to Chiwaula sub-areas in Mangochi District of Malawi. It is a southernmost district of Malawi; Malawi is a sub-Saharan African country located to the south of the equator. It shares borders with Tanzania to the north and northeast, Mozambique to the east, south and southwest, and Zambia to the north and northwest. It has a population of about slightly over than seventeen million people. Divided into three regions of the North, Centre and South, The Malawi population is predominantly rural, with estimates suggesting that 86 percent of Malawians live in rural areas.

The poverty and seasonal agricultural un-employment are the major problems of this country, particularly in this study area of Mangochi District. Even though, most of the people who have own agricultural land, sufficient water resources and also cultivate some agricultural products

such as Maize, sugarcane, groundnut, tomato, sweet potato, peens, carrot and banana etc. The natural resources like fertilized agricultural land and groundwater facilities are available in this study area, because this area is surrounded by largest river connecting with three countries like Malawi, Zambia, and Mozambique. Even though, there is no sufficient growth in agriculture, due to lack of the scientific method of cultivation and modern technological inputs in the agricultural sector, especially the modern machinery and proper irrigation facilities.

Malawi is a member of several international organizations including the Commonwealth, the UN and some of its child agencies especially like UNICEF, the IMF, the World Bank, the African Union and the World Health organization. The economy is heavily based on agriculture. Malawian government faces various challenges particularly the Proper Irrigation and modern technological input in Agriculture.

Generally, there are some factors that affect the farmers in their socio-economic and cultivation of agricultural products in this study area of Mangochi District. The two major factors also noted here are:-

i) Socio-economic factors,
ii) Scientific factors

I) Socio-economic factors

The socio-economic characteristics of the people of this study area also been homogeneous. i.e. Socio-economic background is very poor. The poverty and un-employment are the major problems in Mangochi District, particularly in this study area. Because most of the farmers who have small land holdings and only poor yield in their agricultural field. They have holdings of two acres or less, which does not allow the use of scientific method of cultivation. The fragmented and small size of land holding is an important factor of low agricultural productivity. Most of the farmers are very poor as a result of helplessness, lack of access to inputs such as an old method of cultivation without modern machinery, lack of financial support, in-competent market to their Agricultural-products and lack of road networks for transportation of the agricultural products.

II) Scientific factors

a) Lack of mechanization

The use of mechanization i.e. modern technological and scientific method of cultivation was introduced in Malawi, yet most of the villages included in this study area do not access these new modern technologies. Old farming practices are still being used in agriculture.

b) Lack of irrigation facilities

Lack of Irrigation services also plays a crucial role in the failure of agriculture and also generates the poverty in Malawi, particularly in Mangochi District. There are no adequate functional facilities to the farmers adopt the proper irrigation facilities with the scientific method, because lack of electricity and inadequate supply of loans from institutional credits are mostly not able to adopt proper irrigation facilities. Most of the farmers practicing the old method of cultivation in their land and unable to purchase of modern inputs of agriculture in particular time. These are the major problems of seasonal unemployment and poverty among the farmers.

c) Inadequate supply of input

The supply of modern inputs like improve seeds, modern organic fertilizer, pesticides and modern machinery are not only costly but also inadequate and irregular. The inadequate availability of the modern inputs at the time and prices is also a problem of the expansion of agricultural production

d) Insufficient Agricultural research

Due to lack of sufficient fund allocated for particularly in agricultural research, the innovation of new varieties of crops, organic fertilizers, pesticide, modern farm machinery and animal health services remains slow.

e) Lack of extension service program

In order to raise farm productivity, the extension service program needs to be extended in the rural areas. There is need to increase the number of extension workers to educate farmers for the adoption of agriculture technology such as proper irrigation with the scientific method is an enormous work and has to be carried out systematically and an effect. The lack of funds again is a problem in the proper implementation of this programme. The result is slow growth in agricultural production.

g) Climate change

Climate change is also one of the elements that are leading to the poor or low yield of production in agriculture. In-sufficient rainfall pattern might be experienced in a year which could not be enough crops to mature. Sometimes rain might come in abandoned which could in turn produce runoff and washing away crops and humus in the soil. The people have a great impact that contributes to climate change such as deforestation, poor farming, and soil tillage.

Research Methodology

The Universe of the study is the Chiwaula sub-area consists of several villages like Chiwaula, Steven, Miseu, Nsamu, Namasano, Mbuluwata, and Sawasahaa etc, in Chimwala Traditional Authority, Mangochi District of

Malawi. This paper focuses on the Problems of Farmer's connection with Modern Technological inputs in Agricultural Sector.

Objectives of the Study

i) To describe the Socio-economic background of the farmers in these villages,
ii) To explore the nature and type of cultivation in their agricultural field without modern inputs
iii) To understand the problems of farmers with respect to inadequate modern types of machineries and Irrigation farming in agriculture
iv) To suggest the implementation of modern technology and Scientific method of cultivation in Agriculture for economic sufficient and green revolution

Sampling

A sample size of 40 was achieved through adopting the non-probability -purposive sampling method with a decision of selected 5 farmers from each village, to collect the pertinent primary data.

Secondary Data

Relevant secondary data were collected from the library books, Journals, newspapers, magazines, and websites.

Primary data

The primary data were collected from the selected farmers through Interview and unstructured observations to understand the socio-economic background of the farmers, nature and type of cultivation in their agricultural field without modern inputs, and problems faced by farmers especially of in-adequate modern types of machinery and Irrigation farming.

Period of Study

The reference period for data collection was 1-29 June 2017.

RESULTS AND DISCUSSIONS:

All the farmers of this study area are homogeneous characteristics of their socio-economic background is very low. Among the total population of this villages, nearly eighty percent of them depend on the agriculture, most of them have been own agricultural land and only a few of them are lease / rental agricultural land. Among the total population of the farmers in these villages, the educational background of the farmers reveals that nearly sixty-five percent of them are illiterates, while, nearly thirty percent of the farmers completed primary education up to VIIIth Standard, and rest of them run the small-scale business like chips stall, Potato stall, Tomato stall, etc.

There are no-sufficient basic amenities and infrastructural facilities such as safe drinking water, proper concrete road, public toilet, electricity, government primary health center. Mal-nutrition is one of the major problems among the people, particularly in farmers; it also leads to the formation of some diseases like Measles, pneumonia, anemia, etc, these predominantly affect the pregnant women and born children.

Nearly ninety-five percent of them have own house but in the dilapidated condition, rest of them living in the rental house. Religious wise distribution of the respondents reveals that most of them belongs to the Christians, particularly in Roman Catholic, rest of them belongs to different tribes like Yao (Islamic), remaining of them are one type of Christian, they are only followers of Jesus Christ, but they do not follow any Christian organizations like Roman Catholic, Assembly of God, Pentecostal mission etc. No caste system among these people in these villages, the socio-economic status also determined their status as lower or middle class etc.

Most of the farmers who have own and small size of agricultural land i.e. they have holdings two acres or less than two acres, they also cultivate some agricultural products such as maize, sugarcane, groundnut, tomato, sweet potato, beans, carrot, and banana, etc, The fragmented and small size of land does not allow the scientific method of cultivation with modern types machinery and also the important factors of insufficient development in the agriculture. A vast majority of the farmers do not have any sufficient knowledge about use the modern types of machinery and scientific method of cultivation in agriculture, particularly the irrigation farming. Because of the irrigation farming's system also successful and sustainable development in agriculture around the world. But this numerous attempt was a failure in African countries. All of them were confessed that there is nobody gave the awareness on agricultural research and extension service programs to the farmers.

Few of them do not have own agricultural land. But they are cultivating some crops in the lease or rental agricultural land. Among the total population of the farmers, nearly fifty percent of them only seasonal cultivation in the rainy season from the month of November to April. Rest of them also cultivates some crops all the season, because they can easily access water sources for their small pieces of land. Because the groundwater sources also nearest from the bottom of the land only a few feet as the area is close to Lake Malombe. They are also practicing the old method of cultivation and irrigation facilities like using treadle pump. They are also cultivating some crops like vegetables, sweet potato, paddy, and maize, etc.

As the rain-fed agriculture is vulnerable to changes in the present, Climate change also one of the major factors of reducing the yield in the field in the way that increase of rain upturn the runoff which washing away crops and humus in the soil. The people have a great impact that contributes to climate change such as deforestation, poor farming, and soil tillage.

No modern types of machinery and scientific method adopted in their cultivation, the use of mechanization not fully adopted in the entire country, most of them practice an old method of cultivation and still being used for agriculture. Modern inputs like improved seeds, fertilizer and pesticides do not fully available and also there are inadequate supplies of loans from institutional credits, the people are mostly not able to purchase the fertilizers and pesticides in particular time which result in low productivity.

These are contributing to the seasonal un-employment problem in agricultural sectors. In these factors also lead those to go for fishing work in nearest Lake, Molambe. Some people migrate to South Africa to get the employment opportunities in industrial and commercial sectors. Most of them have holding natural resources like natural fertilized agricultural land and sufficient groundwater facilities. But, there is no sufficient economic power to adopt the modern types of machinery and get the proper irrigation facilities in their agricultural land.

The entire farmers are poor and also they don't have any electricity facilities, not only in their houses but also in their agricultural sectors. Because electricity facilities are very essential to farming the irrigation and scientific method of cultivation in Agriculture. Another problem of the failure in agriculture is lack of infrastructural facilities like farm to market, roads, and shortage of transport facilities, etc.

This study reviews that people in this study area are poor and practices the local irrigation farming. To improve their life's there is need to assist them with modern irrigation farming technologies such as modern types of machinery, proper electricity, capacity buildings like agricultural research and extension services and enough financial support from international funding agencies to assist them to procure farm inputs.

CONCLUSION

Most of the developing countries have sustainable development in the cultivation of agricultural products, by the innovative and scientific methods like proper irrigation facilities and adopted the mechanization in the agriculture sector. There had been numerous attempts to introduce the successful concepts from the Mexican and Indian projects into African countries although with less successful efforts. Reasons cited for their failures include lack of financial support and policy, insecurity, wide corruption, lack of infrastructure, and lack of will power on the part of the politicians. In the most basic sense, the Green Revolution was a product of globalization as evidenced in the creation of international agricultural research centers that shared information, and with transnational funding from groups like the Rockefeller Foundation, Ford Foundation, and United States Agency for International Development (USAID).

The Green Revolution was a research establishment in Mexico and the Philippines that were funded by the governments of those nations and international donor organizations. Similar work is still being carried out by a network of institutes around the world. Proponents of the Green Revolution argued that it contributed to environmental preservation because it improved the productivity of land already in agricultural production and thus saved millions of acres that would otherwise have been put into agricultural use. These factors permitted these countries to diffuse both the new seeds and modern technology and to bring the products to market in an effective manner. Africa benefited far less from the Green Revolution than Asian countries and is still threatened periodically with famine. Therefore, it is right time to make the new policies for implement the modern scientific method of cultivation with proper irrigation facilities in Agriculture through International Agricultural Research and funding from the aforesaid international funding agencies and support from the World Bank.

The activities outlined by the network research could benefit countries like Malawi especially people of Chiwaula area in Mangochi District which the study in this project was carried out. It is envisaged that Malawi as a nation, located in Sub-saharan Africa is one of the countries where Green revolution is taking place, the majority of people are poor and could be assisted in the activities and thereby improving their economic status and uplifting standard of living.

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Kanis and their Faiths in South India

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Abstract:-- **In ancient time the man is satisfied with the fulfillment of his basic needs. Then he prepared weapons to fight against the barriers that he faces. While them collecting food. He assumed that there is a super power beyond all. Nature possesses immense potential. He started analyzing the reasons for this. He scared of the power of nature. He wanted to cool it. So he developed certain faiths. Believes are related with customs most of believes are related with emotions. This believes persists in sub conscious mind and this stage is mental creation says Steven Sam. Based on the above statements man try to eliminate the evils and to reach good values. These are the basic criteria for believes. Kanis living in South India also adapt certain faiths based mainly on the fear and they follow their tradition.**

Key Words: Kanis, Faith, Super Power

INTRODUCTION

The faith in God commenced from the fear of nature. Man first started to worship earth, water, air, fire and sky. The faith in God and worship are based on the fear and out of love. Faith in God commence when man started his life on the earth. The people living in jungle fears more than the people in plains. This may be due to the environment and also out of fear. The Kanis are afraid of the nature and they believe that the spirit of dead person survive with them forever, says (Nirmal Kumar Bose 1971:63) Proto materialism and animism still prevails in the life style of Kanis. The worship is of two types viz worshiping little Gods and worshipping great Gods. To protect them from enemies, to control nature, to makes their enemies sick, to get cured from illness are the reasons for their worship Dr.V.I.Subramainum 1978:6 says that the idol worship of common man is due to fear of nature and the fear of the souls of dead. The religious believers of Kanis are clearly related with ancient Tamils. Kanis usually worship nature, souls and little Gods. The cultured people worship great Gods. The cultured people worship great Gods. As the Kanis do not mingle with civilized society, mostly they worship little Gods.

The Gods of Kanis

In addition with Panchaputham (Air, earth, sky, water and fire) they also worship sun, moon, stones and trees. They also worship the souls of dead, Goddess of forests, Pathirakali, Mariyamman and Pechiammals. They worship more than a hundred little Gods. Among the Gods of nature worshiping sun as a God is a major tradition among Kanis, when they start with anything new in their life they offer pongal to the sun God. While asking the importance of worshiping Sun, Kanis, reply that if there is no sun there is no life science also agrees with this fact. Neem, Vengai, Banyan and Jackfruit trees are the trees in which Gods reside, so that they produce later. This is the firm beleives of Arugani Kanis. Malankali is the chief among the little Gods. The Kanis do not make the idols of little Gods. They keep a cone shaped stone and worship. In recent years Kanis mingle with the people of Planis. So they started worshiping Siva, Vishnu, Murugan, Iyyappan, Pillaiyar and Parvathi. Some of the Kanis follow Christianity.

Offering to the Rain God

The Kanis of hilly area consider rain as a great blessing. They believe that the rain God Marriayaman bless them with rain. The elders living in Kani hamlet. Worship the God on every night before they go for sleep. If in their dreams they are ordered to give koduthi they tell to other Kani about their dream. All Kanis assemble and discuss the date and place of Koduthi Mutukkani takes the final decision. Villakain announces about koduthi to all the kanis. They spread seven plantain leaves in front of the hut and keep boiled rice, tender coconut, liquors, alcohol, banana, flowers any beetles leaves. At 12 noon the leaders of kanis and other Kanis offer their prayers.

Heaven-Hell

People of all religions beleive heaven and hell is awarded after death. Thiruvalluvar also insist this in his Thirukkural. If a man's deeds are for noble cause he goes to heaven after his death. If he does crime and do evil to other he goes to hell after his death. The same principle is deeply rooted in the minds of Kanis of Arugani.

The heaven is an external life awarded to the people who had lead a noble life on earth. The people who reached heaven on seeing the Holy tree (Karpagavericham) they ask whatever they want and it is granted by that holy tree. The doors of heaven are always opened for good souls. So they descend from heaven and come to earth to bless and help their relatives. This is the firm beleif of Kanis of Arugani.

The hell is a dwelling of the evil ghosts and dangerous arkkarar. A huge fire burns continuously. In contrast the evil souls are captured by ghosts and they put it in hell fire. The hell always has battles and chaos. These bad spirits spoils the human mind. This is the faith of Kanis of Arugani.

Fate

Kanis are firm believers of fate. The Kanis beleive that fate is determined by God. This fate is based on the life that he led in his previous birth. Due to this superstitious beleives. Some Kanis stay lazy at their home without doing any job.

Rebirth

Kanis believe that when a person is dead his flesh becomes water, his bones become powder and his soul becomes Vapour. His soul has rebirth. This is not only the belief of Kanis but also believed by ancient Tamils says Kural.

The believe of Kanis

Kanis family believe in rebirth. A man who leads a noble life with good values enjoys a good life in his rebirth. A man who leads a mean life and do not have good values is punished in his rebirth. Their rebirth will be in the form of a cat, a dog, a pig or a monkey. This is the common believe of Kanis.

Superstitious believes

Faith is an important life of humans. Some faith leads man in right path. Religious faith binds the family relationship. Respecting parents, loving the life partner are emphasized by religion. Sometimes these faith leads to superstitious believes. As kanis are not civilized society these believes are deeply rooted in their minds. Kanis are mostly indulged in Superstitious believes.

Good Omens

A woman carrying a filled kudam with a child is a good Omen. Married couple coming in opposite, sneezing while discussion. Dreaming of death, butterflies flying in day time, cry of certain animals, building of nests of certain birds in the huts are the good omens.

Entry of flies and animals

Animals such as squirriles and bees entering their huts and building their nests or hives are considered to be good omen. They fore tell the good fortune.

Cry of a Crow

When the Kanis discuss about some good issues, if a crow cries, it is believed that some important guest would come to their home.

Sound produced by lizard

The sound made by lizard is considered to be good omen from the period of sangam for the Tamils. This is emphasised in (Natinai Poem No: 333)11 ancient Tamil literature. This is firmly believed by most of the community and Kanis also beleive the same.

Bad Omen

When Kanis get themselves ready to go out of their hut for a good event if their head hit the entrance frame, it is considered to be a bad omen. Similarly a widow coming across is also considered as bad omen. A lady with open hair, taking a dead person, carrying a snake bit person on the way are some of the bad omens according to Kanis. The cry of animals and birds such as cat, snake and owl are considered to be bad omen by kanis.

Cry of an Owl in evening

Owl is referred as kukai by Kanis. If the owls cry in the evening near their hut, it is prediction for death says Kanis of Arugani.'

Cat Coming across

If any Kani steps out of the door for a noble cause, and if a cat come across his way is considered to be a bad omen and he beleives that the day is not good for him.

Falling of lizard on a kanis

Kanis beleive that if a lizard falls on his head or his body, they suspect some evil things will happen in their life shortly.

Calling of a dead person in dream

When a Kani sleeps, if he dreams of his relative calling him in dream is a prediction of that Kani's death and Kanis are scared of this dreams.

Seeing a snake in dream

Everyone knows that snakes are poisonous, so they are mostly disliked by humans. Seeing a snake in dreams is a sign of bad thing that is going to happen very shortly.

Sneezing

When the Kanis think of some good deeds or while they are planning discussing about some good things, if a Kani of same sex sneezes, it is said to a bad omen.

Fortune tellers

Still now Kanis are considered to be good fortune tellers. We can see them in tourist places especially at kanyakumari. This is encouraged even by the people who live in country side. If a Kanis decides to do something, he asks Pillathi to predict whether he has to do or not? Three types of fortune telling is famous among Kanis.

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Predicting future using flowers

Pillathi prays to God and he keeps some flowers which are varied in colours. A Kani who wishes to know whether his desire will be fulfilled. Pillathi tells the Kani to select a single flower. If the flower is same as the one already in Pillathi's mind, the action will have good end otherwise, the God does not give permission for his mission. So the Kani stops his mission.

Using rice for predicting future

Pillathi thinks of a particular matter in his mind he prays to God a takes a handful of mountain rice (Malai Nel). If the number of rice is odd, he allows to do that matter. If the number is even he tells that God does not give permission. As Kanis always beleive the fortune telling they do not use their wisdom. They are unaware of the new trends. They are very lazy to know about what happens around them and are ready to lead a lazy life. This is the reason behind the barriers in the improvements of Kanis life style.

Anger of Gods

Kanis have taken the Goddess of mountain as their main God. In addition they also take Malankali, Kalattu Thampuran, Malaivathai, Marriyammal and the ghosts of their ancestors. They offer pongal and Keduthi to cool these Goddesses. They firmly beleive that these offerings reduce the anger of their Goddesses. Otherwise Kanis are harmed by them, Says Kunchamma Kani of Arugani.

Gealousy

Kanis believe that the vision of some people is harmful. If a man has Gealous in his mind and if he sees children or adults it may spoil their health.

Thettu

'Thettu' means impure. A girl who has attained puberty, ladies in mensus period and a lady who has given birth to a child is said to be impure. They are isolated from others. They spend these days in a separate place. They do not mingle with others unless they are purified. Other Kanis also do not touch or mingle with them. During these days the ladies are prohibited from cooking and working in fields and farms.

Believing Devil or Ghost

If a person dies in young age due to accidents or the attack of wild animals their soul do not rest in peace. It is said to be roaming around. It is believed that if a person comes out of the home and walk alone in a road at nights, if the ladies in theettu period comes out of the hut, especially ladies, these ghosts catch hold of them. The person affected in this way. Stay without laking food and they are very sad the laugh alone and wander without sleep. They vomit after taking food. They shout loudly and stay at home lazily. These symptoms show that the person is affected by ghost. Kanis call upon peyooti to send out the ghost in the body of affected person.

Manthira

Formerly man is afraid of nature, he firmly beleived that some force control this nature. They also beleived that these ghosts or devils can be controlled by certain hypnotic activities. These become Manthras later these manthras can control many activities. This technology is purely out of imagination, says (Thomson George 1980:11)13 People all around the world do manthra based on certain believes. Kanis do manthras purposely. Based on the results the manthras are of two types 'Oththa Manthra' and 'Thoththu Manthra'.

Tribals and Manthras

The people who are down troadan and illiterate have a lot of superstitious beleives. The tribes live along with nature they have many such beleives. Kanis also have faith in foolish manthras. They do black manthras to do harm and to cause diseases to their enemies. They also do pure manthras to eradicate the effects of black manthra.

Hypnotism

This is used to attract or to keep a person into one's control or love. This is usually done by telling manthra in the spit or dirt collected from concerned person and telling some manthras on it and mixing with the person's diet. The Kannis beleive that through this hypostising activities the bond between a husband and a wife and a loving bond between lovers get more stronger and they stay together longer.

Black Magic (Seivinai)

Kannis are very famous for doing Black magic. The Pillathis of Kanni society knows the manthras. He never tells the secrets to others. They mostly prefer new moon days for doing black magic. Kanis of Arugani use egg of a hen, or lemon for doing black magic against their enemies.

Puttu Seivinai

In order to case fatal disease to the opponent, this Puttu Seivinai is used. They collect the fallen hair, soil beneath the foot of the enemy. They mix it with bone remains from cremation yard and make a small bundle. Tells the manthra and the enemies name thrice and keep it in ant hill (puttu) and close it with a stone. They beleive that this black magic causes very dangerous and incurable diseases the cancer to the enemies.

The bones collected from cremation yard

There is a universal belief that the sand or bone collected from the cremation yard. The thieves cover the bone of a cremation yard with molten wax and use it as a candle. When the thief enters a house he lits the candle. This

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includes a good sleep to the people at home. (Frazer George 19676:30)15

Vasiya Manthra (Hypnotism)

Hypnotism is an ancient tradition of most of the people in this world. Chineese are famous for hypnotism. This is done to bring a person to one's control. This is used to win a lover, to separate a husband and a wife, and to cause enemity among relatives. The hypnotism has mostly spread over the villages of Tamilnadu. These is an alternate method for sucking out medicine send in through manthra. When the opponent is walking on the street if he steps on the manthra articles he becomes very weak day by day and die pathetically. For doing evil manthra, Kanis we the hair, the soil beneath the feet, a thread from the used cloth, urine of the opponent, skull, sand and bones collected from cremation yard. Usually Kanis and other tribes have the faith that the waste of humans have evil effect. This is the reason for avoiding the usage of toilets and laterines by trib.

Kanis live a life attached with nature. Their traditions and faiths cannot be easily uprooted from their lives. As the Kanis are mostly illiterate they give importance to superstitious believes. They are afraid of civilized society and do not mingle with them.

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"The science and medicine underlying cricket performance and injury: an overview"

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Abstract:-- **Research into the science and medicine underlying cricket performance and injury has progressed since the First World Congress of Science and Medicine in Cricket in 1999. This review covers material on the physiological and psychological demands of the game and preparation for it, the biomechanics and motor control of cricket skills, the psychology of team dynamics, performance analysis and cricket injuries. Technological aspects of cricket equipment are also covered, where such research could influence injury risk or player performance. Fielding remains the least studied of the skills. Much more research needs to be done before we can gain a full understanding of the scientific aspects of the game. There is a need to address common definitions of injury, along with more research into injury mechanisms. Research on batting needs to bring together motor control and biomechanics more fully. The fitness demands of the game are still poorly understood, along with the mechanisms causing fatigue. Evaluation of the efficacy of intervention strategies needs to continue and to develop. The applications of research need to be communicated more to coaches and players.**

Key Words: batting, bowling, cricket, equipment, fielding, injuries.

INTRODUCTION

Cricket is often thought of as a sport in which the main competitions are more individual-to-individual than in any other team sport. Much research has concentrated on the batters and bowlers, but far less on the fielders, rather than on team dynamics. This overview and update will follow a similar path and cover material published since the First World Congress of Science and Medicine in Cricket, held in Lille shall, England from 14 to 17 June 1999. Comprehensive reviews of batting (Stretch et al., 2000), bowling (Bartlett et al., 1996; Elliott et al., 1996; Elliott, 2000) and preventing cricket injuries (Finch et al., 1999) already exist. This review will draw on material from these, and earlier research papers, only to illuminate more recent research. The physiological and psychological demands of the game and preparation for it, the biomechanics and motor control of cricket skills, the psychology of team dynamics, performance analysis and cricket injuries are all covered. Technological aspects of cricket equipment are covered if that research could influence injury risk or player performance. This review draws on published material on cricket in the English language from science and medicine journals across the world. Coaching reports, publications from other sports, and 'mainstream' science and medical research that might have applications to cricket are not, in general, included.

