Journal of Applied Environmental and Biological Sciences (JAEBS)

An International Peer-reviewed journal

Number of issues per year: 12
ISSN (Print): 2090-4274
ISSN (Online): 2090-4215

Volume 8, Issue 2, February 2018

J. Appl. Environ. Biol. Sci., **Vol.8 No. 2: pp. 1-187, Year 2018**

Journal of Applied Environmental and Biological Sciences (JAEBS)
Monthly Publication

Number of issues per year: 12
ISSN: 2090-4274 (Print)
ISSN: 2090-4215 (Online)

Journal of Applied Environmental and Biological Sciences (JAEBS) is a peer reviewed, open access international scientific journal dedicated for rapid publication of high quality original research articles as well as review articles in the all areas of Applied Environmental and Biological Sciences.

Scope

Journal of Applied Environmental and Biological Sciences (JAEBS) is devoted to the monthly publication of research papers of outstanding significance in the all fields of environmental sciences, environmental engineering, environmental Pollution, green chemistry, environmentally friendly synthetic pathways, alternatively fuels, environmental analytical chemistry, biomolecular tools and tracers, water and soil, environmental [management, economics, humanities], Mathematics, multidisciplinary aspects such as Business Management, Organizational Behavior, all areas of biological sciences, including cell biology, developmental biology, structural biology, microbiology, molecular biology & genetics, biochemistry, biotechnology, biodiversity, ecology, marine biology, plant biology, bioinformatics, toxicology, developmental biology, structural biology, microbiology, molecular biology & genetics, biotechnology, biodiversity and related fields. The journal presents the latest developments in the fields of environmental social marketing, environmental journalism, environmental education, sustainability education, environmental interpretation, and environmental health communication.

Editorial Board

Editors

Table of Contents, February 2018

Drianantа Pradiptiyas and Ellina S. Pandebesie

Optimization of Material Recovery Facility in Manyar Subdistrict, Gresik

J. Appl. Environ. Biol. Sci. 2018 8(2): 1-6. [Abstract] [Full-Text PDF] [Full-Text XML]

Faiza Anjum, Zahira Batool

Psychosocial Factors Associated with Postpartum Depression among Women in Pakistan

J. Appl. Environ. Biol. Sci. 2018 8(2): 7-13. [Abstract] [Full-Text PDF] [Full-Text XML]

Khoudir KHELLAF and Messaoud HAMIMED

Petro-Mineralogical and Geotechnical Analysis on the Clays of Constantinois Province (Mila North-East Algeria)

J. Appl. Environ. Biol. Sci. 2018 8(2): 14-22. [Abstract] [Full-Text PDF] [Full-Text XML]

Sana Yasin, Tariq Ali, Umar Draz, Low Tan Jung, M. Ayaz Arshad

Formal Analysis of Coherent Non-Redundant Partition-based Motif Detection Algorithm for Data Visual Analytics

J. Appl. Environ. Biol. Sci. 2018 8(2): 23-30. [Abstract] [Full-Text PDF] [Full-Text XML]

Bungku Susilowati and Eddy S. Soedjono

Design of Integrated Sanitation Facilities in Bojonegoro

J. Appl. Environ. Biol. Sci. 2018 8(2): 31-36. [Abstract] [Full-Text PDF] [Full-Text XML]

Aqsa Iram Shahzadi, Dr. Shahzad Ali

What Do They Think about Themselves? Exploring the Realities about Eunuchs in Pakistan

J. Appl. Environ. Biol. Sci. 2018 8(2): 37-45. [Abstract] [Full-Text PDF] [Full-Text XML]

Samir Fellous, Abd el Halim Boussaa, Mohamed Yacine Benzaoui, Riad Djellouli, Youcef Amar

Optimization of Extraction Conditions of Total Flavonoid Content from Cystoseira. amentacea var. Stricta Using Response Surface Methodology

J. Appl. Environ. Biol. Sci. 2018 8(2): 46-52. [Abstract] [Full-Text PDF] [Full-Text XML]

Zakiyah Darojat and Agus Slamet

Operational Strategy Analysis of Septage Treatment Plant Performance Improvement in Blitar

J. Appl. Environ. Biol. Sci. 2018 8(2): 53-58. [Abstract] [Full-Text PDF] [Full-Text XML]

Said Saeed, Prof. Dr. Riasat Ali

Exploring Authentic Leadership in Relation to Work Engagement in Public and Private Sector Universities

J. Appl. Environ. Biol. Sci. 2018 8(2): 59-67. [Abstract] [Full-Text PDF] [Full-Text XML]

Dr. Asad Afzal Humayon, Shoaib Raza, Hina Amir, Muhammad Sajjad Hussain, Noor ul Ain Ansari

Assessment of Work Stress among Police in Pakistan

J. Appl. Environ. Biol. Sci. 2018 8(2): 68-73. [Abstract] [Full-Text PDF] [Full-Text XML]

Fayyaz Ahmed Anjum, Dr. Iffat Batool, Muhammad Umar Fayyaz

A Comparative Study of Stimulus Pull of Modified Hand Test

J. Appl. Environ. Biol. Sci. 2018 8(2): 74-79. [Abstract] [Full-Text PDF] [Full-Text XML]

Susilowati, Luthfiyah Nurlaela, Mustaji

Influence of Application of Dicel Learning Model and Social Attitudes upon Learning Outcomes of Indonesian Food Management Course

J. Appl. Environ. Biol. Sci. 2018 8(2): 80-87. [Abstract] [Full-Text PDF] [Full-Text XML]

Kashif Ali Abro, Sanaullah Dehraj, Saleem Ahmed Naich, Imran Qasim Memon

Effects of Non-Integer Order Derivative over the Slippage of Fractionalized Second Order Fluid Flow

J. Appl. Environ. Biol. Sci. 2018 8(2): 88-95. [Abstract] [Full-Text PDF] [Full-Text XML]

Aditya Noor Rakhmad and Ali Masduqi

Water Losses Management in Water Supply Company of Tabalong Regency

J. Appl. Environ. Biol. Sci. 2018 8(2): 96-99. [Abstract] [Full-Text PDF] [Full-Text XML]

Anas Baryal, Kiran Seeneen, Muhammad Babar Akram, Zıa Ur Rahman

Impacts of Training and Orientation on Police about Juvenile Justice System Ordinance – 2000 A Study of Khyber Pakhtunkhwa Police Regarding Knowledge of JJSO-2000

J. Appl. Environ. Biol. Sci. 2018 8(2): 100-104. [Abstract] [Full-Text PDF] [Full-Text XML]

Agung Stiawan and Yulinah Trihadiningrum

Technical and Financial Assessments of Depo 3R Palasari, Denpasar

J. Appl. Environ. Biol. Sci. 2018 8(2): 105-110. [Abstract] [Full-Text PDF] [Full-Text XML]

Muhammad Nisar, Dilkash Sapna, Asadullah, Mussawar Shah, Anas Baryal, Zia Ur Rahman

Socıal Exclusıon of Transgenders from Pakhtun Socıety (A Case Study of Dıstrıct Charsadda)

J. Appl. Environ. Biol. Sci. 2018 8(2): 111-119. [Abstract] [Full-Text PDF] [Full-Text XML]

Dr. Muhammad Shabbir, Paris Zaka Ullah, Uzma Niaz

Implications of Caste System on Social Development in Rural Areas of District Lodhran in Southern Punjab, Pakistan

J. Appl. Environ. Biol. Sci. 2018 8(2): 120-125. [Abstract] [Full-Text PDF] [Full-Text XML]

Fazli Wahid, Rabia Afzal, Muhammad Hamayun, Zahid Ali But, Rozaida Ghazali

Discrimination of Normal and Abnormal Grapes' Leaves Using Image Processing and Artificial Intelligence Approach

J. Appl. Environ. Biol. Sci. 2018 8(2): 126-135. [Abstract] [Full-Text PDF] [Full-Text XML]

Iftikhar Ahmad, Dr. N.B. Jumani, Dr. Shamsa Aziz

Effect of Systematic Training on Teachers' Performance: An Experimental Study

J. Appl. Environ. Biol. Sci. 2018 8(2): 136-143. [Abstract] [Full-Text PDF] [Full-Text XML]

Bambang Rahadi, Fajri Anugroho, Euis Elih Nurlaelih, Novia Lusiana, Akhmad Adi Sulianto

Assessment of Water Quality Status in Rainy and Dry Seasons along the Brantas Upstream Watershed, Batu City

J. Appl. Environ. Biol. Sci. 2018 8(2): 144-151. [Abstract] [Full-Text PDF] [Full-Text XML]

Attia, W.Y., El-Naggar R.E., Bawadekji, A., Al Ali M.