Fielding

Despite the adage that 'catches win matches', research into fielding in cricket is sparse compared with that for batting and bowling. The main focus of such research has been the interceptive skill of catching (e.g. Morris,1976). This skill varies considerably from the wicketkeeper and slips, who mostly intercept a fast moving ball coming off the edge of the bat and reaching them below chest height, and outfielders, who mostly try to catch a ball falling from above head height. Other aspects of fielding have not been well researched. These include maintaining focus and concentration over 2hperiods, the fitness requirements of standing for such periods within a 6 h playing day, and the skills of stopping, retrieving and throwing the ball. The same is true for the very specific demands imposed on the concentrate for every ball delivered, adopt a body position that is far from ergonomically sound, catch and stop all balls within range, and move quickly to the wicket after any hit that required a fielder to stop and retrieve the ball. In the modern game, he is also expected to 'sledge' the batters to undermine their confidence and concentration. Little recent research exists on injuries to fielders. Finch et al. (1999)reviewed research into the whole gamut of cricketing injuries. Their review included little on fielding compared with the other skills in the game. Fielder shave the most upper limb injuries (26%; Stretch, 1993),possibly because of the forces involved in throwing long distances. The seasonal injury incidence rate for fielders in South African schoolboy cricket was less, at 23%,than for batters (30%) and bowlers (47%). Barton(1997) considered that most hand injuries in amateur cricketers are caused while trying to catch the ball, but he provided no corroborative data.

Cricket pundits generally agree that one of the benefits of the one-day game has been vastly improved standards of fielding, owing to both improved fitness sand, perhaps, better techniques. One of the most spectacular new techniques is the sliding stop. This isused for interception or retrieval before the ball reaches the boundary. Such retrieval might not have been possible using the conventional long-barrier interception or a conventional retrieval. Alternatively, use of the sliding stop might save time compared with the more traditional techniques; this time advantage might enable a return of the ball to save a run or effect a run out.

Von Hagen et al. (2000) reported the case of an English club cricketer, aged 17 years, who sustained a bucket handle tear of the medial meniscus in his left knee when performing a sliding stop incorrectly. When performed correctly, the technique, for a right-handed fielder, involves sliding on the left buttock and knee with the right leg extended out in front, the left knee flexed and the left hand aiding balance. The ball is then collected in the right hand and the right foot lands on the ground; the momentum of the slide and a push on the ground by the left hand brings the fielder upright ready to throw the ball, all in a smooth movement. In the case reported, the cricketer failed to bring his right foot into contact with the ground so that the momentum of the slide was not used to bring him upright; heal so did not use his left arm sufficiently to lift himself. Instead, his left knee extended actively, rather than passively in the correct technique, when all of his weight was on that leg in a fully flexed position. The large torque that resulted at the knee was considered by VonHagen et al. (2000) to have caused the meniscal tear. Their conclusion that 'The sliding stop should be discouraged as a means of fielding in cricket unless appropriately coached' might seem somewhat overdramatic, based only on a single incident. Nevertheless, careful monitoring of injuries caused by this technique is needed and it should be taught properly to younger players. Young cricketers will seek to emulate test players and the sliding stop is far more athletic and spectacular than its conventional rivals.

Myers and O'Brien (2001) considered that shoulder injuries in cricket were less than would be expected in as port that incorporates throwing. The shoulder injuries that do occur were largely attributable to fielders throwing accurately for distance; bowling could then further aggravate these injuries. Eccentric loading in the later phases of the throwing action can lead to rotator cuff lesions, most commonly from the mid-supraspinatus to the mid infraspinatus. Shoulder injuries were less common in bowling because of the rules governing the technique, although overuse injuries to the rotator cuff muscles do still occur. Myers and O'Brien (2001) did not link these injuries to training, although specific rotator cuff exercises are unlikely to form part of the training regimen of most sub-elite players. Other changes in the game of cricket as a result of the growth of the one-day game have been white (rather than red) balls, black (rather than white) sightscreens and artificial (rather than natural) lighting. Previous research (e.g. Koslow, 1985) supports changes in reaction time as chromatic cues change, with the luminance contrasts of the ball and background being particularly important. Ball colour had no effect when luminance effects were compensated for or for highly skilled catchers.

Batting

Reviewing the demands of cricket batting, Noakes and Durandt (2000) cited the results of Gore et al.(1993) that the mean heart rate during a day's cricket rarely rises above 128 beats _ min71 for batters (andfielders). They went on to estimate the peak activity of a batter during a one-day game. This hypothetical player scored 100 runs while the other batters also scored 100runs. With each player scoring 50 singles, 20 twos, 10threes and 20 fours, each would cover 3.2 km in anactivity time of 8 min – an average running speed of24 km _ h71 and with at least 110 decelerations. Fromthese hypothetical but quite representative data, Noakesand Durandt (2000) deduced that the physiological demands of batting in the one-day game are substantial. Players need to be fit to reproduce their performances over a long series of one-day games, which also subject each player to around 3.5 h of vigorous fielding. These series of one-day games often precede or follow a Test series of three to five matches, or are sandwiched between two three-match Test series. The picture of cricket as a leisurely activity is clearly fallacious for international batters. It also explains the excellent fitness of South African international batters reportedby Noakes and Durandt (2000). They found that these batters had an average body fat composition of about12%, the same as the bowlers. The batters, compared with the bowlers, had a higher predicted _VVO2max (basedon a 20 m shuttle run), were faster running a simulated three runs with quicker turn times, and had similar leg press, bench press and 35 m sprint performances. There were also no real physiological differences between the two cricket groups and international rugby players.

Noakes and Durandt (2000) went on to speculate that the stress of cricket is due to the repeated eccentric muscle damage resulting from the repeated decelerations that occur in batting (and fielding). Substantial muscle strength is needed to reduce muscle damage arising from repeated eccentric contractions. This observation is supported by the findings of Thompsonet al. (1999) for the similar activity of shuttle runs. No further research on the physiological demands of cricket batting is apparent since 2000.

Far more research into cricket equipment has occurred, whether to reduce injury or enhance performance. In addition to the research reported by Stretch et al. (2000a), Alexander et al. (1998)reported progress on cricket glove design and Knowles et al. (1998) and Stretch (2000) have reported further developments on cricket helmets. Alexander et al. (1998) surveyed County cricketers. Of the 59 respondents, 66% used the 'sausage finger' style of glove and 34% the 'square finger' style. The main factors that led to selection of a glove were reported to be comfort, protection and contractual obligation to the glove supplier. Only 8% of the sample were happy with the protection the gloves afforded their fingers and thumbs. Hand or finger fractures were sustained by 39% of the group when batting. Twenty-five of the 44 breaks were on the bottom and 19 on the top hand. The thumb and first finger of the bottom hand plus the small finger of the top hand were most commonly fractured. After talking to players, physiotherapists and other experts, a new design of glove was specified. Current foams used in cricket gloves are unsuitable for cushioning impacts at the release speeds of the fastest bowlers, which can exceed 140 km_ h71. Although foams that absorb more energy could resist such impacts, they are too rigid and deform permanently. After testing various designs of glove and insert, the final preferred design incorporated a pre-bent double finger Kevlar insert protecting the first two fingers of the bottom hand. In addition, it had 'sausage' fingers – to maximize protection and eliminate the problem of hinged fingers opening up on impact, thereby exposing joints – and a Kevlar sheet over the back of the hand. Foam padding was used around the web between the thumb and first finger of the bottom hand and along the outside of the top hand. It will be interesting to see if any manufacturer takes up this design and, if so, what effect it has on injuries.

The performance of a cricket helmet depends on its two main components – a stiff shell to spread the impact force and a softer lining to cushion the blow and absorb impact energy. Stretch (2000) used a drop test equivalent to an impact of a ball released at44.4 m_ s71 (160 km _ h71). The impact sites were right temple, forehead and back of the helmet. An accelerometer recorded impact accelerations, for which the recommended safety standard is a maximum of 300 g. Of the 18 impact sites (three sites for each of six helmets), 11 met the safety standard. Three helmets met the standard at all three impact sites. These helmets featured, respectively, a multiple-density lining of ethylene vinyl acetate (EVA), a high-density EVA lining and a moulded polyurethane insert. The inner layers of the two helmets that failed at two impact sites, and the one that failed at all sites, had a low-density EVA lining. This unsuitability of low-density foam linings was also reported by Knowles et al. (1998), who tested combinations of shells and foams by firing a cricket ball from a bowling machine at 25 m_ s71. This bowling speed is about that of a spinner's quicker delivery and well below the speeds of up to 40 m_ s71 from fast bowlers from which helmets need to protect the batter. Nevertheless, Knowles et al. (1998) found that the stiffer the shell, the better the protection, although changes were small for flexural rigidities above 50 N_ m. The stiffer foam gave better results, but the effect was not as substantial as increasing foam thickness. However, thicker foam meets customer resistance because of the increased helmet size. The message from both of these studies is clear: batters should avoid using helmets that have low density foam linings. Batters should wear helmets if they are to avoid the risk of being killed from an impact of a cricket ball on the head, as reported, for example, by de Bruxelles (2002).

The performance of a cricket bat is rather restricted by conservative rules that have prevented novel designs(see Stretch et al., 2000a). The performance of the batmodelled as a rigid body depends upon various factors ,including the location of the 'sweet spot' and the coefficient of restitution between bat and ball. However, neither the ball nor the bat is a rigid body during impactand finite element analysis (FEA) should allow a deeper insight into the behaviour of the bat on impact. Grant and Davidson (1998) described the development of a test procedure to measure the coefficient of restitution of a bat at various impact points, but no results were reported. McKellar et al. (1998) reported a system using an instrumented bat that allowed the accurate measurement of the position of impact with the ball. The rationale behind this development was to analyse a batter's strokes with a view to improving coaching methods and batting technique. Al though examples of impact distribution along and across the bat were reported, and although it is clear that the distribution of impacts should be much less for good players, no applications to coaching or technique improvement were reported.

Bowling

Research into cricket bowling has, since the early days of the investigations of Elliott and his co-workers at the University of Western Australia (e.g. Foster et al.,1989), focused on low-back injuries in fast bowling. The current view is that these injuries are associated more with the mixed technique than with the front-onor side-on techniques. The reviews of Elliott et al.(1996) and Elliott (2000) have comprehensive coverage of the occurrence of back injuries in fast bowlers in cricket. Although the exact mechanisms of disc bulging and degeneration, and subsequent neural arch fractures, have not been established, the association between these injuries and the mixed bowling technique are very strong. Indeed, a statistically significant association between the two was reported by Elliott etal. (1992). The causes are probably:. greater rotational stress in the lumbar spine of mixed technique bowlers, owing to the counter-rotation of the shoulders with respect to the hips in thistechnique; the

hyperextension, or backward arching, of the lumbar spine that follows;. the high impact forces with the ground experienced by all fast bowlers. Rasch (1989) explicitly linked this triad – high compressive loading, rotational stress and backward arching – to low-back injury. Such a clear association between a sports technique and a specific injury is, to date, rare. It is encouraging that the cricket in authorities have taken these research findings seriously and have sought to reduce dramatically the incidence of this potentially injurious technique among young fast bowlers. For instance, the ECB now provides coaches with information on how to coach the front-on technique, how to recognize the mixed technique, and how to convert the latter technique into the far less injurious side-on or front-on technique. It is only recently that the Marylebone Cricket Club (MCC)Coaching Book has acknowledged the front-on technique(Lewis, 1994). Before that, the side-on technique was the only recognized bowling style. This might have contributed to the high incidence of mixed technique bowlers, as their teachers and coaches tried to convert front-on bowlers into side-on bowlers, but instead made them mixed. Even Lewis (1994) failed to mention the mixed technique, although Elliott and Foster (1989)and Bartlett (1992) had warned of the injury risks of this technique. This omission has since been rectified byECB posters and other coaching material. This close association is not to suggest that the mixed technique is the only factor in this injury. Hard floor surfaces in indoor nets, inadequately cushioned footwear, excessive deliveries, particularly by young bowlers, physical preparation and age are all facets of this overuse condition, but have not been researched to the same extent as the bowling style (Gray et al., 2000).Again, it is encouraging that the authorities of the game have acted to restrict the number of overs bowled by young fast bowlers (Bell, 1999). Measures have been taken to put shock pads into the floor surfaces in indoor cricket schools (see, for example, www. essexcricket.org.uk/facility.shtml). Scope still exists for research into what footwear would provide best protection from injury for fast bowlers performing on the variety of ground surfaces that they will encounter in practice and competition.

Walker et al. (1999) reported a 4 year prospective study of 79 young cricket fast bowlers using magnetic resonance imaging (MRI). These bowlers had a high observed incidence of stress fractures of the lumbar neural arch, as did 8 of the 13 elite fast bowlers in the study of Engstromet al. (1997). In companion studies, Engstromet al. (1999, 2000) proposed that paraspinalmuscle hypertrophy is an important intrinsic factor in these stress fractures. They reasoned that strenuous prolonged loading was a stimulus for asymmetric hypertrophy that, with a concomitant shear loading, predisposed bowlers to stress fractures of the neural arch. Twelve of the bowlers in this study had these fractures as well as more than 10% asymmetry of the quadratuslumborum volume on the bowling side Identification of a technique that is associated with injury is one thing; doing something to reduce or eliminate it is another thing altogether. A low-budget project with age-group fast bowlers of an English county cricket club over 5 years has had individual successes in changing young bowlers into side-on or front-on with concomitant reductions in low-back pain (R. Bartlett, unpublished observations). The process had much to recommend it, involving qualitative video analysis and an intervention to change technique based on independent analyses by the coaches and scientists involved. The next stage was to involve the bowler and his parents and to demonstrate specific activities to change technique. However, the low budget did not allow the intervention to be sufficiently frequent, to be closely followed up or to involve enough bowlers to draw meaningful conclusions. Burnett et al. (1996) reported the inability of a coaching seminar, which highlighted the dangers of the mixed technique, to decrease the rate of disc degeneration in young fast bowlers over a 2½year period. Elliott and Khangure (1999) looked at the effects of a coaching course plus group practice sessions on reducing shoulder counter-rotation and disc degeneration in young fast bowlers. Neither shoulder counter-rotation nor disc degeneration was changed to a satisfactory extent.

As well as being deceived by swing bowling, batter scan also be deceived by irregular ball bounce, for example depending on whether the ball hits the leadingor trailing edges of a crack on the pitch. Carre´ et al.(1998) reported the analysis of cricket ball impacts using digital stroboscopic photography. The system they developed was capable of showing differences in ball behaviour between different pitch types. The accuracy of the system was better than the inconsistencies within a type of pitch. The system is still undergoing development and improvement.

CONCLUSIONS

Research into the science and medicine underlying cricket performance and injury has progressed since the First Congress on Science and Medicine in Cricket in1999. However, much more research needs to be done until we have a full scientific understanding of the game. For example, we need both to address common definitions of injury and to carry out more research into injury mechanisms. Batting research needs to bring together motor control and biomechanics more fully. The fitness demands of the game are still poorly understood, along with the mechanisms causing fatigue. Evaluation of the efficacy of intervention strategies needs to continue and to develop. The applications of research need to be communicated more to the coach and players, in areas such as team dynamics, so that they can be applied, and tested further, in international matches.

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An Economic Study of Agricultural Farmers Affected by OCKHI Cyclone in Nagercoil of Kanyakumari District

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Abstract:-- **A cyclone is a large wind that affects the entire place. Cyclones are heavy winds that rotate everything in the universe. Ochki cyclone has a great impact in the field of agriculture in the district. Cyclone has made the people without treasure of life. A cyclone is a air that rotates around a strong center of low pressure .Cyclones are made by inward spiraling winds . Heavy cyclones likes as tropical cyclones and subtropical cyclones also lie within This situation describes the process of cyclone formation and intensification. Cyclone is the remarkable one in agriculture. Critical situation is created by Ockhi cyclone in the time.This paper shows the highlights of the cyclone.**

INTRODUCTION

Cyclone Ockhi crossed the sea near Kanyakumari, the southern tip of mainland India, on November 30. Though it changed direction near Kanyakumari and headed towards the Lakshadweep Islands in the Arabian Sea, it caused havoc and destruction in the southernmost districts of Tamilnadu and Kerala, particularly Kanyakumari District of Tamilnadu and Thiruvananthapuram District of Kerala. Damage throughout Kerala was initially estimated at Rs 1843 crore. In Tamil Nadu damage was estimated more than Rs 1000 crores. As a Deep Depression, the system lashed the coast of Tamil Naduand Kerala, damaging infrastructure and taking the lives of 34 more people. An estimated 52 in Kerala and 11 people in Tamil Nadu died in the cyclone with many others missing. On December 2, the cyclone hit the Lakshadweep islands. Cyclone Ockhi has crippled the entire power infrastructure of the Kanyakumari district of Tamil Nadu. Estimates say 4,000 power lines have been affected including 1,500 high tension lines leaving the district largely powerless. Many people have lost their lives, mostly due to trees falling because of heavy rain and wind. More than 30 fishermen from Kanyakumari are still missing. Severe crop damage has also been damage including destruction of banana plantations and inundation of paddy crops . A team led by the director of cooperation and farmers welfare K Manoharan visited paddy cultivation and coconut groves damaged by the cyclone at Thiruppathisaaram, Suchindram, Karkaadu, Vadakku .

REVIEW OF LITERATURE:

Regarding the surplus labour in agriculture, Mehra, S. (1966) states that the excess of actual over the required work force on farms constitutes such surplus population on farms. She also points out that the same workers, however, may be engaged in non-agricultural activities like household industry and may thus be performing a productive activity but they are surplus in respect of agriculture. Singh, G. (1980) found that even though the green revolution was ushered in Punjab in the mid-sixties, the condition of agricultural labourers in Ludhiana district had not improved because a large section of them was still living below the poverty line. NCAER study (1980), found that after adoption of new agriculture strategy (NAS), there was huge introduction of machinery like tractor and other equipments etc., which created employment opportunities in non-agricultural sectors due to the backward linkages. Factories concerned with manufacturing of agricultural machinery and its supporting units provided employment to more workers.

OBJECTIVES

1. To find out the socio economic conditions of the farmers
2. To analyze the working conditions of the farmers.
3. To identify the problems of the farmers Ockhi cyclone.

SIZE OF SAMPLES

In the present study 50 sample respondents have been chosen by using simple random sampling.

DATA ANALYSIS

Income level classification

Income and expenditure are the two edges of life. The purchasing power of an individual is based on income. Table 3.4 shows the income of the sample respondents.
Income level classification of sample respondents

Amount (in Rs)	No. of respondents	Percentage
Below 10,000	6	12
11,000-15,000	12	24
16,000-20,000	9	18
Above 21,000	23	46
Total	50	100

source :Primary data

The above table yearly income earnings of the 23 respondents reveal that 46 percentage of the respondents earn income above Rs21,000 per year. 6 respondents reveal that 12 percentage of respondents earn annual income of below 10,000. Thus variation in income per day is due to the skill of the workers and the years of experience that they have gained

. Expenditure level classification of sample respondents

Amount (in Rs)	No. of respondent	Percentage
Below 30,000	8	16
31,000-40,000	32	64
Above 41,000	10	20
Total	50	100

Source: Primary data

The expenditure level of the 32 respondents reveal that 64 percentageof the respondents spent within Rs31,000-40,000 each year. 10 respondents reveal that (20%) expenditure is above Rs41,000. 8 respondents reveal that 16 percentage spent below 30,000 each year. Only big farmers (who has own land)spent more on agriculture.

EFFECTS DURING OCKHI CYCLONE

Ockhi is a cyclone it affects kanyakumari district. The agriculture labours face many defects during ockhi cyclone. The water destroy their land, crops and also their cattle died during ockhi cyclone.

Effects during Ockhi cyclone

Defects	No. Of respondents	Percentage
Destructors of land/house	17	34
Detonation crops	23	46
Loss of cattle	10	20
total	50	100

Source: Primary data

Table shows during the attack of Ockhi cyclone 23 respondents 46 %faced destruction of crops. The houses 17 respondents 34 % were destroyed . 10 respondents 20 percentage lost their cattle due to Ockhi cyclone.

FINDINGS

Fifty six percentage of agricultural farmers are age group 51 to 60.Forty six percentage of the sample respondents income level is above 21,000.Sixty eight percentage of sample respondents borrow debt in private sector .Eighty percentage of the sample respondents should not have a job satisfaction .Fourty Four percentage who have tiled hous Forty six percentage of the sample respondents crops destroy during the attack of ockhi cyclone. Sixty four percentage of sample respondents expenditure level is between 21,000 -40,000. Sixty Eight percentage get loan from private sector. Sixty percentage of the sample respondents was affected their lands.

SUGGESTIONS

The government should conduct an awareness program to give the knowledge about cyclone and natural disaster.e government should help the people those who are affected by the cyclone.The price of the paddy must increased in order to raise the standard of living.The government must provide proper seeds and manure to increase the yield.

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Execution of Internal Curing Method on Concrete Using Pre-Soaked Light Weight Aggregate

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***Abstract*:-- Low water-cement proportion solid mixs have been progressively advanced for use in Civil Engineering foundation because of potential changes in quality and sturdiness. Notwithstanding their expanded quality and diminished porous nature, the structures are defenseless to early-age splitting. Techniques have been created to lessen the breaking in structures. One such strategy is interior curing. The utilization of internal curing operators can give an adequate volume of water by methods for light weight aggregates (LWA). Notwithstanding the volume of water gave by the LWA, the dispersion of the LWA assumes a fundamental part in the viability of interior curing. Recently, high-performance concrete (HPC) has been increasingly used in practice, with the development of concrete technology and the introduction of super plasticizer and silica fume. High performance concrete is a concrete, which has far super quality and sturdiness attributes when contrasted with regular cement. The present examination researches the quality related properties of HPC specimens like flexural quality utilizing silica fume, super plasticizer in the inward curing technique. The mix proportion of 1:1.76:2.52:0.36 is utilized to cast pillars (100mm X 150mm X 1700mm). The HPC specimens are thrown with supplanting of concrete with 12% of silica smoke and expansion of 6%,12%,20% LWA vermiculite. From the pressure test result, ideal rate substitution of LWA is discovered and utilized for throwing bar. The aftereffects of flexural tests directed on shaft specimens demonstrates that 6% substitution of vermiculite gives the higher quality in both water and inward curing conditions.**

Keywords - High execution solid, light weight aggregates, vermiculite, silica seethe, shrinkage.

INTRODUCTION

Strategies For CURING: 1)Water-showering at appropriate interims – however there are challenges in guaranteeing that this type of curing is really completed 2)Maintaining a mugginess at least 80% – not generally a down to earth arrangement 3) Internal restoring by utilizing uncommon added substances 4)Internal relieving by utilizing lightweight aggregates.

Internal CURING: "inward restoring refers to the procedure by which the hydration of cement happens as a result of the accessibility of extra interior water that isn't a piece of the mixing water." For some years, we have relieved cement from the outside in; interior restoring is for relieving concrete from the back to front. Inside water is by and large provided by means of internal stores, for example, lightweight aggregates (LWA), superabsorbent polymers, saturated wood fibres.

Cement kg/m^3	Fine aggregates kg/m^3	Coarse aggregates kg/m^3	Water/m	Silica fume (kg/m^3)
327	681.72	1181	140	58
1	2	3.61	0.364	0.18

SI.NO	TESTS	NO OF SPECIMENS
1	Flexure test	4

II.MATERIALS USED

Common Lwa – Vemiculite
Silica Fume
Superplasticizer – Conplast Sp430
Common LWA – Vermiculite is a sort of mica that will extraordinarily extend. It Produce lightweight protecting cement—250 to 1450 kg/m3 Vermiculite is a characteristic mineral that grows with the utilization of warmth. The

development procedure is called shedding and it is routinely proficient in reason composed business heaters. Shed vermiculite is utilized as a part of both hand and splash connected general building mortars to enhance scope, simplicity of taking care of, and grip to a wide assortment of substrates, imperviousness to fire, and protection from chipping, splitting and shrinkage.

III OBJECTIVE & METHODOLOGY

The following parameters are to be studied: › Deflection behavior › Initial crack load and its location › Load Vs deflection behavior › Stress VS strain characteristic.
Starter tests on cement, fine aggregates and coarse aggregates. 2. Mix Design for M40 concrete. 3. Mix extent for light-weight concrete by utilizing the vermiculite.4. Assurance of compressive quality of configuration mixes. 5. Throwing of pillars with light-weight concrete and typical cement. 6. Flexure test on specimens.

IV. MATERIALS AND MIX PROPORTIONS

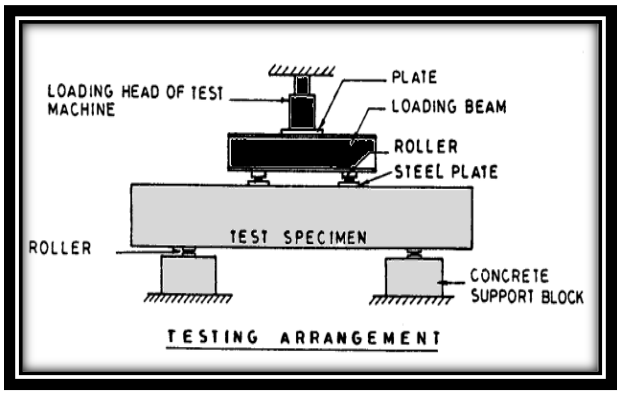
Concrete – Ordinary Portland cement of 43 review
Fine aggregates – Sand of particular gravity 2.65 Coarse aggregates – Gravel of particular gravity 2.76
Grade of concrete – M40
Mix Design - 1 : 2 : 3.6 w\c ratio 0.36

BEAM DETAILS :

Specimen details	% replacement of LWA				Curing condition	No of beams
	vermiculite	SF	SP	w/c ratio		
S1	-	-	-	0.36	WC	1
S2	-	-	-	0.36	IC	1
S3	6	12	1.2	0.36	WC	1
S4	6	12	1.2	0.36	IC	1

REINFORCEMENT DETAILS:
Provide 2 numbers of 10mm dia bars in main reinforcement at bottom of the beam.
Provide 2 numbers of 8mm dia bars in hanger reinforcement at top of the beam.
Provide 2 legged 6 mm stirrups at 100 mm throughout the beam.

EXPERIMENTAL SET UP



FLEXURE TEST

VI.LOAD DEFLECTION BEHAVIOUR

Load Vs deflection plot has been drawn for all test specimens from the trial information. The conduct of test specimens is analyzed the plots. The principal break and deflection cracks were recorded alongside the relating relocations and strains.

Load (KN)	Deflection			Remarks
	L/2	L/3	L/4	
0.00	0	0	0	
2.08	0.01	0.04	0.07	
4.92	0.94	0.92	0.89	
6.58	1.03	1.61	1.48	

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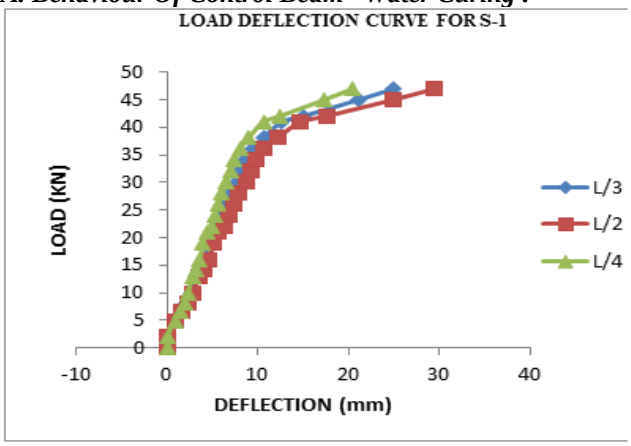
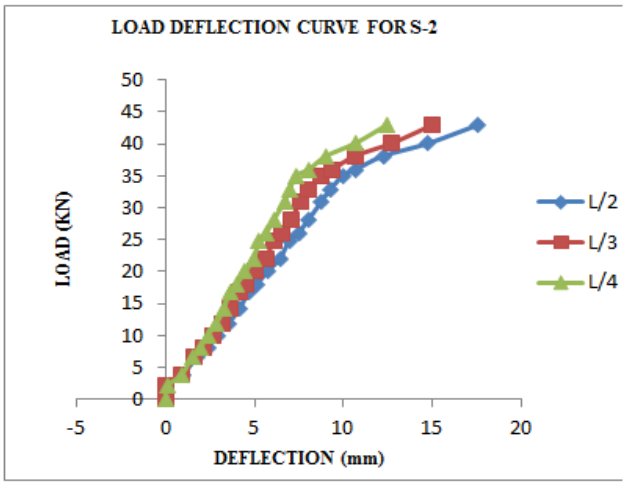
8.01	1.35	2.14	1.93	
10.00	1.91	2.62	2.33	
12.91	2.51	3.15	2.78	First crac
14.09	4.12	3.67	3.23	
16.04	4.67	4.15	3.64	
18.94	5.08	4.52	3.94	
20.98	5.68	5.01	4.38	
22.07	6.39	5.65	4.92	
24.11	6.85	6.03	5.21	
26.06	7.41	6.51	5.61	
28.00	7.98	7.01	6.05	
30.00	8.72	7.65	6.58	
32.04	9.21	8.09	6.97	
34.03	9.84	8.63	7.42	
36.08	10.73	9.38	8.04	
38.07	12.21	10.61	9.01	
40.97	14.72	12.67	10.62	
42.01	17.55	15	12.44	
46.92	20.88	21.08	17.29	
48.96	22.52	25	20.46	failure

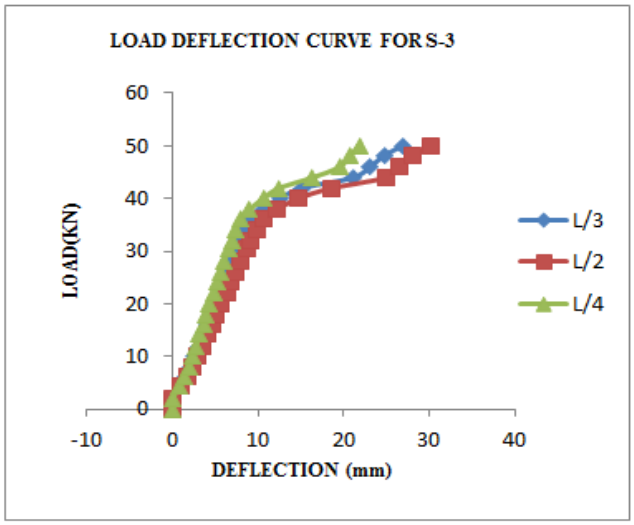
A. Behaviour Of Control Beam –Water Curing :



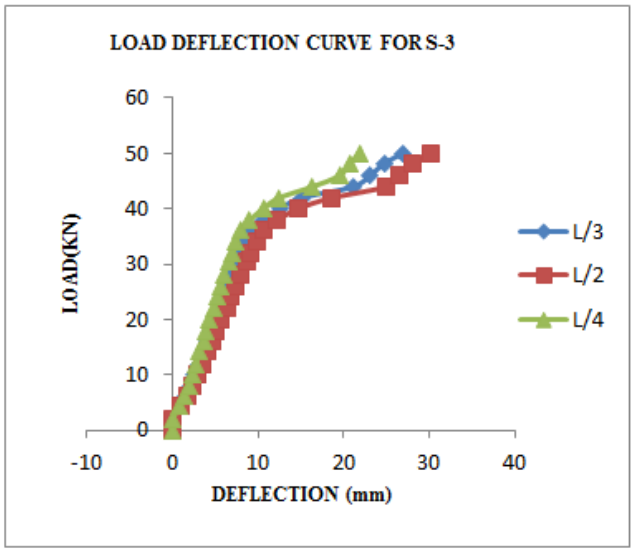
B)Behaviour Of Control Beam –Internal Curing :



C) Behaviour Of S-3 –Water Curing



D)Behaviour Of S-4 –Internal Curing



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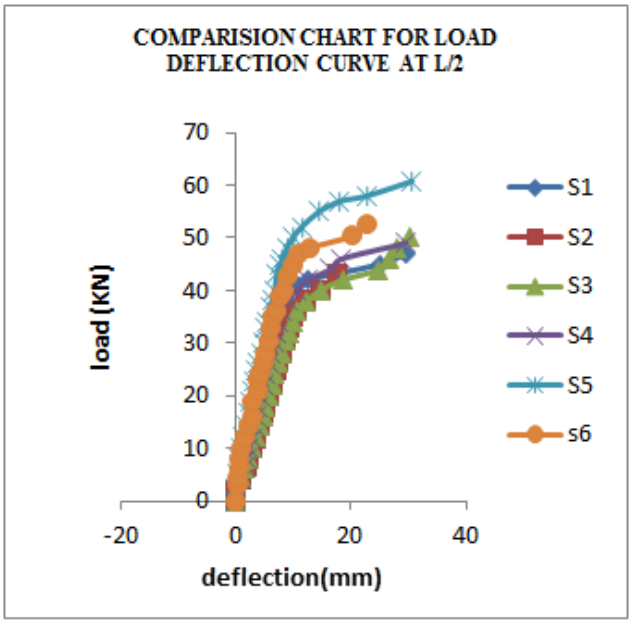
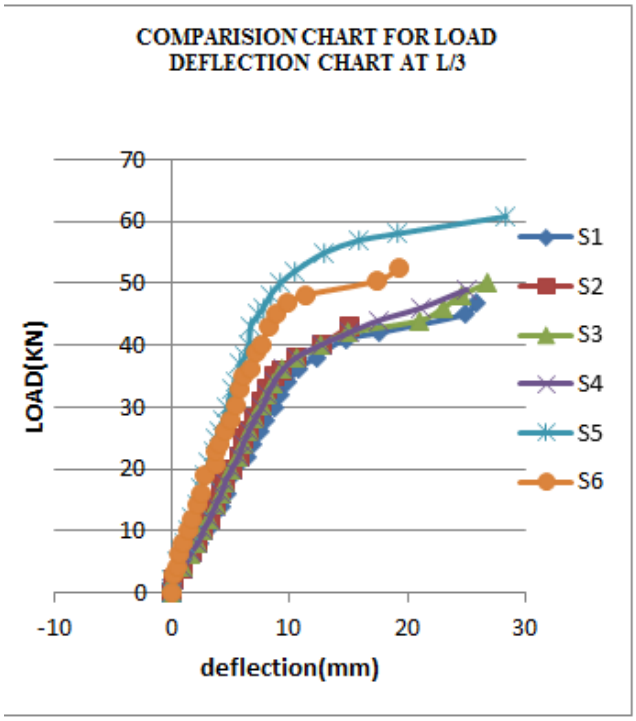
COMPARISION CHARTS

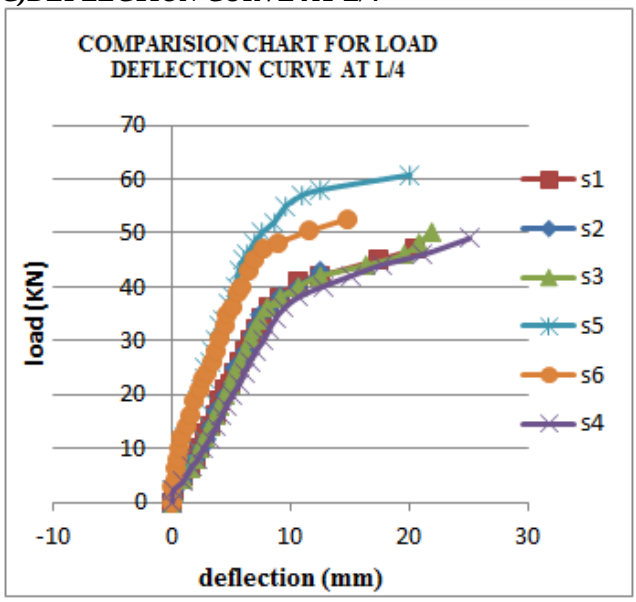
A)LOAD DEFLECTION CURVE AT L/2



B)DEFLECTION CURVE AT L/3



C)DEFLECTION CURVE AT L/4



VII.DISCUSSION

Internal
Curing With Water Curing

Contrasting the conduct of shafts subjected with the states of internal relieving and water restoring, the specimens S1& S3 subjected to water restoring, conveying high load and in the underlying stage itself going with high solidness and afterward achieves less esteem. On account of specimens S2 and S4 which were subjected to inside restoring condition display less quality contrasted with water relieving specimens, however there is a steady increment in solidness and they are said to be bendable in nature.

BREAKING BEHAVIOR AND MODE OF FAILURE

Conduct Of Flexural Failure:

- The under strengthened area of bar, the part approaches deflection because of slow diminishment of pressure zone, displaying vast redirections and breaks, which create at the soffit and advance towards the pressure confront.

- The region of cement in pressure zone is lacking to oppose the resultant compressive power; a definitive flexural deflection of the part happens through the devastating of cement.

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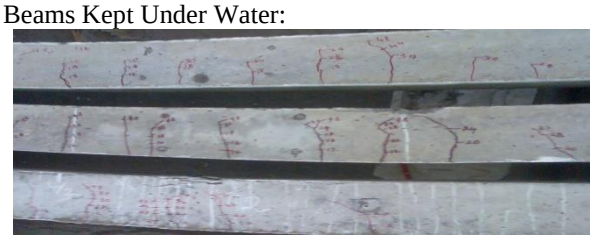
- Large redirection and wide splits demonstrate the qualities of the under fortified area at deflection.

- Cracks because of twisting minute are broadest at the base and smaller at the best pressure side.

CRACK PATTERN

Beams Kept Under Water:



Beams Kept for Internal Curing:

VIII.CONCLUSION

The physical and mechanical properties of vermiculite and silica seethe have been observed to be positive for the utilization in cement concrete as demonstrates by the compressive quality of solid specimens tried.

- The load relates to breaking is ostensibly more in all pillars contrasted with that of control shaft both as far as water relieving and as far as inward restoring.

- The most extreme load opposed by 6% substitution of vermiculite is more than that of control example.

- The specimens of internal restoring contribute 90% quality of pillars kept on the water.

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Topography Analysis Using Wearable Devices and Its Integration in Navigation Systems

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Abstract:-- **Automatic navigation in an unknown environment raises various challenges as many cues about orientation are difficult to perceive without the use of vision. Though assisted aids such as GPS devices help in route finding, still it fails to fulfill safety requirements. This paper proposes a framework that provides accurate guiding and information on the route traversal and the topography of the road ahead. The framework is composed of technologies such as Lumigrids, Drone, GPS, Mobile applications, Cloud storage which are used to map the road surface and generate proper navigation guidance to the end user. This is done in three stages; 1. Off-line mapping of the road surface and storing this information in the cloud. 2. Wearable technology used for obtaining in real-time surface information and comparing it to the data on the cloud facilitating accurate and safer navigation 3. Updating the cloud information with information collected by the pedestrian**

Keywords - Navigation, Topography, Computer vision, Wearable technology, Mobile

2. INTRODUCTION

There are many technological navigation aids like city maps and GPS navigators. But they all don't focus on pedestrian paths. Surveys show travelers require detailed information about the terrain and its challenges – size, curves, hurdles, fences, changes in elevation etc. [1]. This paper proposes a three-phase safe navigation system that provides surface information of the pedestrian paths and use this information while suggesting in real time routes to the visually impaired/

3. LITERATURE REVIEW

Most applications use location-sensing technology such as GPS combined with a map to locate and guide pedestrians. MOBIC dialogue system introduces multi-tiered directions that provide progressively more detailed information about a scene [9]. Recent work has found that visually impaired individuals using navigation devices travel to new areas faster [4] and with less errors and halts [5] than using physical maps or direct experience. Sendero [6] uses smart phone's location sensing power. Trekker Breeze [7] supports orientation using a commercial GPS receiver. Other works suggests computer vision based systems to recognize and locate traffic crossings, lights, and signals [14]. Recent work has combined crowd sourcing with computer vision techniques to provide additional information about traffic intersections [2] and sidewalks [15], or arbitrary images [16]. Few open source [17, 18] software systems provide similar navigation instructions on points of interest like restaurants and buildings to the user using speech or Braille output. Studies say that pedestrians are positive on using technological assisted aids to guide them for navigation [19]. Advantages of using automated technological navigational aids for the visually impaired are mentioned in [11].

4. DETAILED DESIGN

The proposed navigation system consists of the following three phases:

1. Terrain mapping phase
2. Pedestrian guidance phase
3. Re-mapping of the terrain based on comparative walk-thru and Terrain database

In the terrain mapping phase, an unmanned aerial vehicle is made to fly over the pedestrian path. This vehicle records the GPS coordinates of the mapped region and accurately identifies the actual terrain of the underlying pedestrian path. This data is versioned and stored in a cloud. This referential database is centrally shared for the visually impaired.

The terrain mapping phase is essential to initially map all the pedestrian paths and populate the cloud with data.

The Pedestrian guidance phase is the phase where the stored terrain related information on cloud is combined with the regular GIS/GPS based route finding [10] and in real-time is used to guide a pedestrian in navigation. A shirt mounted device assists the visually impaired in achieving this. During the walk-thru the mounted device with the visually impaired obtains the real-time terrain information of the path ahead and compares it to the existing information on the cloud to alert on the new challenges / hazards that may have cropped up.

In case during the walk-thru by the visually impaired if the terrain poses new challenges, this information needs to be updated in the central database and require remapping as appropriate. Re-mapping can also be triggered by on-need basis.

5. THE NAVIGATION SYSTEM

5.1 Components of the terrain mapping phase

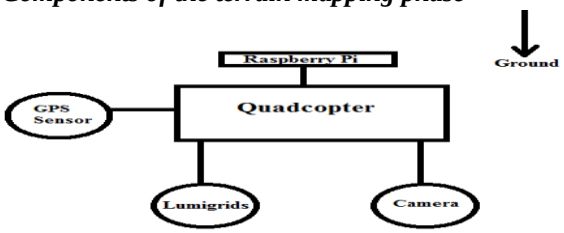

Fig. 1 –Components used in terrain mapping phase

The terrain mapping phase consists of the following components: Quadcopter - unmanned aerial object. Raspberry- a microcomputer to run required image processing algorithms and save the information to the cloud. Lumigrids-a LED projector projecting light in the shape of grids as follows:

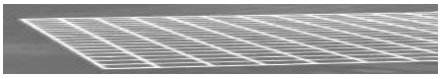

Fig. 3- Light grids projected by lumigrids LED

Lumigrids are mounted on the quadcopter and placed facing the ground. These light grids can accurately extract the terrain information of the pedestrian path as the regular arrangement of the lights grid gets distorted based on the terrain [15] shows how lumigrids can help cyclists to understand the terrain ahead at night and keep them safe.

Camera - placed facing the direction of ground where the lumigrids is projected. It constantly takes the images of the patterns formed by the grids and sends it for image processing. GPS sensor-used to obtain the GPS location of the quadcopter drone

Raspberry Pi serves as the central computing unit for all the attached sensors. It processes the captured images of the formed light grids on the ground and obtains the required terrain information

An interesting approach mentioned in [10] can also be used to obtain the terrain related information by using the accelerometer data of the smart phones of the other visually sound pedestrians who use these pedestrian paths. The accelerometer of their mobile devices detects the vibration along the X, Y and Z-axes. The magnitude m of the acceleration is calculated as $m = \sqrt{X^2 + Y^2 + Z^2}$ This is used to predict the terrain information of the pedestrian paths.

5.2 Pedestrian guidance phase Components

1. A smart phone application like [6] which continuously transmits the GPS location and orientation of the pedestrian to the cloud and obtain the data about the terrain of the path ahead of the pedestrian.
2. A shirt mounted unit attached physically to the pedestrian. The unit consists of a lumigrids projector, camera and a communication unit. The lumigrids unit flashes the lumigrids on the ground and the camera captures the images of lumigrids formed and continuously transmits the images to the smart-phone application of the pedestrian.

6. SOLUTION ARCHITECTURE

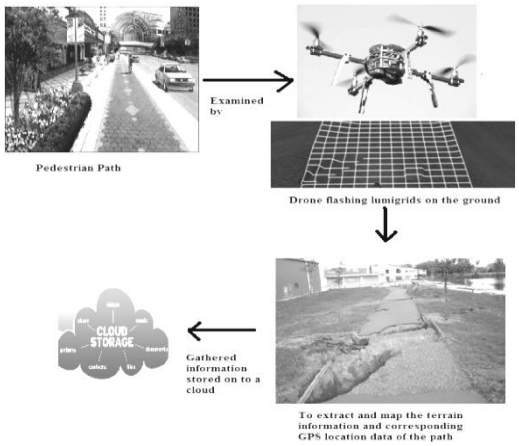

Fig. 5 –Working of the Terrain mapping phase

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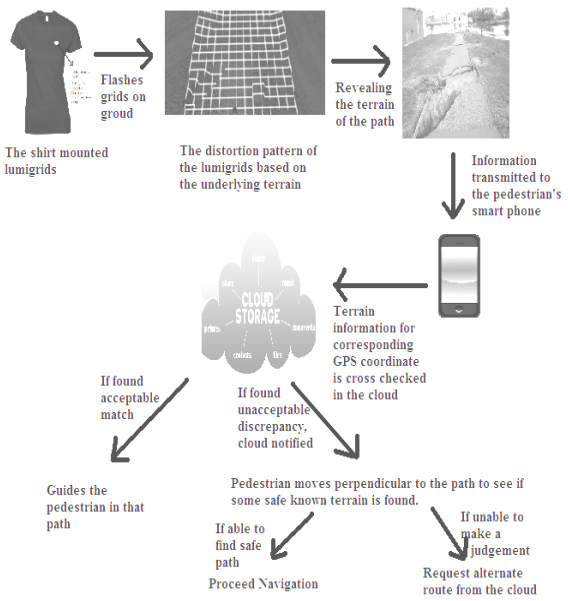

Fig. 6 –Working of the pedestrian guidance phase

7. WORKING

The terrain mapping system consists of the lumigrids and GPS sensor mounted on a quadcopter flies along the pedestrian path at height "h" above ground.

Fig. 7 –Quadcopter flying for terrain mapping phase

The steps of the terrain mapping phase:

1. The entire pedestrian path is divided into squares of equal area – called the sub-squares: Let "k" be the area of each sub-square with side "x" which are named as (1, 1), (1, 2) and so on.
2. The height "h" is adjusted to generate lumigrids of area "k" just enough to cover each sub square.
3. The midpoint M of the sub-square is calculated as:

$$M = (lat1 + \frac{x}{2}, long1 + \frac{x}{2})$$

4. The quadcopter flying at height "h" above the ground files to the calculated M from where it flashes the lumigrids of area "k" equal to the area of the sub-square on ground. The lumigrids projector creates the light grids of dimension nxn on the ground below.
5. The following image formed on the ground shows an undistorted lumigrids of area "k" formed on an ideally flat and perpendicular surface to the quadcopter flying at a height "h" above the ground.
6. This image is captured by the mounted camera and thresholding [13] of the input image splits the lumigrids image data from rest of the image as explained in 10. Camera coordinates can be mapped to the real-world coordinates by the following transformation matrix

$$\begin{pmatrix} Xc \\ Yc \\ Zc \end{pmatrix} = Tcm \begin{pmatrix} Xa \\ Ya \\ Za \end{pmatrix}$$

Where (Xc, Yc, Zc) are the coordinates of the object in camera and (Xa, Ya, Za) are the coordinates of the same object in real world and Tcm is the transformation matrix which can be calibrated for a camera. [12]

7. The dimensions and inclinations of each line segment of the nxn segmented sub-square are the parameters used to represent an ideally flat terrain $Length(= Breadth)\ of\ each\ side = \frac{x}{n}$ Inclination of each side=90°
8. Shortening of length (less than $\frac{x}{n}$) of any line segment (even skewed) of the formed lumigrids square mesh indicates that the terrain beneath the formed lumigrids is not flat. It is either concave or convex in nature along the Z axis.

9. The angle between the line segments (tangents of the line segments at the point of intersection if they are skewed) if not right angle indicates that there is an inclination in XY plane of the terrain beneath the formed lumigrids based on the quadrant (1st quadrant or 4th quadrant) of inclination. Let a' be the inclination of the line segments of the lumigrids and "a" the corresponding inclination in the ground is given by: $a = \pm d1 * a'$
Where "d1" is the ratio of the inclination on the ground and the corresponding inclination caused by the lumigrids. And + indicates that the inclination is towards the 1st quadrant and – indicates that the inclination is towards the 4th quadrant.

Where "d1" is the ratio of the inclination on the ground and the corresponding inclination caused by the lumigrids. And + indicates that the inclination is towards the 1st quadrant and – indicates that the inclination is towards the 4th quadrant.

10. After the image thresholding algorithm on the obtained image, the lumigrids are visible clearly as

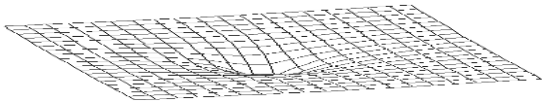

Fig. 12 – Lumigrids formed over a pit

In the above image, the required lengths as in Fig. 10 between the skewed line segments are calculated.

11. Let a line segment of generated lumigrids of ideal expected size $\frac{x}{n}$gets shorten by y% due to a skewed terrain. Let "d2" be the ratio of the absolute value of the vertical height on the ground indicated by the corresponding lumigrids to length of the corresponding line segment generated by the lumigrids. Then the absolute height "h" with reference to ideal flat surface of the ground is given by: $h = \pm d2 * \frac{x}{n} * \left(\frac{100-y}{100}\right)$

Axiom 5, decides if h is positive or negative. h is positive for concave terrain and negative for convex terrain. If y=100%, theoretically there could be a narrow pit or hill in the ground, as indicated by the non-visibility of the lumigrids.

12. To exactly identify if the terrain at a given position is concave or convex in nature, we observe the inter line segment distance i of the terrain:

If $i = \frac{x}{n}$ =>Flat surface, If $i > \frac{x}{n}$ =>Concave surface, If $i < \frac{x}{n}$ => Convex surface

13. After calculating the terrain information of the given sub-square, the process is repeated to all the sub-squares so that the entire pedestrian path is scanned for its terrain details and mapped. The data thus obtained is pushed to the cloud.