Evaluation of some in vitro Anti-Carcinogenic Activities of Polysaccharides Extracted from Ascomata of the Desert Truffle Terfezia claveryi Chatin

J. Appl. Environ. Biol. Sci. 2018 8(2): 152-159. [Abstract] [Full-Text PDF] [Full-Text XML]

Rafiq, M.; Dr. Syed Asad Abbas Rizvi

Sources of Acquisition of Moral Values: An Analysis of Personal Experiences of University Teachers

J. Appl. Environ. Biol. Sci. 2018 8(2): 160-169. [Abstract] [Full-Text PDF] [Full-Text XML]

Saeed Ahmed Memon, Rafique Ahmed Memon, Muhammad Anwar Solangi, Farooq Ahmad

Stresses and Power Consumption Analysis of Mixing Flow in Cylindrical Shaped Container

J. Appl. Environ. Biol. Sci. 2018 8(2): 170-177. [Abstract] [Full-Text PDF] [Full-Text XML]

Irfan Ullah, Ashfaq U. Rehman, Sajjad Ali, Azra Yasmin

National Internal Security Policy: An Analysis of Prospects and Challenges for Pakistan

J. Appl. Environ. Biol. Sci. 2018 8(2): 178-183. [Abstract] [Full-Text PDF] [Full-Text XML]

Abdul Majid, Dr. S. Azkia Hashimi, Muhammad Muneeeb

Scientific Interpretations of Quranic Verses regarding Protection of Nature

J. Appl. Environ. Biol. Sci. 2018 8(2): 184-187. [Abstract] [Full-Text PDF] [Full-Text XML]

J. Appl. Environ. Biol. Sci., 8(2)1-6, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Optimization of Material Recovery Facility in Manyar Subdistrict, Gresik

Drianantа Pradiptiyas* **and Ellina S. Pandebesie**

Post Graduate Program, Department of Environmental Engineering,
Institut Teknologi Sepuluh Nopember, Indonesia

Received: October 11, 2017
Accepted: December 24, 2017

ABSTRACT

The existing solid waste service in Manyar Subdistrict which currently as much as 40,4% was apparently far from the national target of 100% solid waste service for 2019. EstablishingMaterial Recovery Facility(MRF) temporary dump is an effort to achieve that target. MRF development plan at Manyar district was built upon the evaluation result at MRF of Peganden to obtain the specific design criteria and other technical aspects. Initial study has done by taking solid waste sample of 120 houses for 8 days consecutively and then followed by an evaluation to get the data related to infrastructure and facility. Further observation on community participation is required to discover their level of knowledge, behavior and attitude on solid waste treatment, therefore as much as 130 questionnaire were given to the local community. According to the observation, the community of Yosowilangun, Tanggulrejo, and Gumeno which represent the density level of high, medium and low respectively, judged to have the highest assessment point. MRF development was prioritized by the level of density, in which the densest district became top priority. The design which being applied was that belongs to Peganden. There will be another 6 and 4 MRFs in the upcoming 2018-2023 and 2024-2027 period respectively.
KEYWORDS: Solid Waste, Material Recovery Facility, Community Participation

INTRODUCTION

Manyar subdistrict is one of the subdistrict in Gresik which has a population as much as 111,205 inhabitants and has 3.34% / year of growth in these past 7 years [1]. Population growth, urbanization, and technological innovation were contributed in the increasing of solid waste generation [2]. The solid waste service in Manyar Subdistrict which currently as much as 40.4%, was still far from the target of 100% national solid waste service in 2019 [3]. Therefore necessarry optimization of Material Recovery Facility (MRF) in Manyar Subdistrict.

Solid waste management can be implemented by reducing, reusing and recycling solid waste. Efficient solid waste recycling can be done by maximizing the use of existing technologies for sustainable and environmentally profitable management [4,5]. One of the waste management implementation in Indonesia was through the provision of MRF. MRF has an important role in solid waste management system by improving the energy recovery and reducing the economic costs of the total waste management's chain [6]. Effective solid waste reusing and recycling may have a positive impact to job opportunity, economical development, and reduction of environmental pollution [7].

Currently, Manyar Subdistrict hasa MRF which located in Peganden Village. Peganden MRF which built in 2016 hassolid waste processing area as large as 198 m^2. MRF Peganden which planned to serve 600 families (2,400 inhabitants) has now been increased to as much as 1,117 (4,468 inhabitants). Existing MRF Peganden focus on sorting and selling. The application on MRF will become the evaluation basis, whether it is possible or not to be implemented for other subdistricts.

Financial has become the problem in MRF Peganden in which there are no willingness in the community to pay for monthly service charge, thus monetary deficit are being experienced by the administrator. The willingness of the citizens to pay was affected by the application of the policy of fines and penalties. The policy application of fines and penalties is effectively increasing the percentage of community willingness to pay for the application of this policy[8]. Policy makers need to be aware that the socio-economic characteristics and the quality of solid waste service will affect the willingness of citizens to pay [9]. In addition, organizer's expenses were used more for labor as there are no participation from the community. The majority of waste were reused and recycled [10]. The study of community participation will be implemented in another village to see if the community meets the criteria to receive the MRF development.

After the criteria design being obtained, the evaluation of existing MRF will be planned. Procurement of MRF will be prioritized for the village that has the highest participation willingness. MRF design planning was

***Corresponding author:** Drianantа Pradiptiya, Post Graduate Program, Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember, Indonesia. email: drianantа@gmail.com

based upon existing MRF evaluation that meet the technical aspects and participation level, thus allowing MRF to operate optimally and financial problems can be eliminated.

MATERIALS AND METHODS

Data Collection

The calculation of solid waste generation was done for eight days andsampling was performed on 120 households with the assumption that each of them produce 1 kg of solid waste per day [11]. Unit of volume and weight used on the calculation were m^3/day and kg/day respectively.The measurement of solid waste density was being made after calculating the number of solid waste generation. Solid waste generated by 120 households taken were as much as 100 kg. The measurement was undergone for 3 days. Solid waste measurement which consist of sorting and weighing was being done for 3 days. Classification of household solid waste composition that can be separated are food wastes, yard wastes, plastic, paper, glass, textiles, rubber, wood, metal and other [12].
Measurement and calculation of the RF value done for 3 days by using the formula as follows

$$RF = \frac{V_2}{V_1} x\ 100\% \quad \text{.....(1)}$$

V1 = the weight of each type of household solid waste after sorting (kg)
V2 = weight of each type of household solid waste that can be used (kg)

Technical Aspect

Technical analysis has undergone to obtain waste generation rate, waste compositiondensity, recovery factor and recycling potential in manyar subdistrict as well as evaluating solid waste treatment technology and other infrastructure that being utilized in betoyoguci and peganden MRF. Analytical technique were as follows

- ✓ Analysis of Mass Balance and Potential Domestic Solid Waste Recycling in Manyar Subdistrict
  From solid waste generation rate, waste composition and recovery factor, mass balance analysis can be conducted to find out the potential of solid waste recycling and the amount of the resulting residues in Manyar Subdistrict. Steps in conducting an analysis of mass balance are as follows.
  - From the results of the calculation of the Recovery Factor (RF) of each composition of waste, calculated the weight of the waste that can be recycled (kg) using the formula.
    Weight Solid Waste Recycled (kg) = RF (%) x Weight of Solid Waste Each Composition (kg)
  - Calculate Residual Solid Waste Each Composition
    Residues (kg) = weight of the solid waste before it is recycled (kg) – the weight of the solid waste that can be recycled (kg)
  - In the analysis of mass balance is necessary Weight Solid Waste Input = Weight Solid Waste Output + Weight Solid Waste Residue
- ✓ Analysis of Infrastructure and Facilities in MRF Betoyoguci and Peganden were being held to find out sorting rate, infrastructure and facilities of MRF which appropriate to apply to other villages in Manyar Subdistrict. Infrastructure and facilities that have been analyzed were dropoff and sorting, storage, composting, compost chopper machine and compost filter machine, storage leachate, residual container, office, bathroom, storage shed, small mosque and parking lot cart motor.