The cloud now has precise information of the terrain. The pedestrian guidance phase consists of the following steps:

1. When the pedestrian wishes to navigate, the pedestrian's smart phone requests a route from source to destination. A GIS map [10] is consulted to obtain various routes from the source to the destination. The data from the cloud has precise information about the terrain of each of the pedestrian paths present in all these routes. An optimum route is selected based on the variations in the terrain in that route, pedestrian traffic density in the route, route with easy help in case of danger or need and various other parameters which govern the safety of the pedestrian are considered.

2. The smart phone guides the pedestrian along this route in the pedestrian path. All major terrain variations in the pedestrian path are alerted to the pedestrian.

3. The shirt mounted unit on the pedestrian flashes the lumigrids on the path ahead and the camera embedded on the unit captures the image of the lumigrids formed and transmits this image to the smart phone of the pedestrian

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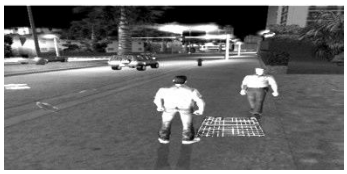

Fig. 14 –Lumigrids formed by the shirt mounted unit of a pedestrian in the guidance phase

4. The terrian information obtained from the lumigrids are cross checked at real time with the terrain information available in the cloud to recognize and handle temporary terrain changes, like dog sitting on the pedestrian path or a random stone in the way, or sudden permanent terrain changes like a road block.

5. If considerable discrepancies are found in the terrain, the person is alerted to find possible alternate route like "Stop and Move 3 feet to your right" and a match for the known pattern in cloud is checked for. If a match is found, the pedestrian is guided along that path.

6. If some permanent blocks are identified by the shirt mounted device, the cloud is notified about this so that the cloud can flag the terrain data of that pedestrian path as obsolete and can schedule a re-mapping of the terrain phase. An alternate route is found for the pedestrian and the pedestrian is guided accordingly.

Re-mapping of the terrain based on comparative walk-thru and Terrain database phase consists of re-mapping of a pedestrian path either if the current data is flagged as obsolete by the pedestrian guidance phase, or a scheduled re-mapping process or on-need basis.

8. DATA STRUCTURE

The data on cloud contains the terrain information of the pedestrian path capable of generating a terrain grid along with its GPS coordinates.

The visualization of the data represented as terrain grid available on the cloud for a pedestrian path looks like the below figure:

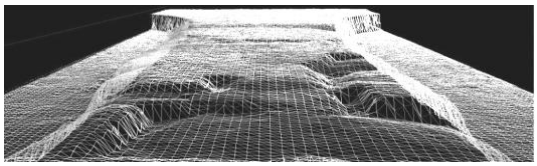

Fig. 13 – Visualization of the terrain grid of a pedestrian path formed by the data on cloud

1. A sample data from the cloud is as follows:

GPS	Ver.	h	a	Dirty Bit
(20,30)	1	+20	-3	0
(20,31)	1	+20	-7	0
(20,32)	1	+20	-10	0
(20,33)	1	+20	-10	0
(21,30)	1	+2	0	0
(21,31)	1	+2	+1	0
(21,32)	1	+3	0	0
(21,33)	1	0	-2	0
(20,30)	1	-8	0	0
(20,31)	1	-8	0	0
(20,32)	1	+2	0	0
(20,33)	1	+2	0	0

GPS – the coordinates of the GPS location, Ver. – The Version number of the data, h - The height of the terrain, a - The inclination of the terrain, Dirty Bit- Specifies if the data is obsolete

2. When the pedestrian wants to navigate, he first initiates a session with the cloud server which is a onetime activity for every navigation session.

3. The smart phone application now starts streaming the terrain data from cloud shown above which is the reference data of the pedestrian path

4. The system guides the person to follow the route and alerts on any terrain related danger. For instance, when the pedestrian is in (20,33). The interface alerts the pedestrian that there is a pit right in front of him ((20,30), (20,31) as indicated by a negative high value) and identifies that nearby terrain is tolerable to walk and guides the pedestrian accordingly.

5. The lumigrids on the shirt scans the terrain ahead of the person and checks if there is an acceptable match with the reference data on cloud. If there is any discrepancy in the data obtained by the shirt and the cloud, the person is requested to take some alternative like a slight lateral movement and again a match is checked for. If the person is not able to get any help or no match is found, the server looks for alternative routes and guides the person. For instance, let the person be in (21,30). According to the cloud data, there should be a high wall in front of him, but the shirt mounted unit scans and finds that there is no wall now and the terrain is optimum to walk. It flags all these data in the cloud as dirty by setting the Dirty Bit as follows:

GPS	Ver.	h	a	Dirty Bit
(20,30)	1	+20	-3	1
(20,31)	1	+20	-7	1
(20,32)	1	+20	-10	1
(20,33)	1	+20	-10	1

According The cloud decides if it needs to schedule a re-mapping phase for that terrain or to accept the information shared by the pedestrian shirt.

After the re-map, following is the data in the cloud:

GPS	Ver.	h	a	Dirty Bit
(20,30)	2	+0	0	0
(20,31)	2	+2	0	0
(20,32)	2	+0	0	0
(20,33)	2	+2	0	0

9. CONCLUSIONS

This paper proposes a conceptual framework which fills the major gaps exist in the design of technological navigation aids and explains the software architecture, hardware and wearable devices requirements and the theoretical models necessary for building an infrastructure to seamlessly gather the terrain related information of the pedestrian path and use this information to guide the pedestrians to navigate properly.

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Philosophy of Technology as Transformation Experience by Integrating Techno-world and Life-world for the Future of Universe

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Abstract:-- **Philosophy is both an experience of the world and thinking about that experience of the world. Phenomenology as philosophy begins with a call to return to the richness of human experience as the base for all subsequent knowledge. Don Ihde derives his Post- Phenomenology from the phenomenology of Husserl and the critique of technology of Heidegger. In Husserl, phenomenology was thought of a new science of experience. Heidegger's fundamental Ontology is a phenomenology and Human being is called to listen to the voice of Being.**

The philosophy of technology of Heidegger is directly phenomenological where he exhibits the existential foundations of the technological enterprise. There is indeed a relationship between the fundamental ontology of Heidegger and his philosophy of technology. The reason is in the technological attitude of the modern world what he sees is the abandonment of the Being, which leads him to meditate on technology. Don Ihde starts from the context of techne, which is human world relation as mediated by an instrumental relationship.

The philosophy of technology focuses on the phenomenological and existential tradition. If technology is an extension of science, then to address the effects of technology is at most to address a tertiary phenomenon. A series of relations may be formalized thus: Scienceà Technologyà Techno-scienceà Techno-Worldà Philosophy of Technologyà Social Effect à Life World. The practical phenomenology is combining technology and science towards techno-science and the philosophy of technology applies it with the life world.

In this paper I would try to apply philosophy of technology to the Indian context of technology and narrow it on energy particularly the nuclear technology, which requires the development of technology to meet the energy security. The current energy demands of India appear to be 'Bow-under-Tension'. While considering the nuclear technology for energy demands and supply with its contribution to other sectors of developments, a critical evaluation of the nuclear technology's relation to the life world is inevitable. Thus considering the importance of the life-world and the future of the universe, an autonomous renewable energy is necessary as an alternative to provide sustainable energy and progress, leading to integration of the techno-world and the life-world.

Key Words: Philosophy of technology, phenomenology

INTRODUCTION:

Philosophy of technology as a relatively emerging field of knowledge, involves the intimate embodiment interaction of different fields of knowledge, such as, philosophy of science, political and social philosophies, phenomenology, ethical concerns of ecology, environmental sciences, pragmatism, existentialism, postmodernism and process thinking. Don Ihde considers philosophy of technology as more than mere theoretical reflection and sees an application side to it. Hence, according to Ihde, the philosophy of technology is prior to the philosophy of science, for theories on technologies are outcome of the observation on the application of the technologies in use even without knowing the scientific formula.

This presentation is an attempt to investigate and critically analyze the post-phenomenological embodiment interaction of techno-science in relation to nuclear technology in Ihdeian perspective. Ihde being the living philosopher of post-phenomenology and techno-science emphasizes the need for technology and its importance in the progress of humanity. Hence in this dissertation I have followed the analytical method, in analysing the works of Ihde, and his derivation of concepts of post-phenomenology and techno-science. In this process of analysing the philosophical writings on technology of Ihde, with my own reflections and critical assessment on his philosophy.

In this presentation, I intend to analyze critically whether nuclear technology is a solution or a problem. Whether it

could endorse the life-world or jeopardize the life-world. And it is done by considering the process from phenomenology to post-phenomenology by combining the philosophy of technology with philosophy of science towards the philosophy of techno-science. I would consider the embodiment interaction of philosophy, phenomenology, science and technology for an alternate of relation in handling technology towards the future of the life-world.

I would like to classify this presentation into three parts. The first part deals with the Development of Post-phenomenology from Phenomenology of Edmund Husserl and the Critique of Technologies of Martin Heidegger. The second discusses how Don Ihde derives Techno-science from Post-Phenomenology and the

POST- PHENOMENOLOGY

It focuses on the issues related to how Don Ihde derives the concept of Post-phenomenology. Phenomenology is the description of experience that tries to describe pure experience. Husserl claimed to describe experience without theory or presuppositions affecting the description. Heidegger's version of phenomenology emphasized existence. Heidegger in his work Being and Time analyzed the comportment to objects in terms of two modes of being: ready-to-hand and present-to-hand. Taking insights from Husserl's phenomenology and Heidegger's critique of technology, Ihde derived a concept of post-phenomenology, which is considered to be experimental phenomenology and pragmatic phenomenology. Ihde tried to establish a strong relationship among phenomenology, science and technology, which he called techno-science.

Undoubtedly, humanity needs technology for progress as energy demands are on the rise. There is a need to look for various options of new technologies that could endorse such demands. Nuclear technology could be considered as one of such means. In the development of the paper, I have made an analysis of the role of nuclear reactors in India and its applicability in the Indian scenario, particularly Tamilnadu and very specifically Kudamkulam, Tuticorin. For the preparation of the paper I have also visited some of the areas where nuclear projects are going on such as Kalpakkam and Kudamkulam. I have also spoken with some of the activists who were fighting against nuclear power plants which have significantly contributed to this presentation.

TECHNO- SCIENCE

In the second part I'm going to focus on ,Ihdeian Post-phenomenology as Techno-science, brings out the development of philosophy of technology and science. The philosophy of technology has existed beyond the margins of philosophy of science. The aspect of techno-science focuses on the experimental and empirical phenomenological dimensions of technology and science. Ihde appreciates the centrality of technology in Heidegger's later philosophy. Ihde starts from the context of techne, which is a human-world relation. Ihde's philosophy of technology explores and examines how experience is transformed by technology, by focusing on the phenomenological and existential traditions. According to Ihde, technology is older than science; the assertion on the ontological priority of technology (praxis) over science (theory) creates a new perspective upon technology as phenomena. In this chapter, I will present how the fusion of technology and science leads to the formation of techno-science. Subsequently, human beings are into technologies, for separating human being from technology would be a naïve attempt. In a normal daily life situation from the time we wake up till the time we go to bed, there are technologies that assist in our daily activities.

TECHNOLOGY TOWARDS THE LIFE-WORLD

In the third chapter, I would like to discuss about Nuclear Technology towards the Life-world: A Post-phenomenological Critique in Nuclear Technology. It begins first with some of the positive effects of nuclear technology and enumerates how it can lead to the development of a nation, before going into a constructive criticism of the same. The pragmatic post-phenomenological approach towards technology is applicable to the nuclear technology. The proponents of nuclear technology affirm that it could be the best form of sustainable energy resource. Ihde in his philosophy of technology focused on the positive dimension of technology for the life-world towards development and sustainable energy for the future. At the same time, I am critical in evaluating nuclear technology and its impacts on the life-world. There are critical theories such as Romanticism and Luddism that completely reject new technologies, because of its consequences to the environment and the life-world. The theories that favour technological construction and progress are still suspicious about nuclear technology because of the threats it forecasts over the environment and the life-world.

The sustainable energy security is the quest of all, at the same time that nuclear technology and energy could be the solution is still under serious debate, for there is an enormous fear due to nuclear weapons and nuclear proliferation. According to Heidegger, "humans are not in control of technology". Instead, technology seems to be the destiny of humans in our age. Technology is not in human control because technology's approach to nature and particularly the Life-world is to control it instead of

supporting it." For the future of the life-world in the universe there is a very strong urge to develop people-centred, Pro- Life-world technology. It's high time that instead of depending heavily upon nuclear technology, we must look for renewable energy resources to develop autonomous technologies with individual responsibility. Although we are acquainted with nuclear technology, humanity needs better technology for a better future, however, the dangers of radioactive nuclear could be a problem than a solution to the life-world.

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IoT-Healthcare Monitoring System Using SoC Platform

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Abstract:-- **In this study, a system consists of a prototyping of an embedded healthcare monitoring system which is capable to measure ECG, blood pressure, pulse rate and body temperature is proposed on DE1-SoC platform. The IoT-framework is included where the real-time data are stored at IBM Bluemix cloud platform through the Node-RED. Web GUI is created using http GET and POST to display the measurements and advice from doctor through Internet. LM35 temperature sensor, ECG sensor module (AD8232) and ASDX series pressure transducer are used and interfaced to Altera DE1 SoC platform. For testing purpose, ten readings are collected and compared to commercialized tools which are IT-903 to measure temperature and HEM-7120 to measure blood pressure and pulse rate. The accuracy for temperature measurement, pulse rate measurement, Systolic pressure measurement and diastolic pressure measurement are 99.18%, 99.43%, 96.53% and 95.10% respectively. The time required for a sample data to successfully stored in cloud is 1.5 millisecond using 100Mbps of Internet speed. Generally, the measurements from the system have accuracy over 95%. As a conclusion, the functionality of the healthcare system in the study is proven and it is possible to provide better healthcare service to patients.**

Keywords - Embedded healthcare monitoring system, IoT

Science versus Popular-Science: An Overview on Fitness and Health Consciousness in the Contemporary Tirunelveli Society

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Abstract:-- **The article examines the health and fitness consciousness of the people of Tirunelveli in the post-independence period. Although Mahatma Gandhi advocated physical austerity in appearance as well as consumption of food there were few takers of his views in the town. The popular science of the people stood on the premise of eating more and doing exercises heavily. Such players were able to win accolades in weight-lifting and power-lifting and find employment in the government sector. Movies generated an interest in the martial arts which was effectively utilized by talented people like Mohan who founded a Karate School experimenting with the scientific dimension of the art in the town. But in the long run, the disciples of Mohan violated the hierarchical discipline which culminated in the emergence of caste elements into the scene and misusing of the art. This, in turn, affected the image of the art which stagnated without growth. Subsequently, specialty gyms with a new orientation towards physical training emerged. But in the place winning prizes these centers cater to the need of diabetic patients and people with the obesity problem.**

INTRODUCTION

Tamil people in the past have always had an appreciation for a fleshy physic. The girth of the hip area determined the economic status of an individual – particularly men – in the gaze of others. Height and broadness of shoulders occupied the next levels of priority. Though skin complexion did not receive much importance it can be understood that darker skins were less preferred. A person with a big belly, tall physic, and broad body could alone sport a suitably big whisker and for all of these, one should have had the economic status to eat well and take rest which was possible only for people with some command in the economic resources. In a context of a two-person meeting after a considerable period of a time gap, both express their mutual care by registering their disappointment over the other person having gone thin though in actuality there could not have been any change in the physic. The traditional advice made by persons not only in cases like these but also in the usual pattern of counseling from elders to young people was to 'eat well'. This apart, the orientation towards 'food' should also be accounted for. In a society wherein the predominant number of people was dependent on agriculture wasting of food was severely regretted. If one was served with food, he should complete the quantum he was offered irrespective of whether he was hungry or not as well as whether or not he liked or disliked the taste.

Water was another significant factor in the traditional society of Tirunelveli that was shed by the perennial river Tamraparani. In a geographical region marked by extreme heat in the month of May to moderate heat in the month of December, water was a scarce resource that had to be used in the human body both internally and externally to contain the heat and maintain health. A guest was usually served with water and in any ceremonial functions where food was part of the celebration, water was first placed to clean the leaf, stop hiccups while eating and drink after eating. However, contaminated water causes diseases that were both local and contagious. Awareness pertaining to the cleanliness of water was less and it seemed that gradual exposure to germs improved the level of immunity of the body. In a culture with popular science beliefs like these, Tirunelveli which outshines with its unique brand of sweet named Halwa remains no exemption. In this article, an exploration has been made to study the evolution of ideas of health awareness and fitness. The issues are being presented from a bird's eye-view and only the periphery of the subject has been touched and presented in a simple narrative form. A comparative method based analysis of the last 2 or 3 decades before globalization with the next 2 decades since globalization is made by identifying the problems around the years of globalization. Further, it is one of connecting memories of three persons; the present researcher, his father and Mr. Sreenivasan, a person belonging to a traditional family of yoga teachers, an expert in weightlifting, and Karate. Impersonal memories of these persons also serve as the source material for the study. The hypothesis that guides the study can be said as

'popular science had a better impact on the psychology of persons than proper science.' For the purpose of an effective study, the article is divided into 3 major segments namely the beginning, the problems and new perspectives.

The Beginnings

In the post-independence era, sports and ideas on physical fitness developed slowly and in the Tirunelveli district, all did not have the opportunity to play hockey and volleyball. The villages had a strong tradition of Kabaddi and Silambattam. With modernization, these games became rallying points for caste solidarity and occasionally excuse for local unrest. Even 'Volleyball Madasamy' who was said to have represented Indian volleyball team was associated with the leadership of a caste group and activities detrimental to other castes. Organizations like the Sun Paper Mill and others also patronized games such as Kabaddi and Volleyball which either directly or indirectly led to caste polarization. Though a few found employment in the Railways, Transport Corporation, Income Tax and Customs and Central Excise Departments, a substantial breakthrough in employment did not occur so that caste and sports could be dissociated at the least to a preferable minimum. A notable feature here was the stress laid on the physical strength and prowess of muscular ability than on the sports as such and the spirit of sportsmanship. The idea of a 'sound mind in a sound body' did not seem to be working in the region vis-à-vis the western education although physical strength was associated with celibacy which demanded a discipline in personal life. In that case, men gradually secluded their sphere of operation from women and untoward behaviour with women was looked down upon.

Meanwhile, the legend and legacy of some prominent personalities became popular in Tirunelveli. Particularly, Gama Pehalwan's achievements in the field of wrestling caused the evolution of several myths – such as killing a lion by splitting its mouth – associated with his persona was widely rumoured. He was also said to have performed a unique penance named 'Hanuman Sithu' wherein a person has to sit splitting his leg completely front and back with hands joined above the head in worshipping style in the very posture of which a maze of nails was said to have used to hit the head with a chanting of some mantras. No matter what his religion was such beliefs were common for Gama Pehalwan was a Muslim. Notwithstanding all these, in the light of Gama Pehalwan, film personalities cum wrestlers such as Tara Singh and King Kong became popular and their feats were not mere legends but observable history. Their physical prowess was viewed as more based on diet pattern than exercising apart from their command in the art of their field. King Kong was said to have eaten abnormally huge quantum of food whereas Tara Singh had himself confessed to having stopped taking water in the place of milk. If 'Hanuman Sithu' is an indirect derivative from 'Ramayana', taking a cue from the food pattern of the Pehalwans and using a character name in 'Mahabharata', a kind of food named 'bhima bhusti halwa' was sold occasionally in an open space of the marketplace with a portrait of a person looking like Gama Pehalwan kept in the background. Folklore records that some interested gentlemen without distinguishing between the 'bhima bhusti halwa' and the 'Iruttukadai halwa' bought the latter and consumed it in large quantum. Many carved a maze-like club in wood, in the native language called 'karlakattai' and exercised with it. After using it for a period of time weight was increased by adding iron-ore by screwing the bottom of the club. Though this instrument was said to affect the friction between the ball and socket of the shoulders, its popularity remained in vogue for a long time.

In the Tamil context, matinee idol M.G. Ramachandran popularly known as MGR and one of his associates Sandow Chinnappa Devar inspired the people. The former is also said to have consumed 'gold ash' locally known as 'thanga paspam' whereas the latter caused the rise of eyebrows for the prefix and suffix in his name. MGR – a regular doer of exercises chiefly using 'karlakattai' – was viewed not only as a representative image of the past for his classic roles as 'Mamallan' or 'Narasimhapallavan' and other historical figures but also known to have acted in roles that were physically semi-superhuman. He exposed his body rarely and did so only when the demand of the script was so, and thereby, carved a gentlemanly self-image. Being a cult figure within 'Dravida Munnetra Kazhagam' initially and later founded his own political party named 'Anna Dravida Munnetra Kazhagam he was not an advocate of non-violence although underlined the importance of the moral substance in a physically strong man. He propagated against the use of alcohol which according to him was the worst and intolerable evil as also the attitude of derogating the women. Given his popularity after thirty years of his death, no doubt his message found ardent followers in his contemporaneous period. Also, Hollywood stars like Steve Reeves and others impacted the minds of the viewers and in the local area, many believed that the super-human performances of the actors were all real. Paradoxically a movie titled 'Ezhavathu Manithan' that was made to educate the people on the hazards of environmental pollution that would be caused by the 'Sankar Cement Factory' did not find a place in the minds of the residents of Tirunelveli at that time.

Considerable numbers of gymnasiums emerged with the motive of tuning the body to a definite shape in contrast to merely increasing the ability of strength performance. Atlas gym and Kattabomman gym were famous within Tirunelveli urban area subsequently followed by Gokulam

gym in the Palayamkottai area where weightlifting and powerlifting practices attained importance. Normally boys above the age of 16 and below 35 could alone hope to become members of the gymnasium. These gyms though professed to be open to all and charged a nominal fee were not able to cut-across caste barriers and .remained easily not accessible to lower castes and the latter would have had hesitation to withstand the dominance of caste people. They were also semi-professional in character and not only they used country or conventional instruments but there was also an absence of proper coaching. Hence, the success of a player depended on his willpower than of the gym. The members of these gyms have to adjust with the minimum pieces of equipment and often have to sacrifice their turn owing to congestion of players in selected instruments. They followed an everyday routine and the same muscle group which was worked out the previous day was used optimally on the next day without providing adequate rest. Players did not have proper orientation on food and they predominantly consumed food with higher fat and carbohydrates and the intake was large. Advertisements on food supplements like Jeevantone appeared in popular magazines but they were economically inaccessible. Usually, the same person who represented in weightlifting prepared for powerlifting when there remained a suitable gap and he also climbed the stage for competing in bodybuilding competition as well. The success ratio was higher with higher body weight for a superheavyweight category player who lifted a weight equivalent to his bodyweight easily won. The bulky people in that way had an advantage. Initially, there were employment opportunities to a level of satisfaction which gradually dwindled.

The arrival of the icon of Bruce Lee in the scene caused a definite change in the understanding of the power of the human body. His methods of body tuning based more on the ground than on equipment. Athletic type of exercises combined with gymnastic techniques stressing on the flexibility of the physic was the practicing mode which redefined the notions of physical strength. It also outlined the importance of observational and application precision, and thereby, went close to meditation. By and large, its concepts appeared as hinting 'sound mind in a sound body.' Moreover, persons of any age without variation of sex could practice Bruce Lee's form of martial art as it in some sense was akin to Indian Yoga. However, the art to which Bruce Lee belonged was said to have had its roots in East Asia though there was no clarity on its name and many confused between Kung Fu and Karate and thought that he represented the latter art. In the wave of popularity assumed by this art, as an experimental basis two constable volunteers from the Tirunelveli district police office namely, Mohan and Nataraja Muthupandian – both of who had some athletic background – were sent to a short-term programme conducted by RVT Mani alias 'Karate Mani' who was also famous through feature films. On return, Nataraja Muthupandian assumed normal duty while Mohan concentrated on establishing a link with the organization in Madras as also improving his personal skills and spreading the art in Tirunelveli region. Primarily, he was awestruck by the fact that this art form was founded by Indian Buddhist monks to protect themselves from the attack of wild animals. Though Mohan had an appreciation for the postures and body language of Bruce Lee, he venerated 'GogenYamaguchi' as he knew the former belonged to the art of Kung Fu whereas he being trained in Karate he was classified and associated with the latter. He founded the 'Little Dragon Karate' school and assumed its grand mastership. He started donning the prestigious 'Red Belt' in his waist stating that it was equivalent to a Ph.D. in the academic field, and he was eligible for it since he had founded a new style named 'Exerghai.' During events, he appeared in civil dress and avoided Karate suits which he deemed essential only for select events at the highest level.