Community Participation Aspect

An analysis of variable levels of community participation is carried out by the interview to solid waste-producing households. This includes 6 (six) indicator as follows : Solid waste sorting; Processing Solid Waste with Composting; Solid Waste Utilization of Economical Value; Waste taxes or service charge; The Desire Will be On-site MRF; Solid Waste Management participation.Each of these categories has three questions that are representing the knowledge, attitude and behavior of the community in solid waste management. The results of the interview were analyzed using Likert Scale. Likert scale is the kind of scale that has high reliability in the sort of man based on the intensity of certain attitudes. Likert scale was used to measure attitudes, opinions and perceptions of a person or a group of people about a social phenomenon [13]. Likert formula calculation results is as follows:

$$\text{The Value Of The Likert} = \frac{\Sigma\ (the\ number\ of\ answers\ x\ value)}{Highest\ score\ x\ amount\ of\ total\ respondents}\ x\ 100\% \quad \text{.....(2)}$$

Analysis of participation variable was conducted in the village of Betoyoguci and Peganden. The number of respondents in each villages is 20 households. An analysis of the community participation is also done in the village of Yosowilangun, Tanggulrejo and Gumeno which represent high, medium and low density respectively to represent the community's participation in each interval of population density. For the amount of sampling questionnaire, each village was 30 households. The analysis result in each village represents community

participation in another village with similar density range. The analysis results of three were being compared with those on Betoyoguci and Peganden to determine the priority areas of development of MRF.

MRF Construction Design Planning

Technical aspect analysis of MRF betoyoguci and peganden were being used as planning design in prioritized village. The data includes waste generation rate, composition, density, recovery factor, recycling potential, parsing rate, as well as required infrastructure and facility. The number of MRF required for other villages then be known after the calculation.

RESULTS AND DISCUSSION

The collection of primary data in Manyar Subdistrict exhibit solid waste generation, density and sorting rate was 0,29 kg/person.day, 145,96 kg/m^3, 91,15 kg/hour respectively. Composition and recovery factor of household solid waste in Manyar Subdistrict can be seen in the following Table 1.

Table 1. Composition and Recovery Factor of Household Solid Waste in Manyar Subdistrict

Type Of Waste	Composition (%)	Recovery Factor (%)
Food Waste	59.35	48.21
Yard Waste	7.36	41.98
Plastic	7.23	72.90
Paper	4.34	64.42
Textile	4.52	0
Glass	3.37	45.10
Wood	2.16	0
Rubber	1.15	34.86
Metal	1.19	83.63
Other	9.33	0

Existing Conditions Of MRF Peganden

Solid waste processing area in MRF Peganden consists of dropoff and sorting area, storage area, storage leachate area, residual container area, compost chopper machine and compost filter machine area. Other than that, there are an office, bathroom, storage shed, small mosque, parking lot and MRF road access. Solid waste processing in MRF Peganden begin with collection. The collected solid waste was put in the area of reception and manually sorted. Sorting stage was done for recovering valuable stuff, while food waste, yard waste and solid waste that has no value were all being sent to landfill later on. Sorted materials were stored for 30 days. Transportation of containers to the landfill done every three days.

MRF Peganden currently serves 1,117 households with the weight of 1,183.81 kg/day. The recovery factor for food waste and yard waste is 0%, because MRF Peganden does not do composting. Plastic waste has RF of 1.81%, whereas paper, glass, rubber, and metalwere as much as 0.96%, 0.21%, 0.22%, and 0.52% respectively. Textile and wood does not have an RF value because there are no accomodation for those types of waste in Manyar Subdistrict and the surrounding area. Based on the recovery factor, solid waste that can be recycled in the MRF Peganden was 44.03 kg/day (3.72%) and that being transported to landfill was 1,139.78 kg/day (96.28%). Public awareness on the service charge of solid waste management in Peganden is very high. The percentage of its payment reached 96% with 10.000 IDR/family. month.

Optimization of MRF Peganden

Optimization is required to increase the amount of solid waste recycling and reducingthe disposal to landfill. The optimization utilize Recovery Factor data derived from primarycollection in Manyar Subdistrict. The results show that the optimization of solid waste that can be recycled in MRF Peganden in 2027 was 898kg/day (42,68%) and that being transported to landfill was1,207kg/day (57.32%). The mass balance of MRF Peganden can be seen in Figure 1.

Space requirement analysis was calculated based on the amount of solid waste generation that went to MRF, composition, density, recovery factor, labor hours, and processing solid waste. This analysis also calculated based on 10 years projection (year 2027). Optimization of land requirement on this MRF acquired from analysis that had already been done. Comparison with existing area and results can be obtained from the difference between the required area. Area requirement comparison of existing data and optimization plan can be seen in the following Table 2.

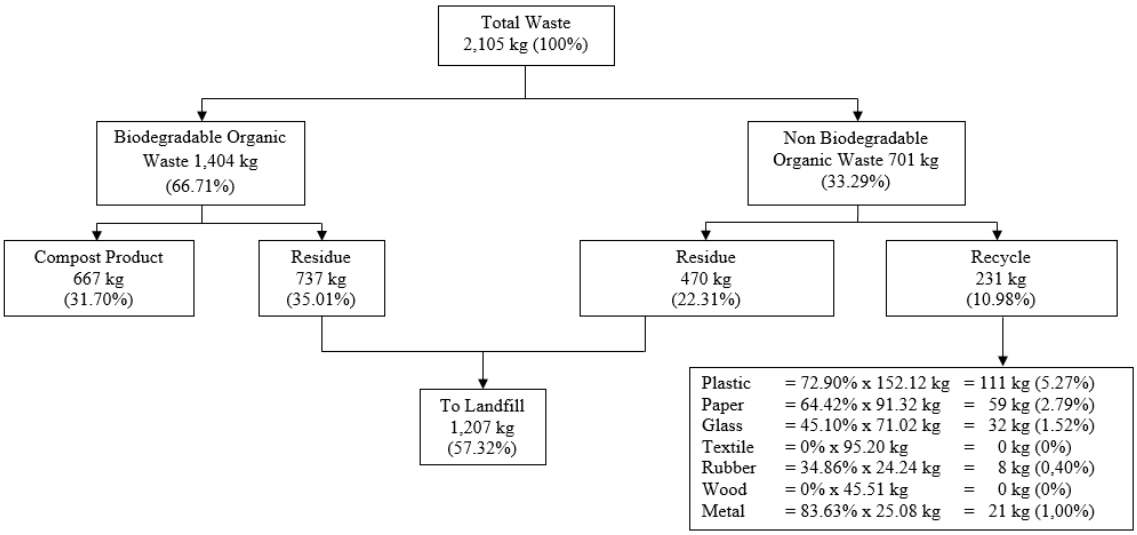


Figure 1. Mass Balanceof MRF Peganden

Tabel 2. Area Requirement Comparison of Existing Data and Optimization Plan

No	Area	Existing Area (m^2)	Optimization Area (m^2)	Area Difference (m^2)
1	Office	16	16	0
2	Bathroom	3	3	0
3	Small Mosque	3	3	0
4	Storage Shed	2	10.06	-8.06
5	- Dropoff and Sorting Area	58.5	56	2.5
	- Storage Area	102	22	80
	- Residual Container Area	12	12	0
	- Composting Area	0	98	-98
	- Compost Chopper Machine Area	2.25	2.25	0
	- Compost Filter Machine Area	8	8	0
	- Storage Leachate Area	0.79	0.79	0
	- Road Access	14.46	0	14.46
	Solid Waste Processing Area	**198**	**198.25**	**-0.25**
6	Parking Lot Cart Motor	10.5	16.5	-6
7	MRF Road Access	145.5	139.5	6
	Total	**378**	**386.31**	**-8.31**

Based on table 1, the difference between optimization and existing land requirement in the year 2027 was -8.31 m^2. Deficiencies occur at the storage shed and solid waste processing area was -8.06 m^2 and -0.25 m^2 respectively. That land shortfall can be addressed by expanding solid waste processingarea so thatsolid waste processing landcan be ran optimally. The required extension of solid waste processing area was 11m x 1m.

The Community Participation in The Village of Yosowilangun, Village of Tanggulrejo and Village of Gumeno

Analysis of community participation in this research was conducted in the village of Yosowilangun (representing high density), Tanggulrejo (representing the medium density) and Gumeno (representing the low density) to represent the community's participation in each population density interval. There are as much as 30 questionaire that represents knowledge, behaviours and attitudes in solid waste management for each household. The comparison results were as follows.