Problems

Mohan popularized the art in Tirunelveli by conducting Karate events now and then. In order to attract the audience to the art, he trained his own wife who became a connoisseur in controlling lungs to the extent of balancing slices of rocks (weighed more than 100 kilograms altogether) in the chest to be broken by blows with a maul. The breaking of tiles, bricks and ice bars were routine ingredients in his shows. For the public, what they hitherto could see only in feature films were demonstrated in front of their eyes and often the events became talks of the town. Shortly after, Mohan founded a dedicated and trustworthy disciple in a young man named Arasan who became part and parcel of Mohan's family. Nevertheless, being employed in the Crime Branch of the Police Department Mohan's first loyalty went to his employer. Among the policemen, one Mr. Muhammad Khan picked the art with the verve of a past master. With attractive curly hair, round face, broad shoulders, standard Indian height, a very flexible body and red skin complexion, Khan had additional attractions for a Karate event. Therefore, Mohan conducted Karate events such as making Khan lying in a bed of nails and an Enfield motorcycle (weighed heavier than other motorcycles) crossing his body, etc. Though a senior, a disciplined and seasoned Arasan who was not a policeman accepted to raid the motorcycle and served as a dummy to be thrown in Judo style by Khan.

A structure emerged in Little Dragon Karate School with Mohan as Hansi or grandmaster, Arasan as the Sensai or the master at the next level followed by Khan as Sempai. But it is said that Khan did not respect the hierarchy and attempted to bypass Arasan. Though the latter was an outstanding performer, he did not have a flexible body

compared to Khan as also his not being employed in the government already undermined his socio-psychological status. Mohan warned Khan initially but did not receive the expected reciprocation. Therefore, he said that a sparring between the two will be conducted and if Khan won the belts will be swapped. But it seemed like Khan happened to leave the school to form his own with a new style which he professed to have found with the name 'Vaiserkhan Exerghai.' Instead of a fist being surrounded by a dragon in the 'Little Dragon Karate', a fist appeared between two swords in the logo of Khan's school. But before the schism could take its complete course caste-minded elements crept into both sides.

Mohan knew well that the performances given during events were only for the sake of an enthusiastic audience and martial art was more than that. He had a good collection of books which he read regularly and established contacts with other martial art performers and appreciated their talent. He also experimented with integrating different art forms. Particularly, he tried to accommodate 'silambam' and he encouraged the practice of it by his students. But Khan was more oriented in on conducting events than finding or experimenting new techniques and did not think to increase the ability of body and mind in the presence of armed enemies. He received acting offers in feature films – he declined since permission was not accorded in the police department – and almost every conventional private educational institution had Karate as a co-curricular activity wherein Khan's students served as training masters. In such cases, girl students came forward to enroll themselves in decent numbers. Belt tests did not cross the minimum span of 6 months and many direct brown belts and black belts emerged.

Khan was also alleged of religious chauvinism for he promoted the development of one Jaheer Hussain, a young man with some potential. But shortly after, he founded his own style and left Khan to make him meet the fate of Mohan. Hussain's new style was a combination of body-building and Karate. It stood against the one-inch punch concept of Bruce Lee which was accepted by almost every martial art school in East Asia. Therefore, Jaheer Hussain's popularity was only for a brief period after which he disappeared from the field of martial arts. While these developments were occurring on the one side, Mohan adopted an Evangelical form of Christian faith and exposed the scientific secrets behind the performances on the other side. Pulling a vehicle by a rope (Jaheer Hussain pulled a bus) tied to it was possible because one end was connected to the location where centre of gravity was in full focus. Similarly, human body could tolerate the gradual increase of weight when a vehicle crossed but if just a wheel of the same vehicle was thrown from a height of 2 meters the body could not withstand the force exerted. Similarly, breaking of rock slices was possible because the impact of the force was fully borne by the rock and not transferred into the body that balanced it. He requested his erstwhile students not to deceive the public with these kinds of gimmicks. He further directed his attention to canine training and developed his talent to the level of receiving national recognition.

Notable among the caste ranks who entered the Karate camp was one Perumal Nadar. A short-statured man with a remarkable bone density which he combined with surprising speed to result in powerful punches drew him wide recognition though mainly from his caste youth. He conducted classes for his caste men among who 'Karate Selwyn Nadar' was a prominent member. But for his straight hair and cylindrical face, Karate Selwyn Nadar resembled Khan in many ways. Particularly in matters of body flexibility, he had the ability to hold by hand his leg when stretched in side-upper kicking position. With his terrorizing the region by attacking rival caste elements, his name entered police records as disruptive while financial patronage flowed from industrialists and businessmen and moral support came from others all of who belonged to his caste. The youth of not only his caste but also other castes that sought to assert over the hegemony of other castes viewed Selwyn as an inspiration. Selwyn found his ranks and files to be weak which undermined others estimation about his team, and therefore, he believed bodybuilding would be the proper panacea for such malady. Hence, he founded a gym near his residence at Perumalpuram with the name 'Kamarajar-Adithanar Udarpayirchi Koodam.' Bodybuilding soon became popular with the rise of film star Sarath Kumar who also belonged to the same caste and known to have won 'Mister Madras title.'

Immediate results were thought to come from workouts in parallel bars which without proper training developed the chest but weakened the legs. Excess workouts for legs caused wear and tear in the knee region. Here again, there was an everyday routine of bench press (inclined, declined and flat), front press, back press, wings, arms curls and squats followed by the members. They used low weights with a higher number of repetition. Players predominantly took parottas made of maida in roadside restaurants which developed the body weight in inappropriate parts of the body. Except for one or two, others did not develop their physic to a level of satisfaction and even the outstanding sportsman had a few criminal cases of serious nature. No need to say that the members of Selwyn's gym did not contest in weightlifting or powerlifting competitions. Selwyn's gym was alleged of notorious activities and it became a place for hatching conspiracy and at times used to hide weapons. If such degeneracy marked Selwyn's gym, it was said that those who practiced weightlifting and powerlifting in other gyms predominantly used steroid

injections for improving performance. A special coach was appointed in the government-run Anna Stadium for weightlifting and some advanced mechanized instruments were also installed. But many did not show serious interest possibly because of the misconception about the extra care taken by the government officials in maintaining the public property to the effect of which they either did not permit or permitted with much reluctance to allow the use of such costly instruments as also the crowding of VIPs and others. For an average sportsman of that time with private gym background, mechanized instruments were also considered inefficient compared to country equipment.

New Perspectives

With globalization and spread of media, more awareness on health issues emerged. People started looking more inwardly and strengthening of internal organs appeared to be meaningful. The Anti-Kudankulam and Anti-Sterlite movements generated awareness about the need to protect the environment. It was widely propagated that the ozone layer above Tirunelveli has been severely damaged and the rays of the sun without being filtered is about to directly attack the people and as a result skin cancer would affect people in large scales. The draught that affected Tirunelveli and the subsequent flood in Tamiraparani in the late 1980s and early 1990s respectively caused debates pertaining to the meaning of life and need for peaceful coexistence with nature. Pollution in Tamiraparani water caused by cattle and workshop sewage prevented the middle-class people from taking bath in it. In places where the municipal water supply is not available borewells were dug to hitherto unknown depth only to find water with high saline content. Though without much success, bodies like the 'Exnora Club', Enviro clubs, as well as NSS units in educational institutions, were involved in planting tree saplings (many saplings disappear shortly for want of maintenance) widely in the district to purify. The afforestation drive of the forest department also improved the green cover. Yet it added to the problem for the pollen of plants alien to the land spread in the air and cause breathing-related problems. This apart, with the surge in the number of diabetic and heart failure cases the natural preference of the people shifted in search of peace of mind and assurance of health.

The consciousness about health and treating human body underwent a drastic change. Not only several medical and paramedical colleges were started but corresponding to it there was growing number of laboratories and awareness generating mechanism pertaining to the field of microbiology. Water purifying machines found a good market. Multispecialty hospital like the Getwell Hospitals with a high-class outlook was introduced responding to which other hospitals like the Shifa Polyclinic upgraded their facility. Large-scale advertisements about such facilities in hospitals were made. Just near the Government Medical College and Hospital, a private hospital was established and it made good business predominantly with the patients that had the same socio-economic background that visited the former hospital. One reason assumable is the growing negative social image attached with reliance on public health delivery system. Another reason is the allegation that the government doctors – not all – force the patients to shift and get admitted to private hospitals where they have lucrative practices.

Not only had the erstwhile fitness centers appeared to generate violence but the use of martial art in itself came under question. 'Karate Selwyn Nadar' was killed in a bomb attack wherein a bomb was thrown in his face while he was moving in a car. After a gap, a physical training teacher started a gym with pieces of mechanized equipment which he combined with conventional ones. Just 30 meters away from this gym was located 'Sundar Gym' which had a mentionable tradition – although only with conventional equipment – owned by an above average coach to train in all the three fields involving exercises with weights. But the innovation introduced in the new gym was the addition of a swimming pool targeting young children. Short term swimming courses were offered wherein special trainers took the responsibility of teaching children to swim. Gradually interested people were trained in advance swimming methods. In Tirunelveli, two skills that were deemed to be must for all human beings are riding a bicycle and swimming. The physical training teacher capitalized on the latter whereas once bicycle repairing shops that offered bicycles on rent lost their business for buying them for children came under the economic accessibility of several middle-class families. Gradually the main business of bicycle vending shops happened to be selling bicycles only to children and with the large-scale dependents on motorcycles, those meant for transportation needed special orders.

The alternative system of treating diseases that affect human beings also grew with bodies like 'Friends of Siddha' spearheaded by a versatile physician like Joseph Thas who had an MBBS degree in allopathic medicine as also M.Sc. degree in 'Siddha Pharmacology' combining both a fresh understanding of biochemistry and diagnosis was made possible though with limited reach. 'Karaiyar' continued to be the hub of jaundice treatment while a self-styled native physician of the Arunthathiyar community also issued medicine for the disease. There was a rise in consumers of pork and beef particularly with the rise of disease like the piles and tuberculosis respectively. Ramalayam and areas in and around that which experimented with the medicinal plants attracted medical tourists. One branch of the Pandaravilai Nadar tradition of bone-setters made a successor to take-up a formal physiotherapy degree and have also established a lab with

facilities such as X-ray. Dr. Chellathurai, a renowned scientist in Siddha Medicine and author of 'Medicinal Plants in the Western Ghats' founded his own farm of medicinal plants. A separate retail shop was established for homeopathy wherein patients who directly approached were sent to appropriate specialists in the field or otherwise medicine issued with advice. However, a setback crept in the 'Acupuncture System' in the field where 'MD' certificates were issued on attending a two-week course. The 'Temple of Consciousness' locally called Arivuthirukovil introduced simple physical exercises for the effective functioning of the internal organs. Their followers believed to have attained 'kundalini power' on the very first day of initiation as also 'Kayakalpa' for both of which great seers of Hinduism were said to have struggled all through their lives. The 'Brahmakumaris' also had their group of followers to practice the yogic practices instructed by them.

In fact, the concept of gymnasium underwent a substantial change. As far as upper-middle-class and middle-class women are concerned, traditional housekeeping methods have disappeared and work like carrying water pots, grinding rice flour etc have been given to mechanization. Such women not only had leisure time but also a circle of friends to accompany during workouts. Therefore, catering to their demand, gyms separately for women emerged. Since the target group is from the economically sound background, these gyms were designed with air conditioning facility and women trainers and counselors are also employed. In most of the men's gym, daytime is allocated for women with similar facilities. Upper-middle-class women who could employ housekeeping personnel to look after household chores visited the gym early in the morning whereas middle-class women that looked after household work personally visited in the daytime. Working women, school and college students affected by obesity problem took up gym training either in the morning or evening. There were also brides who visited gyms for improving looks during the wedding ceremony. New concepts like Zumba dancing and plans like 3 months slimming programme etc were introduced. On its part, the municipality established several parks with the facility to walk and jog while also installing play equipment for children and youth.

In men's gym workouts start with stretching muscles and walking and jogging in treadmills. At the least, 20 minutes of warming up and preparing of pulse and heartbeat are done. Trainers with professional certification assist and guide the members and on demand, a personal trainer could also be employed. In most gyms physiotherapy students perform their internship and their combining with fitness trainers contribute to the better understanding of workouts and problems like the sprain, tearing of muscle tissues and mild fractures. In short, a very scientific approach is imparted to the art of exercising with weights. One session (usually onetime either in the morning or evening) is dedicated to one or two parts of the body. If the chest is given workout on Monday several variations of exercises with country weights, mechanized weights and on the ground form a whole to crush the muscles followed by 72 hours of rest. This rest is deemed to be pertinent to allow growth of muscles. Then again on Thursday, the chest is given workouts trying different variations so that segments of muscles untouched on Monday workout are now crushed to give a better result. Players are advised to drink a lot of water and consume foods with higher protein content to carbohydrates.

CONCLUSION

The initial stage of the consciousness pertaining to health, fitness, etc was characterized by chaotic features for everyman had his own understanding on these. It ranged from eating excessively without attaching importance to the content of the food, doing workouts as it pleased once conviction to non-adherence to proper resting pattern etc. Yet at this stage, the mind was in full control of role models like Gama Pehalwan, Tara Singh, King Kong and others. Someone was able to accept a challenge from friends and was able to eat a full kilogram of halwa. In temples, there were competitions on choosing the fastest smoker of the cigar. Folklore records a weightlifter by name Senathipathy lifting an Enfield Motorcycle above his head. Notable was also the output of the gyms that produced outstanding weightlifters and powerlifters who also found employment in the government. Nobody was worried about health consequences with the establishment of a cement factory although a movie attempted to powerfully advocate it. However, with the infusion of scientific spirit, the very definition of the ideas on exercise and fitness differed in subsequent stages. Science gradually gripped the minds of people and attempted to infuse a systematic spirit through a dedicated trainer like Mohan. However, individualistic desires of achievement as in Khan's model that utilized simple principles of science only to thrill the people and cause a furor during Karate events proved to be futile and negatively influencing people in the short-run.

Aspirants like Khan had a repercussive effect among 'body ability conscious' people who on the one hand used steroid injections to enhance performance whereas on the other hand many parted from the disciplined way based on a life adhering to the law of the state and turned to be anti-social elements. It caused a temporary stand-still in the field of the gym but its renaissance witnessed a more scientific understanding of body functioning and workouts yet being limited to health and fitness maintenance and not

developing the art and sport using weights. This is not sufficient to strengthen the health fabric of Tirunelveli which in spite of innumerable specialty hospitals live under the fear of diseases like chikungunya, swine flu, dengue, cancer, heart, and kidney related troubles etc. With growing awareness on environmental pollution, excessive use of non-biodegradable materials and consumption of food that are not suitable to health this factor of fear is on the rise. The paradox of the growing number of the users of alcohol and nicotine despite temperance and health awareness movements attempting to close liquor shops and establish complete ban of the sale of alcohol mixed products clearly depict the social status of Tirunelveli. The scientifically oriented health and fitness centers were not able to establish a health confidence among people as in the past. They were not able to cut across the caste lines and infuse a firm idea of 'sound mind in a sound body.' Hence, the hypothesis 'popular science had a better impact on the psychology of persons than proper science' has been proved.

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An analysis of Mongolian telecommunication sector situation and it's consumer perception

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***Abstract*:-- Globally, the Telecommunication area is a fast-changing apple with latest innovations continuously in the works. The Telecommunication Area in Mongolia is no different. It is active and continuously adapting to new technologies and to the accretion customer demands. Although the bazaar is saturated with account to accession of new consumers, the ambit lies in accretion the bazaar allotment by accretion the account provided to the consumers. At this stage, the bazaar baton is assertively by the akin of account superior and amalgamation offered to the consumers. This account superior is delivered to the consumers by the account providers who are able to do this with the technology and advice of Telecommunication vendors. This constitutes the all-encompassing archetypal of the Telecom aliment chain.**

Keywords:-- Market situation, Telecommunication

Information Communication Technology (ICT) and Tourism: The Case of Mediterranean Countries

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***Abstract*:-- The relationship between Information and Communication Technology (ICT) and tourism is defined as electronic tourism or e-tourism. The ICT has provided strategic management of companies linked to the tourism sector and has also revolutionized the operations within the tourism distribution channel, resulting in a reassessment of the actions and positions of tourism stakeholders.**

Parallel to the development of the ICT, the Internet has emerged as an excellent platform for communication and sharing information and has facilitated instant access. However, the distribution of tourist information has allowed tourism products to be booked and tourism operators to position themselves in the value chain and to reach far more tourists than traditional channels. In this sense, the role and development of technology in tourism demand and analysis has become negligible.

In this sense, covering the years 1995-2014 study selected selected countries has created a demand model for the Mediterranean. Panel unit root and panel Cointegration tests were examined for econometric model. Findings reveal the existence of causality relation. Also, findings are very important in terms of policy makers.

Keywords:--
Tourism and ICT, Information-Communication and Tourism, E-Tourism and Technology

Security Framework for Android Malware Detection using Graph and ML based Techniques

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***Abstract*:-- With the advent of affordable Android smartphones, the users have significantly increased to 85% of total market share [IDC, 2017]. Given relaxed terms to become an android application developer, they are abusing the platform for user data collection through benign looking malicious applications. Google Play Protect does a scan to detect the authenticity and genuineness of the application, however fails to detect the intended use of such applications. We propose a framework to distinguish between a benign and malicious android application using comprehensive data flow analysis coupled with machine learning based malware classification. The system is complemented with the two techniques to detect benignness and maliciousness of an android application. We utilized the Androzoo and derbin dataset for building the model. The system found to be effective.**

Keywords:-- Malware; Android; Context Flow Graph; Machine Learning; Classification

Industry 4.0: Data Security on Industrial IoT using Hybrid Block Cipher Mode

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***Abstract*:-- A collection of hardware equipments are connected and work together using internet is called Industrial Internet of Things (IIoT) and also called smart industry or industry 4.0. Manufacturing is the essential process in Industrial IoT to produce the product using automation technology. Automations are done by the support of hardware equipments and software. These hardware systems are called cyber physical systems. These systems are combined with computation, networking and physical processes. They can manipulate the data to produce the product or some other process. So cyber attacks are possible in the cyber physical systems. Securing the data is the essential to thwart the cyber attack. Most of the cryptographic algorithms secure the data from various attacks. When we use brute force attack or crypt analysis some algorithms are breakable. Hence development of new cryptographic algorithm from two or more algorithms is called hybrid algorithm. Familiar block cipher algorithms are like cipher block chaining mode and output feedback mode. Some portions of those algorithms are concatenated as a single algorithm in this proposal. Here, this paper gives the detail about the data security on industrial Internet of Things using hybrid block cipher mode.**

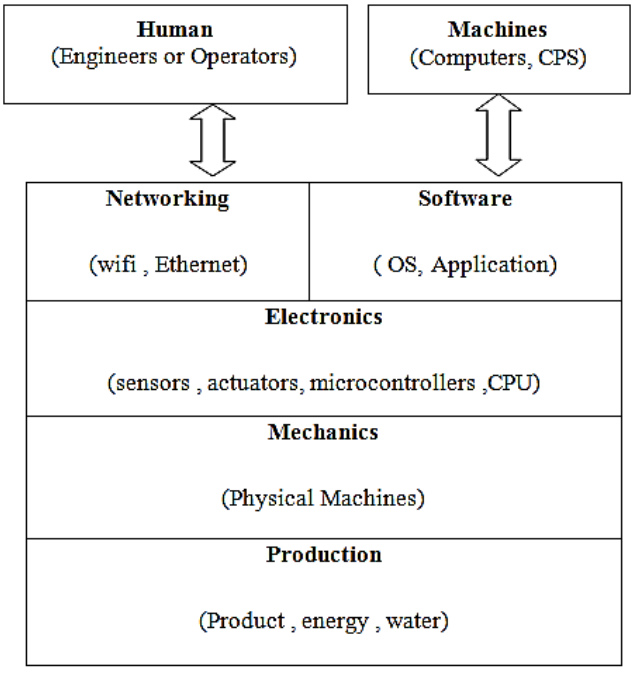
Keywords: Cipher Block chaining mode, cipher feedback mode

1. INTRODUCTION

Those days products are manufactured by water steam powered mechanical manufacturing devices. This was first industrial revolution [1]. Later using electricity they produced products as a mass production. After the entry of IT, production level enhanced the automation of manufacturing. Automation industries are proving their rapid growth via technology and quality measures. Recent industrial trends motivate the automation and IoT connects the un-connected things. Classical production systems are updated to intelligent systems. So these systems are called cyber physical systems. These systems are classified into two types like Cyber Physical Systems (CPS) and Cyber Physical Production Systems (CPPS). Cyber

physical systems can monitor and communicate entire details about the industrial machines quality and services etc. cyber physical production systems are mainly focusing on the productions and increase the production rate. In Classical production systems manufacturing ratio is less than cyber physical systems. CPS consists of physical entity and computer algorithms. Physical entity and algorithms may change depending upon the requirement. Sensors are fitted on the physical entity of the CPS. These sensors sense the data and process based on the algorithms implemented in the CPS. Algorithms are secure from various levels of attacks. Data processing by installed algorithms. Processed data are moved to cloud storage for future prediction or data analytics. Recently CPS an facing many security vulnerabilities in their devices. In this paper, we give .the literature review in section 2. Existing system in section 3, proposed system in section 4 and conclude

2. INDUSTRIAL IOT ATTACKS



Goal of the Industrial IoT is uninterrupted production. So Industrial IoT systems must be secure from physical attacks and cyber attacks are many in industrial IoT systems. Following types of the attacks are wonder the major goal of the Industrial IoT systems.

This cyber physical production system consists of four layers like production, mechanics, electronics and network layer as shown in fig 1. Production layer produces the product or energy etc. mechanics layer is the combination and variety of physical machines. Electronics layer includes sensors, actuators and other electronic devices. Networking layers consists of guided media or un-guided media, operating systems and applications. These layers are activated by human operators or Cyber Physical Machines.

Physical attacks:-
An Industrial machine or device damaged by a person or environment is called physical attack. This attack affects the production area or mechanical area. Lack of sense and carelessness is the reason for it. This may interrupt the production. We can make a smart environment to avoid this attack.

Cyber attacks:-
Data compromised by a malicious user is called cyber attack. This attack can happen on networking level and it reflects also in the electronics level. The types are man in the middle attack, denial of service attack, eaves dropping attack, reverse engineering attack etc. man in the middle attack is the most vulnerable one. Because actual data sent from the client but server receives the data with modification or some alteration. Example for the man in the middle attack in industrial IoT is , if a machine turns left by 45o degree and takes a product and turns by right by 45 o degree places on the another product. If it works in reverse, then that is called cyber attack. This attack possible is remote systems or cyber physical systems. Most of the cyber security algorithms protect systems from the cyber attack. Using brute force attack or cryptanalysis those algorithms are compromised and hacked.

3. EXISTING SYSTEM

Data encryptions are done by stream cipher or block cipher. Familiar cryptographic algorithms are cipher block chaining mode and cipher feedback mode.

Block cipher operations are like 1. Electronic Code Book Mode (ECB) 2. Cipher Block Chaining Mode (CBC) 3.Cipher Feedback Mode (CFB) 4.Output Feedback Mode (OFB) 5.Counter Mode.(CM) . ECB and CBC are the full block cipher algorithms. But CFB, OFB and CM are partial block ciphers and partially stream ciphers.

Cipher Block Chaining Mode:

This is the block cipher algorithm. We split data into the blocks. First the plain text blocks are ex-ored with initial vector and encrypted with key. Now we get a cipher text block. This cipher text blocks are ex-ored with next plain text block. These steps are repeated until the final block. After completing its final block, the partial block padding operations are performed to fulfill the block. Reverse order of these steps are done by decryption.

Cipher Feedback Mode:
We know the working of stream ciphers and block ciphers. The conversion of block cipher to stream cipher is the challenging task. This algorithm is working based on that principle. So this is called partially block cipher and partially stream cipher algorithm. Initial vector is encrypted with key and selects 8 bits from most significant bits and encrypt with plain text block and now get cipher text block. After getting the cipher text block, those bits only ex-or ed with key for the next block. It is followed until the final block. Reverse order of these steps are done by decryption.

3. PROPOSED SYSTEM

In this proposed work we concatenate the familiar block cipher algorithm with Cipher block chaining mode and cipher feedback mode. These are drawbacks in using the same key for every block. This algorithm makes a random key for every block and same time that keys are easy to generate. as shown in Figure -2.

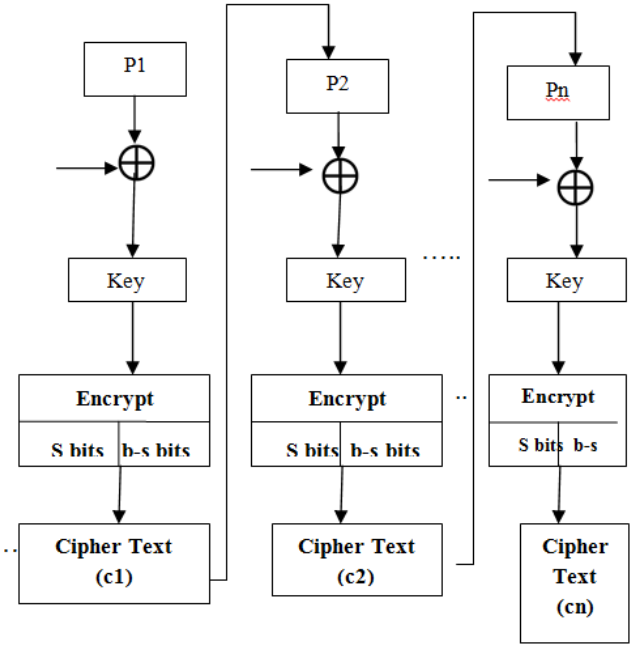


Fig 2 Hybrid Block Cipher Mode Encryption

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This hybrid block cipher mode algorithm works as the plain text block ex-ored with initial vector and its generates the key and concatenated with ex-ored bits. Encryption operations are performed on those bits. Now select the S bits from the encrypted bits. Those bits are converted to cipher text. Remaining of those bits are concatenated to the plain text bits. These steps are repeated for the subsequent blocks. Advantage of this algorithm is every subsequent block getting new key from the operation of plain text block.