- ✓ The knowledge of Village Yosowilangun society excels in 5 categories from a total of 6, namelysolid waste sorting, composting,utilization of economical value, service charge obligation and management.
- ✓ On the behavior side, Yosowilangun resident excels on service charge payment which as much as 8,000 IDR/family.month with payment percentage of 97% (routine), whereas in Tanggulrejo was 6,000 IDR/family.month with a percentage payout is 53% (sometimes) and in Gumeno was 5,000 IDR/family.month with the percentage payout is 57% (sometimes). Service charge payment and payout percentage were very important for the sustainability of the MRF as the income was derived from it.
- ✓ On the attitude side, Yosowilangun resident excels in all categories where the community strongly agree to pay for 10,000 IDR/family month, while community of Tanggulrejo and Gumeno were not as many that agree to

pay the same amount. For the solid waste processing category in the MRF. Yosowilangun people strongly agree (83%) to support MRF built by the government,Whereas People of Tanggulrejo and Gumeno who support MRF were just as much as 32% and 27% respectively.

Development Strategy Of New MRF

The determination of new MRF development location was based on community participation. The top priority was one that has the highest density intervals, and then followed by that has medium and low density. Service level of new MRF development was viewed upon community desire of it. On the high density interval, desire percentage of MRF was 83%, whilst on the medium and low interval were 32% and 27% respectively. Level of service at the end of the year planning (year 2027) to all villages planned 100%, therefore needed a strategy to increase the level of service of the MRF. Problems and strategy of improving community participation in Manyar Subdistrict can be seen in the Table 3.

Table 3. Problems and Strategy Of Improving Community Participation in Manyar Subdistrict

No	Problem	Strategy
1	The role of the head of the village are minimal in the management solid waste	The increased socialization and coordination among all stakeholders on the importance of the management of persampahan for the progress of the region so as to gain attention in the form of priority allocation budget for investment or management costs solid waste
2	The society for less knowing the 3R program	The implementation of promotions that can give you an idea of "value" waste reduction at the source and its impact for health and environmental quality
		Implementation of the 3R campaign widely through various mass media to reach out to the community from many quarters and build a social commitment
3	A small portion of the community has already done the program 3R but not done in constant	Develop and implement the system of incentives and disincentives in the implementation of 3R. Incentives can be either a reduction of the levy on solid waste, gift coupons shopping plastic bags, awards replacement level of villages and others
		Boost community empowerment in order to exploit the economic value of waste 3R campaigns and promotions through the sale of handicraft products produced from recycled solid waste or in the form of compost
4	The public dispose solid waste at any place	Development of regulations as well as local regulations of both villages so that legal rules can be applied as it should be
	The community does not pay the levy in accordance with the applicable	
	The community does not routinely pay a levy	Encourage increased recovery of solid waste costs through increased public awareness to pay a levy

Construction plan of new MRF adjusted to those optimized results at MRF Peganden. Solid waste volume that being managed by MRF Peganden in 2027 is 14,42 m^3/day with approximately 7.379 inhabitants and area of 378 m^2. The first step was projecting the number of population that have not been served by MRF. From the projection, MRF service were able to be estimated. The new MRF development is planned once in a year. The capacity of new MRF was appropriate to MRF Peganden. Development needs of new MRF and service levels can be seen in Table 4.

Table 4. Development Needs of New MRF and Service Levels

No	Village	Service Level Existing MRF (%)	The Population Wants The MRF (%)	Stage I 2018-2024		Stage II 2025-2027	
				Underserved Population (Inhabitants)	Development of MRF	Underserved Population (Inhabitants)	Development of MRF
1	Betoyoguci	69.12	-	1,750	-	1,966	-
2	Banyuwangi	40.98	-	1,712	-	2,602	-
3	Betoyokauman	50.73	-	2,012	-	2,589	-
4	Peganden	80.96	-	5,657	-	7,379	-
5	Yosowilangun	0	83	11,656	2	13,026	-
6	Pongangan	0	83	9,024	2	10,610	1
7	Sukomulyo	0	32	5,564		10,197	
8	Suci	0	83	17,386	3	21,606	-
9	Sembayat	0	32	-	-	6,705	1
10	Gumeno	0	27	-	-	3,873	1
11	Tanggulrejo	0	32	-	-	2,897	
TOTAL						**83,451**	

CONCLUSIONS

Solid waste volume that being managed by MRF Peganden in 2027 is 14.42 m^3/day or 2,105 kg/day with approximately 7,379 inhabitants and area of 378 m^2. The solid waste that can be recycled in MRF Peganden in 2027 was 898 kg/day (42,68%) and that being transported to landfill was1,207 kg/day (57.32%). MRF development was prioritized by the level of density, in which the densest district became top priority. There are 7 and 3 MRFs will be built in 2018-2024 and 2025-2027 period respectively. With the addition of the new MRF, MRF service level in Manyar Subdistrict until the year 2027 was 64.61%

ACKNOWLEDGEMENT

The authors wish thank to Government of Gresik Distrik who have supported this research and also thank to Fajar Mauladan who have helped sampling of solid waste generation and interview to solid waste-producing households.

REFERENCES

[1] Badan Pusat Statistik Kabupaten Gresik, (2016), *Kecamatan Manyar Dalam Angka 2016,* Gresik.

[2] Bari, Q. H., Hassan, K. M., and Haque, R., (2012), "Scenario of Solid Waste Reuse in Khulna City of Bangladesh", *Waste Management,* Vol. 32, p. 2526-2534.

[3] Dinas Lingkungan Hidup Kabupaten Gresik, (2016), *Rencana Indukdan DED Persampahan Kabupaten Gresik,* Gresik.

[4] Demirbas, A., (2010), "Waste Management, Waste Resource Facilities and Waste Conversion Processes", *Energy Conversion and Management,* Vol. 52, p. 1280-1287.

[5] Mangkoedihardjo, S. (2007). Phytotechnology integrity in environmental sanitation for sustainable development. *Journal of Applied Sciences Research*, Vol. 3, No. 10, p. 1037-1044.

[6] Cimpan, C., Maul, A., Jansen, M., Pretz, T., and Wenzel, H., (2015), "Central Sorting and Recovery of MSW Recyclable Materials: A Review of Technological State-of-the-art, Cases, Practice and Implications for Materials Recycling", *Journal of Environmental Management,* Vol. 156, p. 181-199.

[7] Gundupalli, S. P., Hait, S., and Thakur, A., (2016), "A Review on Automated Sorting of Source-Separated Municipal Solid Waste for Recycling", *Waste Management.*

[8] Wang, Z., Dong, X., and Yin, J., (2016), "Antecedents of Urban Residents' Separate Collection Intentions for Household Solid Waste and Their Willingness to Pay: Evidence from China", *Journal of Cleaner Production.*

[9] Afroz, R., Hanaki, K., and Hasegawa, K., (2009), "Willingness to Pay for Waste Management Improvement in Dhaka City, Bangladesh", *Journal of Environmental Managemet,* Vol. 90, p. 492-503.

[10] Ardolino, F., Berto, C., and Arena, U., (2017), "Environmental Performances of Different Configurations of A Material Recovery Facility in A Life Cycle Perspective", *Waste Management.*

[11] Standar Nasional Indonesia (SNI) 19-3964-1994. *Metode Pengambilandan Pengukuran Contoh Timbulan dan Komposisi Sampah Perkotaan*.

[12] Tchobanoglous, G., Theisen, H., and Vigil, S.A., (1993), *Integrated Solid Waste Management: Engineering Principles And Issues*, McGraw Hill International Editions, New York.

[13] Sugiyono, (2012), *Memahami Penelitian Kuantitatif, Kualitatif dan R& D,* Alfabeta, Bandung.

J. Appl. Environ. Biol. Sci., 8(2)7-13, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Psychosocial Factors Associated with Postpartum Depression among Women in Pakistan

Faiza Anjum[1], Zahira Batool[2]

[1]Ph.D Scholar of Sociology, Gc University Faisalabad
[2]Associate Professor and Head of Department of Sociology, Gc University Faisalabad

Received: October 2, 2017
Accepted: December 26, 2017

ABSTRACT

Depression is a state of low mood with lack of concentration and energy that affects the behavior, thoughts, feelings and sense of well-being of a person. Depression is a common and widespread health problem which affects women in their postpartum period. A mother with postpartum depressive symptoms feels helpless, hopeless, sadness and anxiety. The main purpose of the study was to investigate the psychosocial factors of postpartum depression among women. The primary data was collected in the rural areas of District Faisalabad, Punjab, Pakistan. The data were collected from 400 respondents (mothers age 15-44 years, having a child up to the age of one year). The multistage sampling technique was used for the selection of the final sample. A well designed interview schedule was used to collect the responses from the respondents. Both the univariate and bivariate (chi-square and gamma test) analysis was used to evaluate the responses and its association with the level of depressive symptoms. Edinburgh Postnatal Depression Scale (EPDS) was used to check the level of postpartum depression among women. The result of quantitative study indicated that most of the mothers (40.8 percent) had severe depressive symptoms. Among the sample, antenatal depression, stressful life events, conflict with family members, lack of emotional/social support and financial problems have been reported repeatedly. In addition, crying episode, anxiety, irritation, tiredness, eating disorder and sleeping disorder during pregnancy and after childbirth were observed more frequently in most of the postpartum mothers. According to the bivariate results, harsh attitude of the husband and mother in-law; violence by husband; stressful life events and lack of social support; and experiences of crying, anxiety, irritation, tiredness, eating disorder and sleeping disorder during pregnancy and after childbirth having the association with the prevalence of postpartum depression at 0.000 percent level of significance.

KEYWORDS: Postpartum, Postpartum mothers, Depressive symptoms, Factors, Antenatal depression, Stressful life events, Social support.

INTRODUCTION

The mental state of an individual is influenced by the psychological factors as well as societal related factors. Psychological factors based on individual mental level, while social factors are experienced by an individual from his society. These two notions are merged into a single term known as psychosocial. It means that the physical body is affected by both the social and psychological factors. The effects of social factors are identified by psychological understanding [1]. In simple words, psychosocial factors consist of personality and the incidence of any psychiatric disorder influenced by environmental factors. These factors either increase the risks of developing the depressive disorder in an individual or may decrease the risks (protective factors). Generally, examples of psychosocial factors include marital status, social support, social conflict, disruption, loneliness and living or working environment. In developing countries, social setup is an important cause of basic health inequalities among women. In this context, beliefs and attitudes towards the maternal place her on higher risks of postpartum depression [2]. Furthermore, depression can occur due to hormonal changes, childbirth process and the personal ability to deal with psychosocial stressors [3].

Postpartum depression (PPD) is defined as "any non-psychotic depressive illness occurring during the first postpartum year" [4]. A postpartum is a period starting immediately after childbirth and continued for about 1 year. Postpartum depression is the most common complication of childbearing, affecting approximately 15-20 percent of women that represents a considerable maternal health problem [5]. A number of risk factors contributing in the development of postpartum depression; and the psychosocial factors can be hypothesized a leading cause of postpartum depression. It has devastating effects on mothers, infants and their families. The studies concluded that postpartum depression occurs due to family conflict, lack of social support, lack of attachments with baby and intimate partner, low mood, childcare anxiety and sleeplessness [6,7]. Postpartum depression is common in Pakistan with a prevalence rate of 28 percent to 63 percent, placing it among the highest in Asia [8]. By another, almost 1/3rd of women suffered from postpartum depression, the majority of

***Corresponding Author:** Faiza Anjum, Ph.D Scholar of Sociology, Gc University Faisalabad.
email: faizaanjum723@gmail.com

them are moderately or severely depressed [9]. A number of risk factors have been explored, but the actual psychosocial factors of postpartum depression among Pakistani women are not tacit. Thus, the main purpose of this study is to identify the psychosocial factors and its relationship with postpartum depression among women in the rural areas of Pakistan.

Theoretical Framework

The theoretical framework explains a number of factors that contribute in the development of postpartum depression. In the present study, Beck's theory of postpartum depression [10] and Sullivan's theory of interpersonal theory [11] are applied to understand and support the postpartum depression among women. Here, the theoretical model of postpartum depression is built up on the basis of these theories.

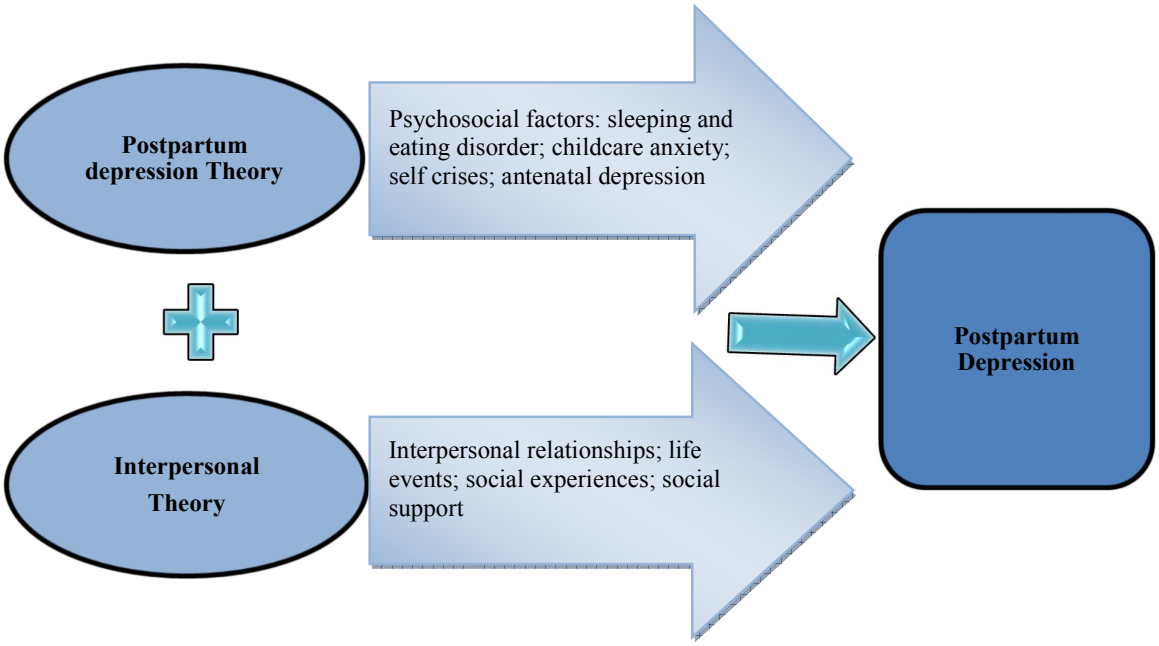


Figure 1: Theoretical Model of Postpartum Depression
Source: Beck, 2002; Sullivan, 1953

Conceptual Framework

The study covered six psychosocial independent variables to examine the relationship between contributory factors and dependent variable (postpartum depression among women). These variables were attitudes of husband, mother-in-law and doctors, violence (verbal and physical), stressful life events, social support, experiences and feelings during pregnancy and within the first two weeks after delivery.

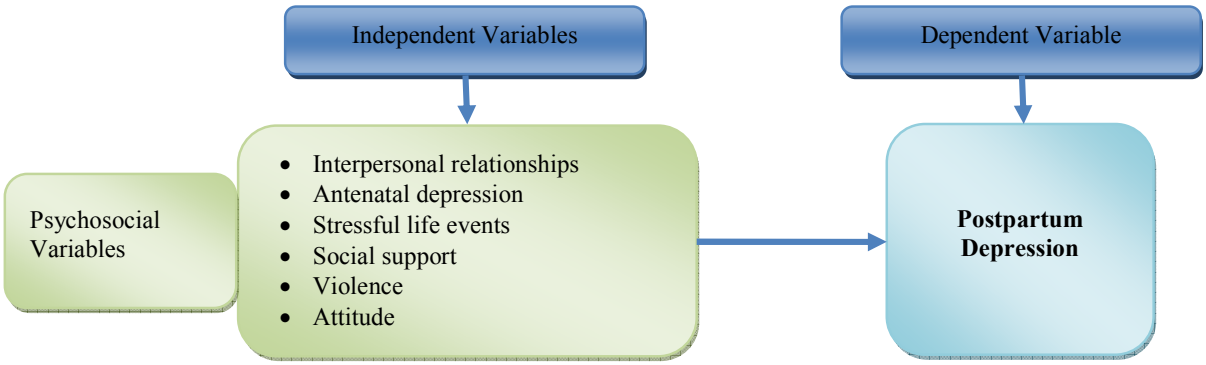


Figure 2: Conceptual Model of postpartum depression

Objectives of the study

1. To identify the contributing factors of postpartum depression among respondents
2. To check the level of postpartum depression among respondents
3. To explore the relationship between psychosocial factors and postpartum depression