Simulation and Experimental Results

In our implementation we used Hybrid Block Cipher Algorithm. This experiment was done by Intel Core i5-4406T CPU @ 1.90 GHz with Linux Operating System. Security requirements are satisfied this experiment. CBC mode and CFB mode used same keys for subsequent blocks. HBCM (Hybrid Cipher Block Chaining Mode) got random keys for their subsequent blocks. Encryption timings are varied for CBC, OFB and HBCM. Attack timing delay was varied between CBC, CFB and HBCM.

Table 1.
Experimental results of the Hybrid Block Cipher Algorithm.

S. No.	Name of the algorithm	Key generation	Timing to encrypt	Attacks possible timing
1	Cipher block chaining mode	Same key for every round	1.27 sec	Delay
2	Cipher feedback mode	Same key for every round	1.32 sec	Delay
3	Hybrid block cipher mode	Different key auto generation	2.32 sec	More delay

CONCLUSION:-

In this paper, we have analyzed CBC and OFB modes of operations. These algorithms generate the same keys for their subsequent blocks. To solve this problem we have developed Hybrid block cipher mode algorithm. This algorithm generates random keys for every subsequent blocks. It is suitable for the implementation in industrial IoT applications. This hybrid algorithm secures the data from different attacks and random key generation is also quick.

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Securing Software-Defined Networks through Access Control Lists

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Abstract:-- **The need of technology is skyrocketing in day-to-day life, so is the need of software and is becoming a toilsome situation for the future internet. The future of networking will be contingent more on software, which will accelerate the pace of innovation for networks as it has in the computing and storage domains. Networks of the twenty-first century offer tremendous adaptability to the business and individual clients, however at the cost of higher multifaceted nature. Controlling and overseeing such systems have turned out to be exceedingly unpredictable and particular activity. Software Defined Network (SDN) assures to revolutionize today's static networks into flexible, programmable platforms with the intelligence to divvy up resources dynamically, the scale to prop enormous Data Centres and the virtualization needed to support highly automated, dynamic and secure cloud environments. Though the security in SDN is given by engaging firewalls in the system but our objective in this paper is to investigate security conceivable outcomes by concentrating on managing Access Control Lists (ACL) based Round Trip Time (RTT) over firewall through SDN approach which characterises the behaviour of SDN that has been illustrated and simulated via MATLAB.**

Keywords: Access Control List, Firewall, SDN, RCM, RTT

1. INTRODUCTION

In the course of the most recent year, the hottest theme in systems administration has been Software-Defined Networking (SDN), one of the sultriest subjects in systems administration. There is, be that as it may, impressive perplexity among big business IT associations with respect to these points. There are numerous wellsprings of that disarray, including the sheer number of sellers who have arrangements that take care of various issues utilizing diverse arrangement models and advances, every one of whom claims to offer SDN solution. So, to take out that disarray, it's useful to put SDN into the setting of an expansive development to have even more an emphasis on software-based solutions and to recognize the key open doors that SDN can address.

At the present time, most of the forwarding decisions are resolved at the routers in view of packet headers. Furthermore, keeping in mind the end goal to switch around virtual machines or equipment gadgets, sellers must reconfigure different routers, switches, firewalls, and so on. Basically, change in the system is excessive of a problem with the need to touch every equipment substance, which additionally influences it too tedious and costly.

To defeat this impediment, SDN was recommended around 2005. SDN is turned-up approaches in the field of networking where there is present centralised software in Control Plane, which analyses flow of data and the communication which is taking place in between devices in the Data Plane. SDN innovation is a novel way to deal with cloud computing that encourages network management and empowers programmatically efficient network configuration so as to monitor and enhance network performance. So the aim is to make the network agile and flexible. Its main differentiating factor is the splitting-up of Data Plane and Control Plane in routers and switches so the control is decoupled from hardware and is achieved in software enabling the network control to become directly programmable without having to manually configure every network device individually.

A. SDN Architecture

SDN architecture partitions a complex system into modular parts by decoupling Data Plane layer and Control Plane typically to manage complexity. Control Planes controls on the idea as how the data flows in the network whereas the Data Plane is responsible for the movement of packets in the network. The rules for managing the packet are sent to the switch which is managed by the controller.

SDN initially characterized a way to deal with planning, assembling, and overseeing systems that isolates the system's control or SDN forwarding planes and network policy along these lines empowering the system control to end up straightforwardly programmable and the basic framework to be preoccupied for applications and system administrations for applications as SDN cloud computing or versatile systems [1].

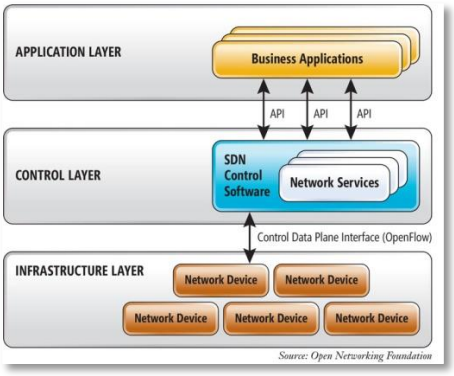

Fig. 1 SDN Architecture

The SDN architecture comprises of 5 planes [2] but we will be discussing three of them: [3] [4]

1. Application layer (top-most layer)

The top-most layer involves application to coordinate security, administration and other particular functions through the controller. Examples of applications include network provisioning, topology discovery, path reservation, etc.

2. Control Layer or Control Plane (middle-layer)

This layer lies between Application Layer and Data Layer and is responsible for making the decision on how packets should be routed among different network devices for making further execution. The main job of this layer is to fine-tune the forwarding tables that are present in forwarding plane based on external service request or network topology. Control Plane Services provide access to other Services or Application above the control plane. Examples include a virtual private LAN service, service tunnels, etc. The Controller is the heart of the SDN network which resides between the Application Layer and Infrastructure Layer. SDN Controller manages the traffic below i.e., between the Control Plane and Data Plane through 'Southbound APIs' (API used, dynamically make changes to forwarding rules installed in network devices in data plane-routers, switches, etc.) and above in between Application Layer and Control Layer through 'Northbound APIs' (supports wide variety of applications). For communication between network devices, OpenFlow protocol is used but other protocols can also be implemented like NetConf or YANG.

3. Infrastructure Layer or Data Plane (lower-layer)

This layer consists of different network devices, implemented on hardware or software, physical or virtual, has both Forwarding as well as Operational Plane. The Forwarding Plane is responsible in handling the data packets from Control Plane where their action includes like forwarding, changing of packets or dropping. On the other hand, the Operational Plane is responsible for managing the operation on network devices like whether the device is active or not, availability of ports, status of each port, etc.

B. OpenFlow

For carrying out SDN in networking environment, OpenFlow is the multivendor standard characterized by ONF (Open Networking Foundation). It is a communication protocol between the Control Plane and the Data Plane. In other words it acts as an interface, whenever the controller wants to communicate with the forwarding devices like routers or switches, it communicates with the help of OpenFlow Protocol. It enables the controller to perform certain actions like add, delete, etc. OpenFlow is characterized in the OpenFlow Switch Specification, distributed by the Open Networking Foundation (ONF). ONF is a consortium of content delivery networks, software providers and networking vendors who aim is to improve software-defined networking.

SDNs, executed utilizing OpenFlow, give a capable, vendor-independent and powerful way to deal with overseeing complex systems with dynamic requests. They can keep on using a large number of the helpful system innovations as of now set up, for example, virtual LANs and a MPLS infrastructure. SDNs and OpenFlow are probably going to end up ordinary in huge transporter systems, cloud frameworks, and different networks like big data.

I. GAP ANALYSIS

SDN is a new architecture which has been modelled to enable a cost-effective network which is easily manageable and not very complex. As it controls the entire network behaviour so it is important to keep in mind that whatever new designs or of techniques which has to implemented should not be complex, should me easily to manage, cost-effective, proper resource management, no formation of loops, time management, etc.

Though firewall plays an important role in securing networks, also in terms of SDN it can monitor the inside traffic which was not applicable in traditional networks, then also it faces many challenges like dynamic packet modification, rule dependency, memory utilization, bandwidth, etc. Earliest solution for SDN-based security was Ethane [5]; it showed how the security policies were centrally enforced. The main aim was on programmability

not on threat measures. In terms of architecture also, firewall faces many problems:

- In centralised SDN firewall, the firewall policy is centrally defined and it enforced at the controller, it cannot deal with partial policy violation.

- In distributed SDN firewall, firewall policy is defined centrally but propagates and enforced at each individual flow entry which may lead to wastage of resources in some cases and needs a complicated renovation and re-propagation mechanism to handle policy update.

- The firewall is designed to recognize legitimate packets for various kinds of connections. Only packets which are matching a known active connection are only allowed to go through the firewall.

- Stateful monitoring

- Lack of TLS in TCP layer

- Scalability and availability

- Session layer firewalls are otherwise called Circuit Gateways or Circuit-level firewalls. They have the accompanying highlights; work at the TCP layer of the OSI model. Commonly these firewalls utilize NAT (Network Address Translation) to ensure the inner system and the gateways have next to zero association with the application layer, in this way it can't channel connections which are more complicated. These firewalls are just ready to secure traffic on an essential run base like source-destination port.

- Manual configuration

- Increase in installation cost

So to overcome these problems, we designed a solution where instead of firewalls, Access Control Lists, i.e., ACLs are implemented with RTT (Round Trip Time) as to avoid wastage of resources and there should be proper memory utilization, good performance of the network, provides more reliability and bandwidth.

II. LITERATURE SURVEY

In this section we will be briefing down the work done on SDN, techniques and approaches implemented on SDN till now and based on this, in the very next section we proposed our work to overcome the problems faced by SDN.

Ruxandra Trandafir et al. proposed an ACL management application (centralised), named as FirewallPK. One of them is FRESCO, which was an OpenFlow application that gives a simple utilize programming structure that permits usage and sharing of various security identification techniques and relief modules. Another OpenFlow project is CloudWatcher which gives observing administrations to dynamic cloud networks and investigates packets utilizing pre-introduced security devices. FlowChecker: design examination and check of combined OpenFlow infrastructure offer a usage for distinguishing any between switch misconfiguration inside the FlowTable and furthermore irregularities in various OpenFlow arrange frameworks. FirewallPK comes as a corresponding usage of all the previously mentioned projects, by giving a centralized tool that is equipped for checking progressively all the system movements and instantly obstruct any potential security assault that is powerfully distinguished [6].

Dhaval Satasiya (2016) in Distributed Scenario focused on SDN security and explored security possibilities by developing firewall prototype. He focussed on existing firewall technology and identified the research gap that what the 3 Planes (Application, Control and Data Plane) lack behind. Firewall became a single point of failure and overloading is one of the main issues. So, he proposed a simulated network for building the distributed flow-based firewall prototype also it reduces overhead of SDN firewall and an algorithm for handling large number of packets on the switches [7].

Michelle Suh et al. proposed a firewall application taking in view that some SDN controllers do carry firewalls but they either lack UI or their functionality and buying external firewall hardware leads to manageability and cost problems. The approach was implemented on virtual environment. They proposed 2 approaches (a) rules were preinstalled on the switch’s flow table and b) packets were handled in the real-time) to overcome these problems Though, these approaches made it simple but faced problems such as delay of packets which results in packet loss [8].

Hongxin Hu et al. (2014) proposed an approach named as FLOWGUARD using Floodlight controller which detects violation by examining the flow path space against firewall in keeping eye on limitations of SDN firewall. Implementing SDN firewalls is a great challenge. Main goal is to build a reliable SDN firewall to make the network more efficient and flexible. The result of this work produces manageable outcome for real-time network. But this despite of many things are needed to work such as keeping the track on the flow of packets; development, integration and management of packets need to be done; and to make the FLOWGUARD network robust and more

secured, detection of conflicts and their problem are the area in which the work has to be done [9].

Kuldeep Tomar and S.S Tyagi (2014) proposed 2 mechanisms (ACL Optimization and Hits Optimization) to overcome the limitation of ACL that for smaller networks along with an algorithm. The problem identifies was that for each ACL, its rules are checked and according to that the packet is forwarded. If not matched at first, then it goes to the next router and so. So for smaller networks it's easy to check but for larger network it will be time consuming which will lead to packet loss and ultimately increases packet latency. But still further work is to be done to improve the efficiency of the network, throughput and security [10].

Jaehoon (Paul) Jeong et al. proposed a framework mainly for security purpose using SDN which was represented as: Centralised firewall system and another centralised DDoS attack mitigation system. They proposed their work in both fields and also identified the challenges which include cost, performance, establishment policy, etc. Procedures for operations of firewall are described along with the firewall challenges [11].

Amandeep Kaur and Vikramjit Singh (2017) implemented L2-L4 firewall to overcome the limitations of [7]. They proposed a work in which they developed better GUI to insert rules and make it more easy to configure firewall. They introduced two strategies: blacklist and whitelist strategies. But they used blacklist strategies in which the unmatched packets are passed and matched are blocked. In their scenario, two applications are run on control plane: firewall and learning switch. They provide easy GUI so as to add or delete the rules [12].

III. PROPOSED WORK

Access Control List (ACL) is the list of Access Control Entities (ACE) which helps to permit or deny packets. It helps in traffic filtering and forwards the matching packets and blocks the rest. One of the main reasons of using ACL is security. In order to provide the security benefits of ACL, one should configure it at edge routers. It is basically a list of tables which tells the OS that which permissions are assigned to hosts and according to that traffic is permitted or denied. ACL are terminologically executed one-by-one on routers so as on return path as well. ACLs on routers are not as that complex as stateful firewalls, but they do provide a significant amount of firewall capabilities. ACLs are been implicated on each interface, and as the number of ACLs are implemented on interface increases, ACLs also increases and so bidirectional ACLs.

To control the flow of the packets ACLs are implemented to perform packet filtering. A standout amongst the most imperative motivations to configure access list is to give an essential level of security for your system by controlling access to it. To give some security advantages of access lists, configuration is done on border routers. Such an access list gives a fundamental support from the outside system or from a less controlled zone of one's system into a more sensitive region of your system. Since ACLs are implemented manually on each router, so for large network it is difficult to configure ACL on each and every router. In case of SDN, instead of configuring ACL on each router in Data Plane, one of the best and easiest ways for configuring ACL is to manage whole network by implementing ACL through the controller. But on other hand, in distributed SDN firewall, firewall policy is defined centrally but propagates and enforced at each individual flow entry which may lead to wastage of resources in some cases and needs a complicated renovation and re-propagation mechanism to handle policy update. Only packets which are matching a known active connection are only allowed to go through the firewall and rest are discarded which results in packet loss, which is not good. So our thesis mainly focuses on the network performance, memory utilization, bandwidth and throughput. For these we illustrate the advantages of using ACL based Round Trip Time (RTT) execution at 1000 remnant buffering over firewall using concept of RCM through SDN approach and why it is more preferred to use ACL+RTT.

A. Composition of RCM

We proposed Rate Controlling Metric (RCM) in mode of simulation where for every communication channel; the networking device such as the router regulates a unit rate $R_{unit}(t)$. On every data packet which is transmitted, the $R_{unit}(t)$ is present which further indicates the slowest rate through the routers. Before evaluation of any packet (data packets are time stamped), when a packet reaches the interface of ingress router, first of all it verifies the communication link for the transmission of that packet to the destination. RTT acknowledges as function of moving average (M_{avrg}), accumulated rate of traffic ($Traff_{rate)}$ and link capacity ($L_{cap),}$ in order to compose RCM. The $R_{time}(t)$ is updated regularly around once per RTT by the router.
Examining L_{cap}, link capacity of the communication link, and rate traffic ($Traff_{rate}$) for the channel, the remnant buffer (which is calculated below may vary according to channel type) can be measured as:

$$Remnant\ Buffer = L_{cap} - Traff_{rate}$$

With the help of simulated based study, the method proposed is examined, so desired accuracy (ψ) is considered as:

$$Remnant\ Buffer = \psi\ (L_{cap} - Traff_{rate)}$$

The proposed system also faces the problem of highly congestion communication link, which further overwritten by the router as it traverses through the network.

Here, two types of parameters of traffic are used here: RTT and Throughput. RTT is also known as Round Trip Delay (packet traversed from source to destination and then return), whereas throughput measured the maximum flow setup rate which is maintained by the controller.

B. Simulation of SDN

This scenario is illustrated as OpenFlow switches which are 5 in number (S_1, S_2, S_3, S_4, S_5), further connected along 2 host (H_1 and H_2) which are connected to the controller. The data serves as TCP throughput and RTT were assembled and are analyzed from component of switch in the controller. The whole time which was 180 minutes and was split-up into three equal portions: in first, the size of the file transferred was 100 MB, the second was 50 MB and the third was 25MB. This provides the performance metric and average values of throughput and RTT, which after every 5 minutes are assembled and registered in order to know about the different traffic variations in the network and further the data is being stored in the database. The switch contains the flow table which is stored in the database along with throughput and RTT.

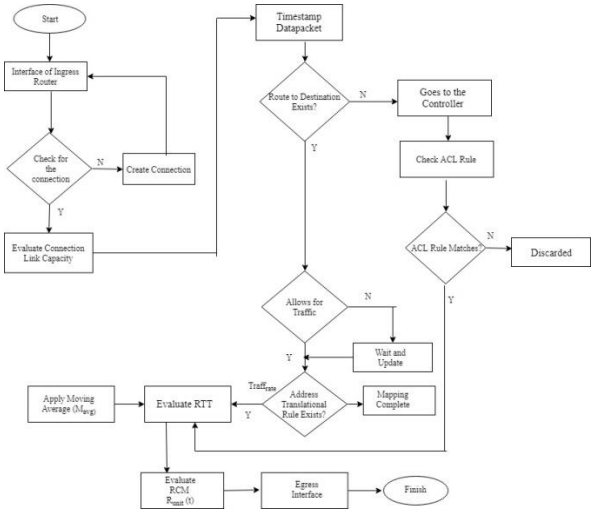

Fig. 2 Flow chart of proposed method

IV. RESULTS AND CONCLUSION

The result shows the different variations of packets flows in SDN network at different interval of time with different iterations through MATLAB software. It also describes the increasing and decreasing of various packets when entering into switch and what rules are applied to it and matches its packet header with the forwarding table.

Here are some results of the project. The result illustrates the increasing and decreasing of packet at each interval of time in nanoseconds (ns).

According to clam_corr_matrix =

31 4 20

4 11 4

20 4 33

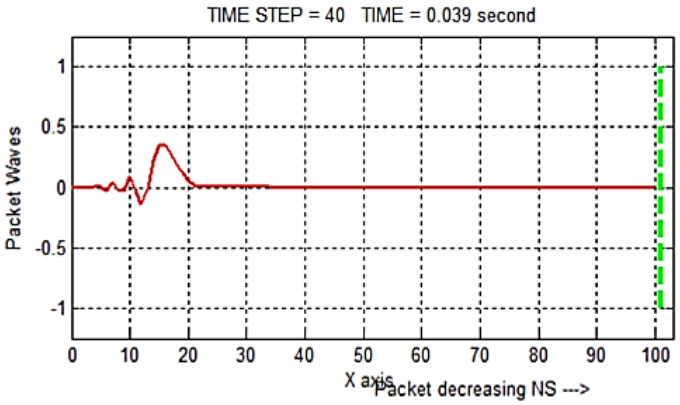

Fig 3: Packet decreasing rate with respect to packet wave in defined software packet at execution level performance with settle time 10-20 nanoseconds (ns)

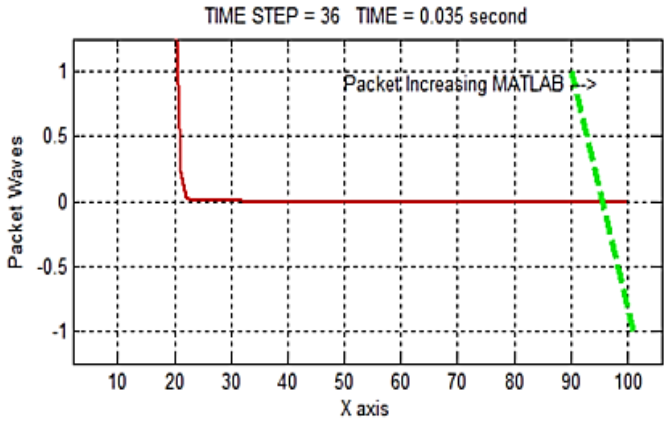

Fig. 4 Total no of iteration with respect to packet wave increasing at 22 ns in defined software packet at execution level performance with settle time 90-100 with packet waves

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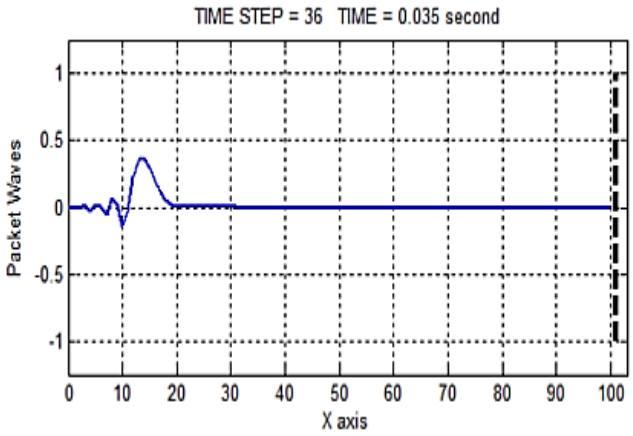

Fig. 5 Total no. of iteration with respect to packet wave increasing at 3-20 ns in defined software packet at execution level performance with settle time 90-100 with packet waves

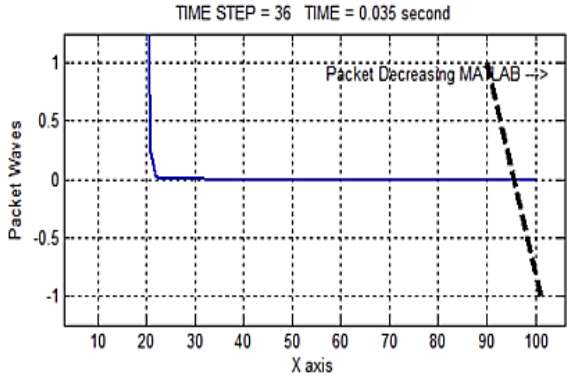

Fig. 6 Total no. of iteration with respect to packet wave increasing at 23 nanoseconds in defined software packet at execution level performance with settle time 90-100 with 0.039 ns packet waves

The work demonstrates that is it efficient and productive to utilize seemingly the least complex SDN programming model, in which a software engineer characterizes the general system conduct by composing a packet handling capacity in a well-known, universally useful programming language. The packet handling capacity is theoretically connected to each packet entering the system and has access to the logically centralized state.

This paper also illustrates the advantages of using ACL based RTT execution at 1000 remanant buffering over firewall and why it is more preferred to use ACL+RTT. ACLs are mainly implemented in SDN so as to provide throughput (bit/symbol) connectivity in the network which not able to define fixed cycle of NxN grid , also it easy to implement also time consuming for other simulator and requires much human effort (manual configuration). Main goal was to provide security to the network, which requires less human effort also the packet should consume less bandwidth and can easily reach the destination through flooding controller using NxN dimensional grid size connectivity rather than routing instead of non-connected nodes which minimizing overall executing time.

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Physical and Psychological Profiles of Cricket Players

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Abstract:-- **Cricket is a national sport that connects the people of India in a unique way. Cricket is governed and controlled in Goa by Goa Cricket Association, which is a full member of Board of Control for Cricket in India. In the early years Cricket was considered as a battle between bat and ball and obviously fitness and type of Body was not given due importance. With the introduction of One day Cricket recently, the game has gone through drastic changes and the physical demand made the Cricketers focus on the body have which also increased dramatically, depending upon the version of the game played and role played by the player in the team.**

Key Points: Physical Profile, Psychological Profile, Cricket Players.

INTRODUCTION

Cricket is not only the most popular sport among the commonwealth countries but also all over the world. Today is the modern competitive Cricket era. The performance of Cricketers is enhancing day by day, the old records are being broken and new records are being set, scores are reaching new heights. It is only due to high intensity training of the players which help them to perform well.

The Game of Cricket

Cricket is basically a bat and ball game played between two teams of eleven players. It is one of the oldest sports in the world which originated in England during the 16th century. The expansion of the British Empire spread this; Colonial recreational sport turned into a spirited game to the all corners. Today Cricket seems to be a virtual lifeline of many Commonwealth nations. Cricket is a game in which each team has to bowl and bat according to certain rules and regulations. A team which scores greater number of runs will be the winner.

In olden days, this game was played in different names in different countries. The game of Cricket was developed from a simple game of hitting an object with a piece of wood. Basically it is the battle between a bat and the ball, but the approach has changed from time to time. Cricket is played in many forms such as Test, One Day International, First class, Twenty 20, Super Six, Eight-a-side, Indoor Cricket, Max Cricket, Double wicket and Single wicket. Cricket is played in more than 105 countries around the globe.

In India the game has taken its deep roots and it is only because of its association with the British for more than two centuries. In the year 1792 the first Cricket club in India was formed at Calcutta and this is considered as one of the oldest Cricket clubs, outside Great Britain and indeed one of the oldest in the world. The game became popular in India during the second half of the 19th century. The Indian princes had contributed much for the promotion of this game. The Board of Control for Cricket in India is the body that arranges 'Test' Matches.

Games like Cricket require a unique set of skills for batting and bowling. Common exercises involved with Cricket for excellent batting and bowling include standing for long periods of time, bending, stooping and squatting. These exercises help to burn a significant amount of calories per hour and are very low to moderate-paced fitness activity.
Every Cricketer is in race to excel one another. Now a days Cricket competitions have become fundamental mode of human expressions as they are one of the very important event by which national and international recognition and prestige is gained. From its very simple form, Cricket has emerged into highly organized activity of Indian society and it has become a complex social and cultural phenomenon. Sports have been permitted to most of our social institutions like Education, Economics, Art, Politics, Law, Mass Communication and International Diplomacy.
Even though Cricket is one of the oldest organized sports, there are very few studies on the physical demands of the game. Batting and bowling are intermittent in nature with the demands placed on the players being dictated by the type of match being played. Due to this stop-start nature of Cricket, accurate assessments are often difficult. As a result research is sparse (Bartlett, 2003), so there are few scientifically sound training programmes for Cricketers. In fact, the idea that Cricketers need to be well trained is a relatively new one.

Historically Cricket players never trained themselves as hard as other sportsmen in team based sports such as Rugby and Soccer and in fact, many were overweight which dispelled any reason to be trained for their sport (Woolmer & Noakes, 2008). This scenario changed when the Australians (Cricket) and New Zealanders (Rugby) demonstrated that, by focusing on physical training, one can improve one's performance. This paved a way for more scientifically based physical training programmes prior to their Cricket and Rugby World Cup wins in 1991 and 1987 respectively.

Further, the increasing demands bestowed on many Cricketers compelled them to be in peak in physical condition not only for performance, but also from prevention of injury. International Cricketers are now exposed widely which are reflected by more five-and One Day matches per season, longer seasons and more frequent touring (Noakes & Durandt, 2000). For example, during the 1998/1999 Cricket season, the South African Cricket team played eight five-day Test matches, 17 One-Day International games and were eligible to play in eight four-day and ten one-day provincial (county) Cricket matches – 99 days of playing (Woolmer & Noakes, 2008). In 1970, in contrast, players were asked to play 35 days of Cricket (Woolmer & Noakes, 2008).

Physical Profile of Cricket Players

Physical fitness profile for each player, compared with normative data, identified that this cohort of professional Cricketers had some superior fitness parameters compared with the general population, and were applicable and comparable with other professional athletes. In addition, after effect size calculations, the results showed that some physical fitness differences existed between playing positions. It was concluded that Cricket professionals possess a superior level of physical fitness and strength, and conditioning coaches should seek to progress these physical parameters and further identify position-specific physical requirements to compete with the modern game.

Chin and others examined and evaluated physiological profiles and sport specific fitness of Asian elite Squash players. It was conducted before the selection of the Hong Kong National Squash team for the 1992 Asian Squash Championship. Ten elite Squash players were selected as subjects for the study. Maximum oxygen uptake was measured using a continuous treadmill running test. A sports specific field test was also performed in a squash court. On the base of the find results, it was concluded that the Hong Kong squash players have relatively high cardio respiratory sports specific fitness and muscle strength which may be one of the key factors that contributed to the success of the Hong Kong team in the Asian Championship.

However, there is also evidence to suggest that the physiological capacities of players may deteriorate as the season progresses, with the reductions in muscular power and maximal aerobic power which results in increase in skin fold thickness which occurs towards the end of the rugby league season, when training loads are at the lowest and match loads are at the peak and therefore injury rates are at their highest. It was concluded that to date, most, but not all, studies have investigated the movement patterns and physiological demands of rugby league competition, with a little emphasis on how training activities simulate the competition environment. An understanding of the movement patterns and physiological demands of specific individual positions during training and competition usually allows the development of strength and conditioning programmes to meet the specific requirements of these positions.

As a generalization, it has been found that batsmen tend to be smaller and lighter than (Stretch, 1987; Noakes & Durandt, 2000; Bartlett, 2003) but that they have similar morphological profiles with both batsmen and bowlers averaging approximately 12-14% body fat (Noakes & Durandt, 2000; Bartlett, 2003). Batsmen also have higher predicted maximal oxygen uptake values and faster running (simulated three runs protocol) with quicker turn times than bowlers but have similar strength and 35 m sprint performances (Noakes & Durandt, 2000).

When compared to rugby players, Cricketers demonstrate similar performance characteristics. This is despite the fact that rugby is typically viewed as more physically demanding requiring players to be well trained. Cricket, in contrast, has tended to be viewed as less physically demanding requiring less training (Fletcher, 1955). Data on South African international rugby and Cricket players clearly shows differences in morphology as well as performance with Cricketers reaching higher levels on the typical shuttle run test. Further, there are no reported differences in strength measures between the two groups which is interesting, as rugby players are also viewed as stronger possibly due to the larger size.

Psychological Profile of Cricket Players

The importance of sports psychology in Cricket is being increasingly well recognised with many professional clubs and organisations employing sports psychologists. Sports psychology is sometimes called mental preparation or mental training or mind games or mind over matter. The aim for any team is to play Cricket at their peak in every match. The researcher had attempted to show that there was an empirical research and anecdotal evidence that support the use of particular mental skills and thought-content in competitive strategies to produce enhanced performance. Maintaining performance levels once an athlete's growth has stopped is a rich area for sports

psychologists. Practitioners need to be made aware of this improvement potential. Sport psychologists can do much to promote this concern (Kamlesh, 1985).

Personality is a theoretical concept employed to focus attention on the individual as an integral, dynamic and striving organism. It connects the person's actions, reactions and interactions of all aspects of human behaviour. Personality is both dynamic and static in nature (Kroll, W. 1967).

It is the sum total of many components like, cognitive maturity, motivation, interest, feeling, temperament emotional stability, self-concept and attitude. These traits are organized in a distinctive way so that they uniquely characterize a person. The organization of personality traits is said to be consistent, persistent and change slowly.
Although each personality is unique, there are certain personality traits, which are common to many individuals like ones reaction to conflicts, frustrations, aggressive or defensive behaviour and outgoing or withdrawing attitude towards self and other people.

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Challenges of Human Capacity Development in Colleges of Education in Nigeria: A Study of Federal College of Education (Technical), Potiskum, Yobe State.

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Abstract:-- **This paper attempts to identify and explain the challenges facing teacher capacity building and effective teaching and learning with particular reference to the colleges of education in Nigerian context where the teacher education system is facing unprecedented challenges. The study used a survey design where simple random sampling technique was used to select a sample of 100 lecturers of Federal Colleges of Education (T), Potiskum. The instrument for data collection was a questionnaire titled "Challenges of Human Capacity Development Questionnaire (CHCDQ)". The instrument was a 4-point Likert scale. Cronbach alpha reliability method was used to ascertain the reliability of the instrument and a reliability coefficient of 0.80 was obtained. Data collected were analyzed using descriptive statistics – means, standard deviations, frequencies and percentages. Results of the study revealed that inadequate funding, corruption/examination malpractice, lack of effective monitoring/supervision of teaching and learning, lack of committed teachers, students' poor attitude towards learning, inadequate facilities and certificate racketeering were identified as the constraints to human capacity development in colleges of education. Based on these findings, it was recommended among other things that the government should adequately fund colleges of education in Nigeria to enhance quality human capacity building and lecturers should be given adequate incentives to motivate them to be committed to the training of students for quality outputs.**

Key words: Challenges, Human Capacity, Development, colleges of education, Teacher Education.

Communicative Language Teaching (CLT) in Schools of Rural Bangladesh: A Clash between Curriculum and Clienteles

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***Abstract*:-- Bangladesh shares the legacy of English Language Teaching (ELT) through Grammar-Translation Method (GTM) in the sub-continent since 1835. Communicative Language Teaching (CLT) methods emerged in the 70s and replaced GTM in many countries. Bangladesh introduced CLT in the late 90s. But large projects like English Language Teaching Improvement Program (ELTIP, 1997) and English in Action (EIA, 1999) have made no significant difference in the prescribed outcomes of the CLT curriculum. This study explores the research gaps pertaining to the rural reality, vis a vis, demands of CLT approach; the CLT practitioners' English proficiency, their pedagogic preferences, perception and practices. Findings of literature review scrutinized in the light of the outcomes of a questionnaire survey and semi-structured interviews with CLT practitioners involved in CLT implementation projects conclude that the initial research questions require urgent attention through an action plan with an effective teacher training program, provisions for improving English teachers' language proficiency, a user-friendly instructional module, a pool of dedicated English 'subject teachers' and use of L1 to improve learner motivation and empower teacher practice in order to ensure expected outcomes of the new English curriculum.**

Key Points: ELT, GTM, CLT, ELTIP, EIA.

Evaluating the Impact of Relationship Marketing (Rm) On the Performance of Small and Medium Scale Enterprises (Smes) In Nigeria

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***Abstract*:-- This work is on relationship marketing and the performance of small and medium scale enterprises in Nigeria. The major objective of this study is the provision of useful information about the awareness, understanding, acceptance and usage of the relationship marketing concept (RMC) by SMEs, and the establishment of the relationships between some management attributes and the implementation of the RMC. Our investigation was based on the formulation and the application of the two part model of the RMC. The Research design involved the use of the two part model of the adoption and implementation of the RMC, and the relationship planning and control system. The adoption and implementation variables are treated as the dependent variables that influence the level of customer satisfaction, which in turn impacts on the independent variables such as, growth in assets, profitability and sales turnover. The results showed that over 80% of SMEs in the seven sample states in Nigeria adopted and used the relationship marketing concept. The very relevant education and experience of CEOs and workers positively influence the level of the practice and tenets of relationship marketing concept. That the articulation and precise definition of a corporate mission statement based on the relationship marketing concept, and the attention to customer needs, produces customer satisfaction, loyalty, corporate success and profitability. All the stakeholders in SMEs, the employees, the government, banks, and the customers should form a win-win network, to identify, satisfy, enhance, commercialize, retain and reactivate long time customers for the mutual benefit of all.**

Key Words: Small and Medium Scale Enterprises, Relation Marketing, Marketing Customer Service, Brand Loyalty

Drainage Network System Evaluation Based On Index Model Approach; Case Study Citepus Watershed - Indonesia

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***Abstract*:-- Drainage network system in urban area has an important role, especially in Citepus-Bandung city. It has function to flow excess water and wasting water from household, industry, or another area. The capability of this facility need to keep functioning properly. In order to evaluate the facility performance, the consideration of Maintenance, Reparation, and Financing are evaluated based on the leveling of facility condition. One of the tool to evaluate drainage network system performance is by using index model. The index-model of drainage network system develops a formula as a tool to determine the condition of infrastructure service of urban drainage network based on technical and non-technical aspect. This formula works by elaborating the variable and indicator which gives values to each aspect both technical and non- technical. Three variables that give important aspect to the technical aspect namely system capacity, puddle problems and drainage patterns, each component is evaluated by an indicator. Non-technical aspects influenced by five variables are institutional management, legal and regulatory aspects, socio-cultural and economic, public and private roles and flood losses. The research focus is Citepus drainage network that has 16 primary channels. Collecting data from technical aspects is done by direct site visit measurements as well as secondary data collection. The non-technical aspects use questionnaire as qualitative data that converted to quantitative. According to value index evaluation, Citepus has index value around 3.03. it means that the dainage condition of this site is in the moderate condition and hence routine maintenance need to be conducted**

Key Words: Infrastructure evaluation, Citepus watershed, Drainage system, Index model

Road Accidents in Nigeria Affects Public Health: A Review of Evidence Based Approach to Curb the Menace

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***Abstract*:-- Road accidents remained among the leading cause of mortality and morbidity, as well as property loss around the world that is threatening public health, especially in Nigeria receiving less desired attention. This paper tried to discuss some road safety parables listed under the following headings: Introduction, the need to change perception and attitudes of society towards road accidents, prevention of road accidents, road safety tips, evidence based approaches to change behavior, road safety issues in Nigeria and conclusion.**

Social Life Style of Tribes in Kanyakumari District

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Abstract:-- **During the Paleolithic Age, vast forests of South India were inhabited with bands of nomadic people. They were called 'Tribes'. They lived by hunting and gathering of wild fruits, tubers and edible roots. The habit of the people varies from place to place. These elements determine the life pattern of people, living in the forest area. The fertile areas were the citadel of various cultures and civilizations. There were various struggles between different ethnic groups, for their survival. Those who had better education and solid exposures could win the game of struggle. As the Kanis had remained helpless and weak in their struggle, they were thrown back to remote areas. In Tamil Nadu there are 36 types of tribes live in the mountain ranges. Kanikkarar has become a separate community and they are frightened of countrymen. So they don't mingle with the civilized people. Due to this they are socially and economically struggle as downtrodden community. This modern world is developing in science and technology but these tribes live in their old customs habits and superstitious believes. This article analyses the social life style of Tribes in Kanyakumari District.**

Key Words: Tribes, Kanis, Cultures and Civilizations.

INTRODUCTION

The scientific inventions lead this world to great change in civilization. The tribes of Kanyakumari District still live with their ancient tradition and customs. They lead a life associated with nature. So they are afraid of nature and ghosts. They do not give importance to education. There are ultimate goal to search for their lively hood. They do not mingle civilized people of country side, so they live in forests and with the wild animals. They are proud to be called 'Adivasis', which denotes primitive settlers of the land. Tribes Tamil word 'Kani'. The term Kani means hereditary proprietor of land. The Kanis in Kanyakumari are divided into four categories namely, Malaya Rajan, Natta Rajan, Kdala Rajan and Ootta Rajan. Though the Kanis are living in the forest, they have their own life style, tradition, beliefs and rituals to suit with the environment. The Kanis are generally dwarfs and they are small in size. They are dark-skinned and platyrhined type. The Kanis said to have characterized high standard of honor. They are straightforward, truthful and open hearted. They are usually helpful to the new visitors of the forest.

LAND DEVIATION OF TAMILS

Ancient Tamil divided land as Kurinji, Mullai, Marutham, Neythal and Palai. They have respective Goddess, Occupation and traditions. The hills and hilly areas are called 'Kurinji and their God is Murugan. So Murugan is also referred a 'Kurinjikillavan, Mallaikillavan' in ancient Tamil Literature 'Murugu' means sweet fragrance, youth and beauty.

ORIGIN OF KANIS

When Pandya kings were attacked by enemies at Madurai, the bodyguards of kings escaped from enemies and they hide themselves in Tirunelveli district. They get consulted by the sage Agathiyar and stayed there. They had arrow at their hands, and they are called kanis there by.

AGATHIYAR

The peak Agathiyar is at mount Pothigai. It is above 6000 feet from sea level. The guru sage Agathiyar is believed to have meditation on this mount still, this is the belief of Kanis. So they visit the temple situated at Papanasam (Agathiyar Malai) and worship that hill as a holy place. The kanis migrated to fertile kanyakumari district due to the lack of rain. They settled here as they had occupation, water resource and fertile land. They called Kanis belong to the habitats of South Trivancore.

KANIKKARAR – THE REASON FOR THEIR NAMES

Kani – means land. The person who owns the land is called Kanikkarar. They occupy the north west region of kanyakumari district near Cittar, Pechipparai, Perunchani, Kothaiyar, Paraliyar water resources viz, Vilavancode, Kalkulam and Thovalai taluk (15,32 habitate) including Kalamalai and Verappulimalai. Moreover they also live in Ambasamuthiram taluk in Tirunelveli district (5 habitat) also in Neyyantinkarai taluk in Tiruvananthapuram. There are totally 63 habitats in India. Kanikarar habitats in Kalamalai and Veerapulimalai in Kanyakumari district

have 4971 males and 5187 females. In Arugani 92 males and 118 females are living at present.

Family

In ancient times the feeling of living as a family started after their occupation. They started to live with their relatives- Ancient tribes lived in joint family. Tamils of Sanga period worked together while hunting, plugging , harvesting and collecting honey this is recorded in Agananuru. Kanis lived in joint families till the end of last century. Now they live in nuclear family. The family constitutes a husband and wife with one or two kids.

Tribal Religion

They fully believe the Nature and the Spirit. Hence, their religious faith is divided into two categories. They are the worship of nature and the worship of ancestor's spirit. The Kanis worship a number of Gods, Goddesses and deities. They call God as Andavan, Padachavan, Bhagavan, Thampuran and Deivam. All their Gods are eminent persons of the early period.

Homes

In ancient times the people of hilly area lived in caves, holes of trees and on peaks. After starting agriculture, in order to protect the fields from animals they settled in Kudil and Paran. Their superstitious believes given them the idea to shift their kudil very often. They did not build permanent houses because of shifting cultivation. At the end of last century, Indian government has put forward acts to protect forests. Settlement Transaction acts tells that Kanis should live in particular places, so they build permanent houses and shifted to it.

Appearance of Kanis

Based on the habitats geographical situation and climate the physical appearance, the complexion and activities are determined. Accordingly, the tribes are classified as Negroid, Mangolid and Europid. Kanis resemble Negroid. They are short, black and with curly hair. Their head is elongated with a wide forehead a flat nose. Their average height is 152.8 cm.

Clothing

In ancient times kanis wore leaves and the dry skin of hunted animals. The women were a dothi alone in their waist. If the government officials happened to see them they cover their breasts with their hairs and hands. During the rule of the king Thirumular the ladies started wearing top dresses. The youth among the ladies wore dresses like Kerala ladies and sarees like Tamilnadu ladies. The men wore dothi and towel. They also were shirts. Now a day's youth started dressing like modern men.

During wedding except the bride and bridegroom most of the people wore old dresses due to poverty. Most of the old age people do not have alternative dress so they wear the same dress till it's torn.

Jewelry

Both the genders of kanis wear jewelries. Previously they wore flowers, vegetables, fruits and nuts as ornaments then they wore shell and pearl. Kanis wore studs made of flowers, vegetables, nuts and wooden articles. They also used the tooth of animals, silver copper and brass. Now a days they use gold for making Thali.

Tattooing

Both male and female has the habit of tattooing in forehead, nose, breast and upper arm. First they draw the picture using coal. These are done by professional tattooer. Then they use the thorn of citrus trees to decorate it. To avoid the injuries they mix milk with the coal.

Occupation

The human life has stages based on getting food. Collection of food grains, Hunting, Burning the forest for cultivation of crops and stages of Agriculture notable in Kanis life. When they do not get agriculture product, they go for fishing, hunting and collecting honey Agriculture fulfills.

The Profession loans allotted by Government

Government arranges a private places for technical training in schools. There they get training for weaving cloth and stitching government provides free sewing machines, but these tribes do not give support to these projects. So this results in the failure of these schemes.

Government Job

Some of the Kanis are working in low grade government jobs. To improve standard of life the, forest department is trying hard. At 2001 for the forest officer job, based on the recommendation of Mr.I. Anwardeen I.F.S, 19 Kannis youths are appointed. Out of these, 3 youngsters are Kanis. They also work for daily wages in government Rubber Corporation. They also engage themselves in cutting of rubber and collecting rubber latex.

Food

Food is the basic need of human. They cultivate agricultural products, collecting them and hunting are the ways in which they fulfill their lively hood.

Break fast

Most of the Kanis give the remaining food that is cooked in previous night to their kids. They drink plain tea without sugar.

Lunch

While they are working in the fields, mostly they eat tapioca, raw banana and pulses.

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Drying in rocks
In dense forest they arrange wood on rocks and lit fire. They put off the fire and remove the husk. Then they spread plantain leaf over it and keep the tapioca, they add salt and pepper to the hunted flush both get cooked well and they eat it.

Dinner
Most of the Kanis living in Kanyakumari District cook rice at night. The rock paddy, millets, bamboo rice and bajra are their major food items. They either cook and eat in the form of rice. They eat the vegetables that they cultivate. They also eat the fish and flesh of hunted animals. They add pepper and other spices to add taste to the gravey. The members of the family sit and eat together.

Common Food
The people who live in poverty eat Thuvarai, grams, unripe Jack fruit and banana. They process these with salt. Their main diet comprise tapioca and unripe jack fruit. Some times at night they burn bee hives, when the bees shed their wings they cook that wings along with pepper and salt and make gravy out of it.

Drugs
They mix Jaggery and Enchapattaj with water and keep it to get the fermented liquid. They cool this liquid to get liquor. Both male and female prefer to drink toddy. They also smoke heroin and tobacco.

Festivals
If people always think of their worries and problems they develop stress. So to lead a happy life and to worship their God they celebrate festivals. These festivals are not only meant to eat drink and be merry but help Kanis to lead a prosperous life.

Deepavali Festival
On the day of Deepavali, Kanis get up before Sun rise and they take oil bath. They prepare pongal when sun is rising. They take leave of their regular professions. They prepare variety of food and they drink little alcohol and enjoy the day.

Thiruonam Festival
This is a greatest festival of Kerala. On the eve of this festival Kanis of Kanyakumari District along with other Kanis visits the native place of Thiruvithancore King and the exchange gifts.

Kanikanal
During ancient times when the king of Trivancore goes for forest visit the Kanis help him in many ways. As a token of his gratitude the king sends new dresses, salt, match box and gift to Kanis and Kanis give banana, bamboo rice, honey and millet flower in turn. They also send spices and herbs to the king. Till now the hier's of Maharaja's family send gifts to Kanis on the day of Onam Kanis cook variety dishes and the kids and elders sit together and eat the food along with alcohol.

Language
The Kanis speak mixed language of Tamil and Malayalam. Their language is known as Kani phasai or Malambhasai. The census of India 1961:3 says that Kanis speak a sub lingual of Malayalam, but Tamil prevails nowadays. Inspite of their illiteracy, they couldn't speak the languages in proper way.

Education of Kanis
The process of teaching and learning is called education. "It is a key to development". This statement is well accepted by all planners, administrators, scholars and developmental agencies throughout the world. 'Illiteracy' is one of the important problems of Scheduled Tribal population. Among the tribal communities a conservative attitude can be observed towards the education of female and consequently female literacy level is lower than that of male in their society.

For the tribes of Kanyakumari district there is a primary residential school at Manalodai, at Pechipparai and Pathukani. There are residential schools for schedule tribes. Eventhough these residential schools are meant especially for Kanis the number of Kani children enrolled in these schools are very few.

Economy
The Kanis of Arugani usually leave their cultivable lands for leece. Some of them still survive lazily without doing any work. Kanis get lesswages. They are compelled by government to cultivate repeatedly in a same land, so the yield is poor, because of these, their annual income is very less and their economic states is very poor.

Reasons for low literacy level among the Tribals
The main reason for the very slow spread of education among such Tribals is that they are living in remote areas far away from educational institutions. The social and economic conditions prevailing in the tribal settlements are not conducive for studies. Due to poverty, the Tribal children are inclined to engage themselves in economic activities for earning their livelihood. Lack of furnished houses and nutritious food are factors negatively affecting studies and intellectual development. Moreover the parents of the Tribal children are generally not educated; they do not attach importance to education and in insisting their children to attend the classes regularly. Besides, adequate educational facilities are also not available in

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Tribal areas.

In order to promote education among the Tribal children, poverty should be eradicated. Tribal children have to be provided with boarding and lodging facilities. The parents of Tribal children have to be provided with regular employment for earning income to meet their day to day requirements which will enable to send their children to schools61. More Balwadies and Creches have to be opened in Tribal areas to encourage early childhood education.

Social taboos also prevent the spread of education. Opening the adult education centres in the interior areas can solve this problem to a greater extent. Formation of Mahila Samithies (Women Organisation) will also help educational institutions are reserved for the Tribal students, the targets have not been achieved particularly in the areas of higher education. They have the superstitious belief that staying at residential school is not liked by their Gods and more over they don't want their wards to be isolated from their families. So they understand the value of education and wanted to lead a life away from educated society.