Hypothesis of the study

1. An association between attitude of husband, in-laws and doctors towards respondents and prevalence of postpartum depression
2. An association between violence and prevalence of postpartum depression
3. An association between history of stressful life events and prevalence of postpartum depression
4. An association between social support and prevalence of postpartum depression
5. An association between experiences and feelings of the respondents during pregnancy and prevalence of postpartum depression
6. An association between experiences and feelings of the respondents within the first two weeks after delivery and prevalence of postpartum depression

LITERATURE REVIEW

Literature review focuses on a specific topic of interest, including a critical analysis of different researches and its relationship. Its aim is to provide a base for research work, develop the scope of the research and enhance the importance of the research work. A number of studies have been done on the topic of postpartum depression in relation to psychosocial factors, for example, Field [12] concluded that the prevalence rate of postpartum depression was approximately 20 percent among mothers. The associative risk factors were the psychosocial factors contributing in the etiology of postpartum depressive symptoms, including social support, sleep disturbance, prenatal depression and early childhood experiences (maltreatment, attachment and sexual abuse). Naveed and Fouzia [13] also concluded in the same line, explained that lack of social support, interpersonal relationship, self-neuroticism and anxiety plays an important role in the development of postpartum depression. In the context of Pakistani culture, the woman is responsible for the birth of a female child. In most of the families, the attitude of husband and in-laws is changed when they come to know that woman is going to give birth to a female baby. Her spouse and in-laws stop supporting woman, which makes her life unhappy, more disturbed that leads to the symptoms of postpartum depression.

According to Yount & Smith [14] poor social support, frustration, patriarchal kinship, difficulty in order to adapt motherhood and physical or psychological violence are the important factors in contributing postpartum depression. Some other key factors were the sex of the baby, poor relations with in-laws, death of husband, polygamy and women's dependency on family. Furthermore, the study hypothesized that decreased in the symptoms of postpartum depression may relate to the positive relations with mother-in-law. A study by Kalar et al. [15] revealed that almost 1/3 of the women had a high risk of postpartum depression. Whereas, the strongest predictive risk factors were poor family relationships, cesarean delivery, infant health, the number of female children and lack of social support.

LaCoursiere et al. [16] evaluated psychosocial factors to determine the prevalence of postpartum depression. A number of psychosocial risk factors were found to be common among the study sample including financial problems (49.1 percent), self-emotional behavior (35.0 percent), husband's negative attitude (19.8 percent), previous history of depression (16.7 percent), history of abuse (11.7 percent), and traumatic (10.3 percent). Setse et al. [17] concluded that a significant number of women experienced the symptoms of postpartum depression from diverse cultures. The prevalence rate among these women is found to be 7 percent to 50 percent, having the effect on women's own health and their infants. According to these, the risk factors for postpartum depression were pregnancy complications, maternal age, partner' behavior with the incidence of violence, family relationships and insufficient social support. Adrienne [18] found that low energy level, restlessness and anxiety were major characteristics of depression. The non-postpartum mother can be differentiated from postpartum depression symptoms by reporting sadder mood, more suicidal ideation, and more reduced interest.

METHODOLOGY

The cross-sectional based survey was conducted to meet the criteria of study objectives. The quantitative method was used to identify the psychosocial factors contributing in the development of postpartum depression among women. The area of the study was District Faisalabad, Punjab, Pakistan. The target population was the postpartum mothers age 15-44 years, having a baby up to one year of age in the rural areas of District Faisalabad. To gather the requirements of the representative population, four rural towns were selected conveniently from District Faisalabad. A sample of 400 respondents (mothers) was selected through multistage sampling technique. Firstly, four union councils were selected randomly from each rural town.

Secondly, 25 respondents were selected randomly from each selected union council. The data were collected through well designed interview schedule. The data were analyzed through univariate and bivariate analyses by using SPSS (Statistical Package for Social Sciences). The association between the predicting variables and response variable was checked by the chi-square test at the 0.05 percent level of significance. Also, the positive and negative relationship was checked by the gamma test. The level of postpartum depression among women was examined by applying the Edinburgh Postnatal Depression Scale (EPDS). This scale has been proven to be an effective method to identify the risk for "postpartum" depression. The scale (self-reported) contains about 10-questions, each question has four-point ranging from 0 – 3. The selection of response was based on how a respondent has felt in the past 7 days. Generally, the scores in the range of 10 - 30 are indicating the symptoms of depression [19,20,21]. For the present study, postpartum depression was categorized into three levels to see the level of postpartum depression as well as for maximum variations in the responses. These categories are described as follows:

Table: 1 Levels of Postpartum Depression

Severity	Score range	Symptoms of PPD	Screening
Mild / not depressed	0 – 9	No signs and symptoms	Normally remains untreated
Moderate / minor depressed	10 – 12	May present positive symptoms	Requires attention for further screening
Severe / major depressed	13 or above	Frequently present positive symptoms	Needs an appropriate assessment and possible interventions immediately

Source: Montazeri et al. (2007), Pallant et al. (2006), Cox et al. (1987)

RESULTS AND DISCUSSION

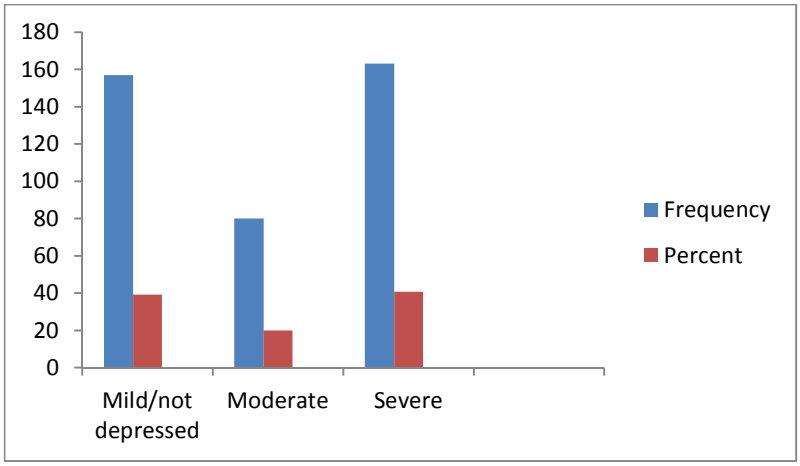


Figure 3: Prevalence of postpartum depression among respondents

The symptoms of postpartum depression of respondents were screened by using the EPDS (Edinburgh Postnatal Depression Score). The distribution of the mothers, according to their symptoms of postpartum depression shown that 40.8 percent of the respondents have severe depressive symptoms; and 20.0 percent of them have moderate depressive symptoms. Whereas, 39.3 percent of the women have no depressive symptoms in their postpartum period.

Table 2: Association between psychosocial factors and the prevalence of postpartum depression

*Dependent Variable: Postpartum depression				
	Chi-square statistics		Gamma statistics	
Independent Variables	Value	Sig. Level	Value	Sig. Level
Attitude (harsh, normal, good)	59.734	0.000	-0.455	0.000
Violence (verbal, physical)	70.177	0.000	0.538	0.000
Stressful life events (in-laws home environment, financial problems, health problems, death of any relative)	86.706	0.000	0.568	0.000
Social support (husband, in-laws, friends)	26.419	0.000	-0.384	0.000
Pregnancy experiences/feelings (crying, sleeping and eating disorder, anxiety, shame or guilt, irritation, feeling tired, perform activity slowly	48.121	0.000	0.456	0.000
Experiences/feelings within the first two weeks after delivery (crying, sleeping and eating disorder, anxiety, shame or guilt, irritation, feeling tired, perform activity slowly)	59.428	0.000	0.513	0.000

The researcher used the cross-tabulation to check the association between dependent and independent variables, in order to accept or reject the hypotheses. Whereas, the value of chi-square shown the relationship between these variables; and the value of gamma explains the positive or negative relationship between these variables. The significant association is determined at 0.05 level of significance.