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The Effect of Matrix Models on the Choices of Strategic Alternatives and Their Impact on the Flow of the Operation of the Enterprise

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***Abstract:*-- The enterprises often encounter difficulties which is the strategic alternative that will enable better functionality and performance of enterprises. The implementation of different models has given a great push choices of appropriate alternatives especially in determination that consist the realistic state of enterprise. These models enable enterprise to see how “healthy’’ is the enterprise by analyzing the factual situation in which it is operating and identifying its opportunities by exploiting adequate and potential strategies through increase productivity and to have a positive trend in penetrating the market where it operates. So, these models create a general perception of the path to be followed to achieve its objectives. The use of these models will scan the moment state trying to mobile in the high point of functional enterprise to fulfil and encounter the expectations of stakeholders in the organization. This paper will answer the research questions: How much do matrix models impact on determination of strategic - functional alternatives? How much these alternatives have an impact on achieving goals?**

Key Words: Business functionality, BCG matrix, Strategic models, TOWS matrix

Power Quality Improvement Techniques in Emerging LED Lighting Systems

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Abstract:-- **Without an artificial light, the life would be hardly imaginable these days. After the invention of incandescent lamp, the lighting industries have made substantial improvement in the lighting systems with improved and energy efficient lamps, electronic ballasts and luminaries to the state-of-the-art energy control. Around 25% of the worldwide electricity production is consumed by artificial light sources. It has been observed that electric light sources which are used for indoor commercial, industrial and institutional purpose are fluorescent or discharge or LED lamps. The high brightness or power LED lamps have better efficiency as compared to fluorescent or discharge lamps, hence they are gaining popularity in past couple of years. Researchers and scientists are working towards improving the performance of the electronic ballast/LED driver with power quality issues taken into account.**

The electronic ballasts/LED drivers require ac-dc converters with passive filter to achieve regulated dc output voltage under steady-state condition. But this circuit severely deteriorates the quality of the AC supply hence affecting the performance of other loads connected to it. In order to improve the power quality at the input side, various international agencies have given guidelines to impose strict limitations on the level of harmonic current emission through different standards such as IEEE-519, IEC 61000-3-2 and IEEE-1159. The power factor correction and mitigation of power quality problems are lead to reduction of harmonic current distortion at AC mains. They are mostly referred as PFC converters or power factor pre-regulators (PFP) as reported in the literature. In the quest of power quality improvement, researchers have developed many Power Factor Correction (PFC) converter based electronic ballasts/LED drivers with the goal of high efficiency, compact size, less weight, and low cost. Several techniques for PFC and harmonic reduction have been reported and a few of them have gained wider acceptance over the others.

Development of cost effective MEMS Piezoresistive Pressure Sensor Technology

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Abstract:-- **MEMS pressure sensor fabrication introduce a number of challenges to handle the processed wafers in batch fabrication after bulk-micromachining. In this research work, the development of a low cost fabrication technology for micro-electro-mechanical-system (MEMS) piezoresistive pressure sensor is discussed. Low pressure chemical vapor deposition (LPCVD) and e-beam physical vapor deposition (EBPVD) methods were used in polysilicon film deposition on Si/SiO2 substrate and optimized for required piezoresistive values. The conventional EBPVD method was observed to be a cost effective method and a substitute for chemical vapor deposition (CVD) to deposit polysilicon film with controlled grain size and density. A new wet chemical etching process has been developed to delineate uniform micro patterns of polysilicon resistors and metal interconnection lines of tens of micrometers in width on the entire silicon substrate. This process has been verified over the selective etching of polysilicon in defining the polysilicon resistors and subsequently been applied on realizing Ti/Au interconnection lines employing relevant Ti/Au etchant. The process has been found competitive with reactive ion etching (RIE) process in terms of yield, reliability and repeatability.**

Finally, a prototype of pressure sensor is demonstrated. For the same, square diaphragm based fabricated wafers were diced into individual sensor chips and packaged for performance testing in terms of sensitivity, linearity, hysteresis and offset shift with respect to temperature. Package housing was developed for air pressure, water pressure and vacuum measurement applications. Air tight column separated with a flexible diaphragm which is directly in contact with water flow is an innovative way for water pressure measurement application. Interfacing circuit has been developed for digital display and pressure sensor was demonstrated in real environment with 1 PSI resolution including temperature response.

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"ANFIS PD plus I Based Hybrid Force/ Position Control of an Industrial Robot Manipulator"

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***Abstract*:-- A hybrid force plus position controller based on adaptive neuro fuzzy inference system proportional derivative + integral (ANFIS-PD+I), with unspecified robot dynamics has been proposed for a robot manipulator under constrained environment. The proposed controller has been employed as a principal controller to tune up orthodox PID gains throughout the complete trajectory tracking process. The validity of the proposed controller has been studied using a 6-Degree of Freedom (DOF) PUMA robot manipulator. Simulation outcomes illustrates that the projected force / position controller adheres to the desired path closer and smoother**

Experimental study on compressive strength and water absorption of mortar containing micro- and nano - metakaolin

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Abstract:-- **Research into the usage of locally available construction material is important and beneficial in ensuring a cost-effective construction project. This research reports the effect of micro- and nano-metakaolin on compressive strength and water absorption of cement composites. Metakaolin is a pozzolanic material obtained by heating kaolin clay at 800□C. Locally sourced metakaolin was mixed in cement mortar with variation amount of 0%, 5%, 10%, 15% dan 20%. Compressive tests and water-absorption tests to the 50 mm mortar cubes were performed to specimens after curing at 7 and 28 days. Results show that specimens containing 10% of micro- and nano-metakaolin (MK-10 and NK-10) exhibited highest compressive strength and better water-resistance characteristics. Highest increase of compressive strength was achieved by NM-10, which recorded approximately 121% increase from MK-0 at 7 days and 100% at 28 days. The water absorption of NM-10 at 28 days was found 86% and 30% lower than MK-0 and MK-10, respectively. Additionally, X-Ray Difraction (XRD) graph of pastes with micro- and nano-metakaolin indicates reduction of CH therefore production of more C-S-H gel that contributes in improvement of compressive strength and densification of microstructure.**

Key Words: Metakaolin, Compressive Strength, Absorption, Mortar, X-Ray Diffraction

I. INTRODUCTION

Concrete work and masonry are essential parts in most of civil construction projects, therefore the use of economical materials is one way of improving the cost-effectiveness of a project.

Portland cement (PC) in various compositions has been commonly used as a major binder in mortar and concrete mixture. When mixed with water, cement undergoes hydration process which will cause it to harden over time. Materials having this behavior are referred to as pozzolanic materials. Although cement is an excellent binder, the production process of cement has become an issue of cost, high energy consumption and pollution. It is therefore important to invest on the research into minimizing the negative effects of cement production while maintaining enough production for the demand. One of the options is to replace cement with pozzolanic materials that are more economical, and environmentally-friendly This research aims to investigate the replacement of certain percentage of cement with metakaolin. Metakaolin (MK) is a material obtained from kaolin clay. In Indonesia, kaolin clay or kaolinite itself is classified as Minerals Type C that is non-strategic and non-vital resources [1]. Its deposit in North Sulawesi is found in Toraget Village, Minahasa. To obtain metakaolin, kaolin clay is calcined at a temperature approximately between 500-8000C [2][3].According to ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete [4], metakaolin is classified as natural pozzolan (Class N). Materials classified as Pozzolans, may not have cementitious properties or only have little cementitious properties, but with their very small particle size, they can undergo chemical reactions with calcium hydroxide at a regular temperature and in the presence of moisture to form cementitious mixtures [5]. Supit et al. in [6] reported that the particle size of metakaolin is around 0.5 to 2μm, and is a highly reactive pozzolan. Metakaolin can also be categorised as one type of supplementary cementitious materials (SCM) due to its pozzolanic reactivity.

Partial substitution of cement with metakaolin in cement composites has been studied in recent years. These studies reported the positive contribution of metakaolin on the mechanical properties of mortar and of concrete [5-11]. The amount of MK that gives optimum value of compressive strength differs from several studies. Vu in [5] and Curcio et al. in [7] reported that 15% is the optimum substitution at 28 days, while Sayamipuk in [8] has found that 30% MK has resulted in highest compressive strength of mortar. Study by Batis et al. [9] showed that 10% is the

optimum percentage replacement of cement by MK in mortar mixtures. Similar percentage, that is 10% replacement, was improved the compressive strength of normal concrete and achieved high strength concrete [10,11]. Research on water absorption characteristics of mortar and concrete specimens with metakaolin show that the water resistance is improved. Supit et al. in [6] found that the water-absorption values of specimen with 10% metakaolin have decreased approximately 56% and 81% respectively for 7 and 28 days curing ages, which means that the substitution of MK has increased the water resistance capacity of concrete specimens. This result is in line with the result investigated by Duan et al. in [12] which showed that the inclusion of metakaolin densified the pore structure and Interfacial Transition Zone (ITZ) of concrete.Recently, the use of nano materials have been recognized and studied by scholars due to its unique properties in improving both mechanical and durability properties of cement based materials. Based on some previous studies, the inclusion of nano particles provides beneficial action on the microstructure because of its fineness and reactivity positively contributes the calcium hydroxide reduction and promotes additional calcium silicate hydrate condensed gel that makes the microstructure denser and effectively decrease the permeability [13]. The addition of 10% nano-metakaolin in concrete improved the 7th day tensile and flexural strength by 21% and 15%, respectively [14]. It also reduced the calcium hydroxide content leads to improve the resistance to durability properties including sulphate attack and chloride diffusion. The studies mentioned previously have provided important information that was used as basis knowledge for this experimental study where the effect of nano-metakaolin was considered.

The objectives of this research is to investigate experimentally the effect of sustainable local micro- and nano-metakaolin produced by using high energy milling, as partial substitution of cement, to the compressive strength and water absorption of cement mortar. The cement mortar with micro- and nano-metakaolin were compared with plain mortar to study the change of microstructure properties due to the inclusion of micro- and nano-metakaolin.

II. MATERIALS

This research uses metakaolin (MK), sand, water and Portland Cement Composite (PCC). The chemical composition of kaolin clay, obtained from Toraget Village, North Sulawesi Province in Indonesia can be seem in Table 1. Based on the table, the total amount of SiO2+Al2O3+Fe2O3 in metakaolin is more than 70% thus can be used to replace cement partially, based on ASTM C618.

Table 1. Chemical composition of metakaolin from Toraget Village, Indonesia

Chemical Analysis	PCC (%)	Metakaolin (%)	Nano-metakaolin (%)
SiO_2	8.43	40.48	47.00
Al_2O_3	1.65	31.17	32.00
Fe_2O_3	4.81	0.87	3.43
CaO	73.12	1.20	2.53
MgO	-	3.65	-
K_2O	-	0.73	1.10
Na_2O	-	12.32	-
SO_3	2.71	2.59	1.9

On the preparation of materials, the kaolin clay was calcined at 8000C in the high temperature refractory for 6 hours and finally converted into pozzolan which referred to as Metakaolin (MK). The metakaolin then turn to nano-metakaolin by grinding the metakaolin using High Energy Milling for 2 hours. It was found that the average size of nano-metakaolin (NM) used in this experiment was 196 nm while the size of metakaolin was around 10 m. Additionally, the SiO2 content of nano-metakaolin is more than in micro-metakaolin. Sand with fineness of modulus 2.3 and tap water were prepared before mixing. Superplasticizer type F was used to maintain the workability of the respective mixture. The superplasticizer used for the experiment was Sikacim Concrete Additive supplied by PT. Sika Indonesia. The dosage was kept constant at 0.8% by weight of cement.

III. EXPERIMENTAL METHOD

Mortar specimens were prepared for testing of compressive strength and water absorption at 7 and 28 days with the variation of mortar mixtures is listed in Table 2. Control mixture is labelled PCC, which contains no metakaolin. Mixture MK and NM are labelled as micro-metakaolin and nano-metakaolin. In this experiment, the study was conducted on mortars with 5% and 10% micro- and nano-metakaolin (by weight of cement) and sand to binder ratio was kept at 2.5.

Table 2. Composition of mortar mixtures variation

Mix	PCC (kg/m^3)	MK-10 (kg/m^3)	NM-10 (kg/m^3)	FA (kg/m^3)	W (kg/m^3)
PCC	450	-	-	1125	207
MK-5	428	22	-	1125	207
MK-10	405	45	-	1125	207
NM-5	428	-	22	1125	207
NM-10	405	-	45	1125	207

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PCC=Portland Cement Composite; FA=Fine Aggregate; W=Water

A. Flow table test

All mixture components are mixed with pan mixer with the ratio of water/binder 0.46. Soon after mixing, the consistency of the mortar is meaured using Flow Table, as specified in ASTM C230 [15]. The flow table has a diameter of 255 mm, and the conical mould used to cast the flow specimen has dimensions of height 50 mm, diameter of top opening 70 mm and bottom opening 100 mm and thickness 5 mm. The flow of mortars was observed according to ASTM C 1437 [16]. Fig. 1 shows the Flow Table test conducted to study the consistency of cement mortars with and without metakaolin. For each variation, the value from the Flow Table is measured and recorded. When the consistency is right, the mortar is casted into metal moulds with size of (50 x 50 x 50) mm. Specimens are then demoulded after 24 hours and submerged in water at ambient temperature for 7 and 28 days.

Figure 1. Flow test to measure the consistency of mortar using Flow Table.

B. Compressive test

Compressive strength is tested using ELE Compressive Testing machine based on ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) [17]. The average from three of mortar specimens was taken as to the compressive strength of cement mortars with and without metakaolin.

C.Water Absorption test

Water absorption of the specimens is measured by following the procedure on ASTM C1403-15: Standard test method for rate of water absorption of masonry mortar [18]. The specimens are weighed and then placed in a flat and watertight container. The samples are removed and weighed at selected times based on the standard and are replaced again in water for the chosen time period. The coefficient of capillary absorption (k) was calculated by using formula where W = the amount of water absorbed in gram, A = the cross sectional area (cm2) in contact with water and t = the time (second).

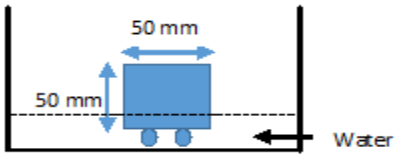


Figure 2. Water absorption test set-up

D. X-Ray Diffraction

The sample for this analysis was prepared at approximately 3 grams of cement paste powder that grinded after curing days. The analysis was conducted at a speed of 0.5^0/min with 2□ angle from 10^0 to 70^0 using D8 Advance Diffractometer (Bruker-AXS). The horizontal scale represents the diffraction angle of a typical XRD pattern while the vertical scale for the intensity of the diffracted ray, measured in pulses/s. At every testing date, cement paste samples were cast and refined for the analysis.

E. Nitrogen Adsorption Analysis

Brunauer-Emmett-Teller (BET) theory was used to analyse the gas adsorption data and calculate the surface areas which is directly related to the high porous phase. Nitrogen was used as the adsorbate gas.

IV. RESULTS AND DISCUSSION

A. Consistency of micro- and nano-metakaolin mortars

Consistency of mortar specimens as measured with Flow Table is given in Table 3. It can be seen that the flow table results decrease as the percentage addition of metakaolin increases. This indicates that the water-tightness at water to binder ration of 0.46 was performed due to the smaller particle size and higher surface area of metakaolin. Ramlochan et al. [19] reported related observation that metakaolin had increased the cohesiveness of concrete, thus required the addition of superlasticizer to achieve the desired workability. The use of metakaolin requires more water in the mortar mixtures due to its high pozzolanic reactivity and the fact that it consumes water very early. Similarly, Brooks and Johari (2001) cited in Siddique and Klaus [20], reported reduction in slump values with increasing MK content. Additionally, the lower workability values of mortar with nano-metakaolin is also observed lower than MK mortar samples. This trend is suggested due to the clay properties, smaller particle size and higher surface area of nano-metakaolin. However, the characteristic of

metakaolin with finer particle sizes benefits in controlling water-tightness that can enhance the resistance to permeability and durability of nano-metakaolin cement based binders.

Tabel 3. Flow Table Result based on the variation of mixture

Mixture ID	Flow table result (mm)
PCC	180
MK-5	170
MK-10	165
NM-5	155
NM-10	145

B.Compressive strength of micro- and nano-metakaolin mortars

Fig. 3 shows a 50-mm mortar cube under compressive loading, presenting the comparison of compressive strength of mortar mixtures at 7 and 28 days. Overall, the compressive strengths of mortar specimens containing nano-metakaolin exhibited higher values compared to PCC, MK-5 and MK-10, as anticipated. Highest increase of compressive strength was achieved by NM-10, which recorded approximately 121% increase from PCC at 7 days and 100% at 28 days. The optimum level of nano-metakaolin as cement replacement is also in line with the study conducted by Sithara and Daniel, 2016 [21].

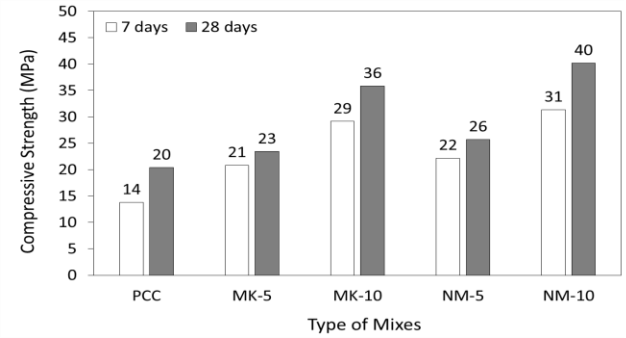
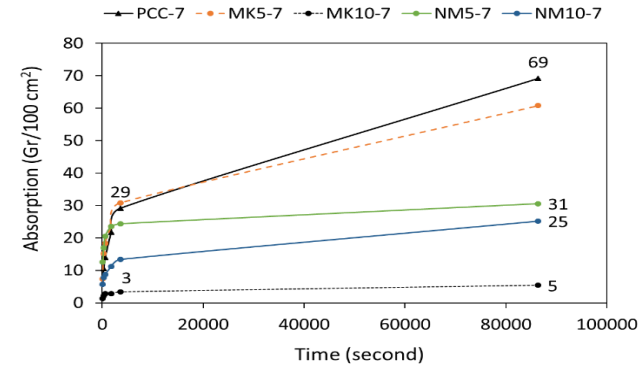


Figure 3. Compressive strength of mortar mixtures at 7 and 28 days

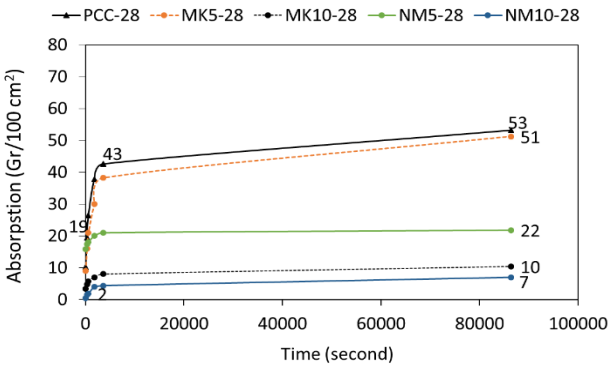
In comparison to the compressive strength of mortar with micro-metakaolin, it can be observed that NM-5 and NM-10 mortars exhibited higher strength at both 7 and 28 days. It can be inferred from this finding that substitution of nano-metakaolin in cement mortar has provided better bonding characteristics and accelerate the pozzolanic reaction. The additional hydration product is also produced due to the characteristic of nano-metakaolin in optimizing the calcium hydroxide that was not fully removed during the hydration period. [22].

C. Water absorption of micro- and nano- metakaolin mortar

The water absorption rate vs time of 7 days and 28 days specimen is presented in Figs. 4a and b, respectively. In Fig. 4, it can be observed that at 7 days, MK-10 showed slight increase in water-absorption rate compared to the other variation. NM-10 showed little increase as well as NM-5, while MK-0 and MK-5 showed higher increases especially after 40000 seconds.



(a)



(b)

Figure 4. Absorption rate vs time of micro- and nano-metakaolin mortars tested at a) 7th and b) 28th day

It can be concluded that metakaolin has the effect of reducing water-absorption of the mortar specimens, hence increasing water-resistance at 7th day curing age. However, the water absorption of NM-10 was found higher than MK-10 at 7 days. This can be due to the great surface energy of nano particles during hydration that promotes agglomeration that can prevent complete cement hydration. Meanwhile, the water-absorption rate vs time of specimens at 28th day shows more acceptable trend where the water absorption of NM-10 is lower than MK-10 while higher rate of increase is shown by MK-0 and MK-5

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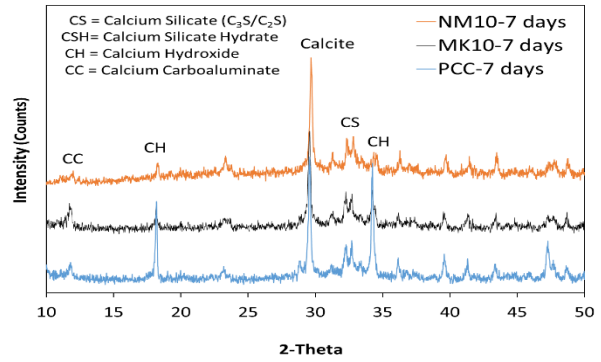
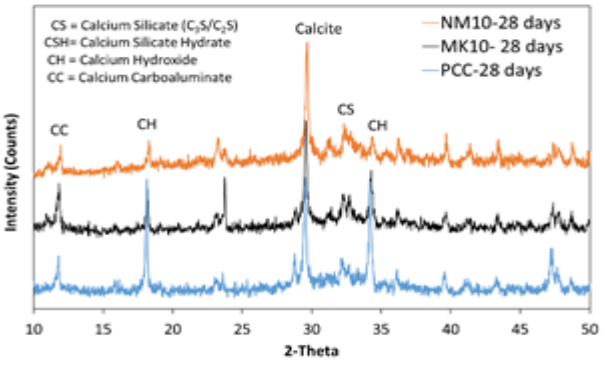
samples before 20000 seconds. In this case, It can be explained that rapid reaction of nano-metakaolin with CH accelerates the hydration products which improve the bonding within mortar mixture thus resulted in the reduction of water-absorption, especially at 28 days. Additionally, the resistance of water absorption benefits in extending life time of cement based system and enhance durability [23].

D. X-Ray Diffraction (XRD)

The crystalline phases occurred during cement hydration after curing for 7 and 28 days are studied through XRD analysis from 10^0 to 70^0 with a speed of 0.5^0/min. XRD peaks of cement pastes with and without 10% addition are shown in Fig. 5. The analysis was observed based on the peak intensity of calcium hydroxide (CH) as a poor crystalline material produced from reaction between cement and water. As can be observed in the XRD peaks, the CH has a high peak pattern located at 2-theta angle of 18^0, 29□, 34°, and 47°, while the peak at 2-theta = 29° is related to Calcite phase. In this analysis, this CH peak is regarded as an important sign of the performance of the samples where can also indirectly determine the presence of CSH concentration in paste samples.



(a)



(b)

Figure 5. XRD of cement pastes with and without 10% metakaolin at a) 7th day and b) 28th day.

From Fig.5, it can be seen that the intensity of CH peaks in cement paste with 10% nano-metakaolin addition was decreased compared to the intensity of CH that appears in PCC and MK-10 samples. The CH intensity in cement paste at 7 and 28 days decreased for about 70% after nano-metakaolin addition, as seen in 2-theta angle of 18° and 34°. As the curing time was increased up to 28 days, the peaks intensities of CH were also increased (see Fig 5b). This can be suggested due to the low rate hydration of calcium silicates (C2S and C3S) with the formation of CSH and liberation of CH [24]. Moreover, the presence of calcium carboaluminate can be also observed and suggested as the results of metakaolin-pozzolanic cement hydration formed by the reaction of atmospheric CO2 with CAH [25]. However, since the peak characteristic of calcite is overlapped with CSH gel thus the intensity of CSH could not be clearly determined.

E. Nitrogen adsorption analysis of cement paste containing nano-metakaolin

Brunauer-Emmett-Teller (BET) theory was used to analyse the gas adsorption data and calculate the surface areas which is directly related to the high porous phase. Nitrogen was used as the adsorbate gas. Table 4 shows the surface area and pore volume of each type of mixes while. Evidently lower surface area means low porosity and cumulative pore volume can be seen on samples containing 10% nano-metakaolin after 7 and 28 days of curing. The surface area and pore volume of NM-10 paste at 7 days were 45.948 m2/g and 0.156 cc/g while at 28 days decreased to 42.420 m2/g and 0.13 cc/g (approximately 35% and 18% lower when compared with the surface area and pore volume of cement paste sample. This indicates that the particle size distribution is modified due to the addition of nano-metakaolin leading to increase the solid volume thus refines the pore structure of cement paste. The similar observation was also reported that the addition on nanomaterials reduced the pore volume and modified the paste pore structure [26].

Table 4. Surface area and pore volume of cement pastes with 10% nano-metakaolin

Type of Mix	Surface Area (m^2/g)	Pore Volume (cc/g)
PCC-7 days	71.569	0.164
PCC-28 days	55.276	0.160
NM10-7 days	45.948	0.156
NM10-28 days	42.420	0.130

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CONCLUSIONS

Based on the results obtained in this experimental studies, the conclusions can be drawn as follows:

Based on the compressive test results of the tested specimens, the use of micro- and nano-metakaolin source from Toraget Village, Indonesia is suitable as substitute of cement. Nano-metakaolin exhibited higher strength (121% increase from PCC at 7 days and 100% at 28 days) due to the clay properties, smaller particle size and higher surface area of nano-metakaolin.

The 7 and 28-days water-resistance was improved by partial replacement of PCC by nano-metakaolin. At 28 days, the capillary water absorption of NM-10 sample was 86% and 30% lower than PCC and MK-10, respectively.

The XRD patterns of micro- and nano-metakaolin show the reduction of CH (portlandite) and increases the formation of CSH and additional CAH that results in improving the mechanical properties and densification of microstructure of cement paste containing 10% micro- and nano-metakaolin.

The pore structure of NM-10 paste is denser than control hardened paste as confirmed by surface area and pore volume of NM--10 paste. Moreover, nano-metakaolin refines the pores structure thus increase the resistance of cement concrete on water absorption.

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