According to the results, the value of chi-square (59.734) indicated the existence of an association between the attitude and the incidence of depression in the postpartum period; whereas, the gamma value (-0.455) verified a strong negative relationship. It means that those women who faced harsh attitude were more likely to be more depressed in the postpartum period than those who faced good attitude. Violence in the form of either verbal or physical has adverse effect on women' psychological and physical health. In the context of Islam, violence against women by their husband is prohibited [22]. But in contrast to Islamic preach, intimate partner violence against women is common in Pakistan, which has adverse effects on women' mental health status. As the value of chi-square (70.177) shown a significant relationship (P=0.000) between the violence and postpartum depression and the value of gamma (0.538) indicated a strong positive relationship. Regarding the stressful life events, the value of chi-square (86.706) and gamma statistics (0.568) confirmed the existence and positive relationship between the predicting and response variable. It means mother with lower incidence of stressful life events were not depressed during their postpartum period. In the present study, the reported stressful life events were financial problems, the husband and mother-in-law had a pressure to be pregnant in the first year of marriage, in-laws home environment, health problems, change home, death of love ones and relationship changing.

Social support in the child care is helpful for mothers in adjusting to their new situation. Low social support is associated with postpartum depression and other related psychological issues. The value of chi-square (26.419) shown a significant association (P = 0.000) and gamma value (-0.384) indicated a strong negative relationship between social support and symptoms of depression. Evidence also supported by the theoretical model, as theory illustrated a strong positive association between stressful life (self-crises) event, lack of social support and the development of postpartum depressive symptoms among women [10,11]. If support is provided to mothers by their intimate partner, obviously they felt more security and love [23,24].

In reference to the relationship between respondent's feelings and experiences during pregnancy and the prevalence of postpartum depression; chi-square value (48.121) shown a significant association (P = 0.000) and the gamma value (0.456) depicted a strong positive relationship between these variables. Women who experienced the problems of crying, sleeping or eating disorder; and felt irritated, anxiety and tiredness to a great or some extent during pregnancy were depressed severely in the postpartum period.

Chi-square value (59.428) shown a significant association (P = 0.000) and the gamma value (0.513) proved a strong positive relationship between women's feelings and experiences within the first two weeks after delivery and postpartum depression. Others, concluded that baby blues or mild depressive symptoms (sadness, irritability, crying, poor concentration) are common due to hormonal changes; and the most frequent symptoms of depression can include low mood, change in appetite, anxiety, and suicidal thoughts [10,25].

CONCLUSION

Based on survey results, it is concluded that women who faced verbal or physical violence by their husbands, have more the symptoms of postpartum depression in terms of moderate or severe. The insufficient social support and stressful life events are identified as a strong positive predictor of the development of depression. In Pakistan, social support is affected by the traditional cultural values and misconception of health care practices. Negative thinking including desperate and suicidal thought occurs due to child care anxiety, irritation and stress. It may happen due to the maternal health complications and low level of social support during pregnancy or in the postpartum period. The continuity of these problems may elevate the risks of depression; and these are known to be the symptoms of postpartum depression, if it has gradual incidence. It was observed that women who attain professional help and have social support, tend to feel more relaxed and safety during their postpartum period. On that basis, it is suggested that a mother's care is essential for her physical and psychological well-being because a supportive relationship is helpful to change the maternal depressive mood. Furthermore, it is necessary to access a previous history of anxiety, stress or depressive symptoms of the antenatal period, because the previous history of depressive symptoms is known to be a strong risk factor for postpartum depression.

RECOMMENDATIONS

Based on the study findings, it is recommended that:

1. The government should appoint a psychologist at hospitals for counseling and creating awareness about the antenatal and postpartum related psychological issues.
2. It is necessary to eradicate all the types of violence against women, because violence was found to be a strong predictor for the depressive symptoms.

3. Gender based workshops and seminars should be organized, where the awareness should be provided about the effects of violence against women.
4. Women should visit to the doctors or at least discussed with lady health workers on feeling fatigue, weakness, anxiety, stress, shortness or rapid heartbeat, dizziness or loss of concentration. Because all are the strongest contributory factors of postpartum depression, if these problems occur during pregnancy or after a childbirth.

REFERENCES

1. Stansfeld, S., and F. Rasul, 2007. Psychosocial factors, depression and illness. In A. Steptoe (Ed.), Depression and physical illness pp. 19–52. Cambridge: Cambridge University Press.
2. Staneva, A.A., B. Fiona and W. Anja, 2015. The experience of psychological distress, depression, and anxiety during pregnancy: A meta-synthesis of qualitative research. Midwifery., 31 (6): 563–573.
3. Vaghee, S., Z.N. Moghaddam., S.A. Sajadi., H. Chamanzari, M. Sepehrikia., A. Salarhaji, 2016. The Effect of Occupational Therapy Activities on Self-Efficacy of Housewives with Mood Disorders after Discharge from the Hospital: Clinical Trial. J. Appl. Environ. Biol. Sci., 6(8): 78-87.
4. Scottish Intercollegiate Guidelines Network, 2012. Management of perinatal mood disorders: A national clinical guideline. http://www.sign.ac.uk/pdf/sign127.pdf.
5. Marcus, S. M., 2009. Depression during pregnancy: rates, risks and consequences--Motherisk update 2008. The Canadian Journal of Clinical Pharmacology., 16 (1): e15-22.
6. Jafarpour, M., E. Marziyeh., M. Sherafat., & S.H. Fatemeh, 2014. The Effect of Stressful Life Events on Postpartum Depression. Journal of Kermanshah University of Medical Sciences, 10(4): 1-4.
7. Leung, S.S., I.M. Martinson., & D.G. Arthur, 2005. Postpartum depression and related psychosocial variables in Hong Kong Chinese women: findings from a prospective study.Res Nurs Health., 28 (1): 27-38.
8. Gulamani, S.S., P. Shahirose., K. Zeenatkhanu and I.A. Syed, 2013. Preterm Birth a Risk factor for postpartum depression in Pakistani women. Open Journal of Depression., 2 (4): 77-81.
9. Muneer, A., A.M. Fareed, T.N. Asad, M. Faiza and T.U. Asma, 2009. Frequency and Associated Factors for Postnatal Depression. Journal of the College of Physicians and Surgeons Pakistan., Vol. 19 (4): 236-239.
10. Beck, C.T., 2002. Theoretical perspectives of postpartum depression and their treatment implications. Am J Maternal Child Nurs., 27: 282–7.
11. Sullivan, H. S., (ed) 1953. The Interpersonal Theory of Psychiatry. W. W. Norton, New York, USA.
12. Field, T. (2017). Postpartum Depression Effects, Risk Factors and Interventions: A Review. Clin Depress., 3 (122): 1-13.
13. Naveed, A. & N. Fouzia, 2015. Risk Factors for Postpartum Depression, Interpersonal Relationship Anxiety, Neuroticism and Social Support in Women with Postpartum Depression. Pakistan Journal of Social Sciences (PJSS), 35 (2): 911-924.
14. Yount, K. M. & S.M. Smith, 2012. Gender and postpartum depression in Arab Middle Eastern women. Women's Studies International Forum, 35: 187-193.
15. Kalar, M. U., F. Iqbal., N. Kalar., Z. Ausaf., W. Ghori., Z. Rizwan., W. Waseem., U. Rasheed and J. Farhat, 2012. Prevalence and predictors of postnatal depression in mothers of Karachi. International Journal of Collaborative Research on Internal Medicine & Public Health, 4 (5): 830-830.
16. LaCoursiere, D.Y., K.P. Hirst & E. Barrett-Connor 2012. Depression and pregnancy stressors affect the association between abuse and postpartum depression. Maternal Child Health J., 16 (4): 929-35.
17. Setse, R., R. Grogan., L. Pham., L.A. Cooper., D. Strobin., N.R. Powe & W. Nicholson, 2009. Longitudinal study of depressive symptoms and healthrelated quality of life during pregnancy and after delivery. Maternal Child Health Journal, 13 (5): 577-587.
18. Adrienne, E., 2009. Introduction: Reproductive Mental Health. 16 (1): e1-e5.
19. Cox, J. L., J.M. Holden and R. Sagovsky, 1987. Detection of Postnatal Depression: Development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry, 150: 782-786.

20. Montazeri, A., T. Behnaz and O. Sepnideh, 2007. The Edinburgh Postnatal Depression Scale (EPDS): translation and validation study of the Iranian version. BMC Psychiatry., 7: 11.
21. Pallant, F.J., L.M. Renée and T. Alan, 2006. Evaluation of the Edinburgh Post Natal Depression Scale using Rasch analysis. BMC Psychiatry., 6: 28.
22. Hidayat Ur Rehman and M.A. Khan, 2016. Equality between Man and Woman and the Spirit of Islam. J. Appl. Environ. Biol. Sci., 6(10): 128-132.
23. Dowleh, S., R.M. Talebi & N. Abdolabbas, 2015. Study of Sociological Effective Factors on Feelings of Social Security (Case Study: Women of Tehran Region 10). J. Appl. Environ. Biol. Sci., 5(1): 119-126.
24. Majd, M.A., 2015. The relationship between personality types and love dimensions with attitude toward infidelity in married. J. Appl. Environ. Biol. Sci., 5(10): 129-132.
25. Pearlstein, T., M. Howard, A. Salisbury and C. Zlotnick, 2009. Postpartum depression. American Journal of Obstetrics & Gynecology., 200 (4): 357-364.

J. Appl. Environ. Biol. Sci., 8(2)14-22, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Petro-Mineralogical and Geotechnical Analysis on the Clays of Constantinois Province (Mila North-East Algeria)

Khoudir KHELLAF[1*] and Messaoud HAMIMED[2]

[1]Faculty of Nature, Earth and Life Sciences, University of Ghardaïa. BP 455, Ghardaïa, 47000, Algeria:
[2]Faculty of Exact Sciences and Nature and Life Sciences. University of Larbi Tebessi. Road of Constantine, 12002-Tebessa- Algeria

Received: October 30, 2017
Accepted: December 26, 2017

ABSTRACT

This work was realized for 5 years. It consists to study a ground located on the Northwest of Mila city. The soil of this region is characterized by marl and clays with gypsum of Mio-Pliocene age. These trainings constitute a seat of a lot geotechnical problems such as swelling, who's engenders damages in the constructions. This study has done to contribute and to solve this problems. Therefore, we have preceded a petrographic analysis according to the model of Czerminski, a mineralogical analysis by diffraction the X-rays and a geotechnical study by analysis of the various parameters. The petrographic analysis revealed a clear evolution of marland clay dominated in the formations. The mineralogical analysis show a variety of minerals dominated by calcite, quartz and interstratified minerals. The geotechnical tests carried out showed clay with high plasticity and medium to high swelling potential. In view of this, we propose adequate solutions to solve this problem.
KEY WORDS: Petrographic analysis, Mineralogical analysis, Geotechnical analysis, Clay, swelling, Mila, Algeria.

1. INTRODUCTION

In the world, the soil is exposed to various natural hazards or risks such as erosion [1], contamination[2], salinity [3], slips [4], settlements [5], swelling [6]…etc.

Algeria has been the subject of a lot research's, we quote the effort of Azzouz [7] on Tlemcen region, Benaissa [8]on Constantine, Bellatrache [9]on Ain Aminas region and Athmania [10, 11], Afes [12], Afès &Didier [13] and Khellaf &*al.*[14] on Mila region…etc.

Mila region is a part of the Constantinois basin. It's characterized by clays overlying marl Moi-Plio-Quaternary age [15]. These clays exhibit a significant shrinkage during drying period and swelling in the presence of water [12, 13, 16]. These phenomena cause significant variations in the volume of soils which causes damages to buildings [14, 19, 17, 5, 18].

The aim of this work is to solve this problem. For that, we have done petrographic analysis, mineralogical analysis (XRD) and geotechnical analyzes of this soils.

Therefore, two profiles are taken into consideration and a systematic sampling was conducted with care.

2. MATERIAL AND METHODS

2.1. Study Riding

The studied area is a part of the Mila-Constantine Neogene basin that belongs to the Constantinois post slick basin [15]. It's located about fifty kilometers in west of Constantine and it's limited on the north by Oued El Kebir, on the east by the cities of Mila and Sidi Merouane, on the south by the mountainous ridge of Marechou and on the west by the hill of Redjas (Fig.1).

[*]**Corresponding author:** Khoudir KHELLAF. Faculty of Nature, Earth and Life Sciences, University of Ghardaïa. BP 455, Ghardaïa, 47000, Algeria. E-mail: khoudir.2006@yahoo.fr. Mobile : +213659922607.

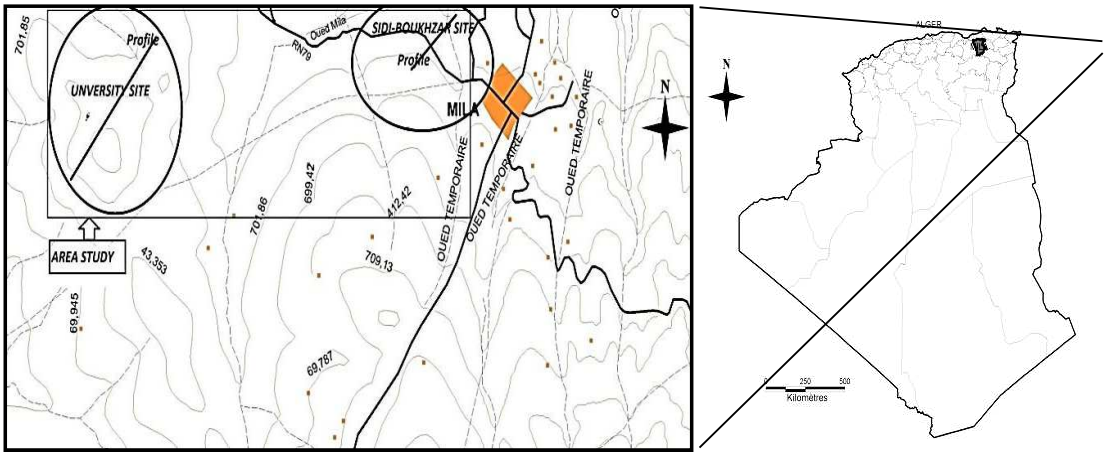


Figure 1: Map of geographical location, studied area and position of the studied profiles.

2.2. Sampling

Clays examined have been taken from different depths. These clays have been chosen according to the problems encountered in this region specially the instability of the area.

2.2.1. Samples Analysis

The analysis of samples has been performed as follows:

1. Petrographic or chemical-weight analysis, which determines the percentages of carbonates, clays and sands, for a specific weight of fine soil with a diameter less than 0.063 mm [19].
2. Diffractometric analysis with X-ray powder diffraction (XRD): is done by interpreting the diffractograms obtained of the samples examined.
3. Geotechnical analysis: This analysis is performed by determining various geotechnical parameters to soil of the two studied sites [20].

The interpretation of the results obtained is from the international bibliography.

2.3. Description of profiles

2.3.1. Profile of Sidi Boukhzar

This profile is located at 1.5 km on north-west of Mila city (Fig.1) with a thickness of 150 m. In this point, the section has been performed from bottom to top (Fig.2):

- Formation (15 to 20 m) of marly clay and sandy, gray to greenish. It contains sandstone and fibrous gypsum.
- A powerful series (thickness 10 m) clay-sandy little marly to gypsum brown to greyish.
- Heterometric and polygenic Conglomerate (100 m) with red cement clay.

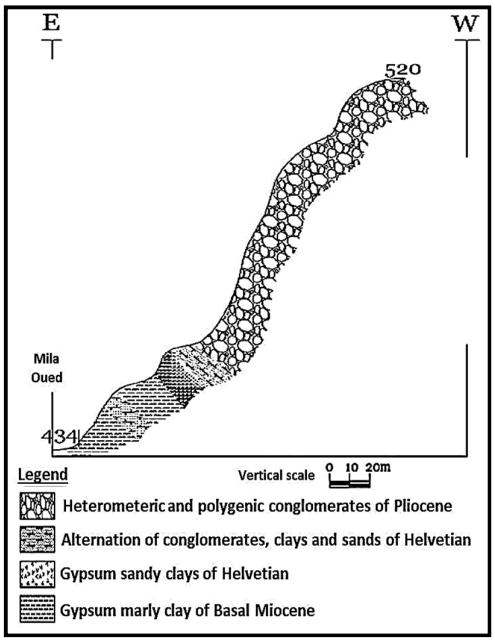


Figure 2: Geological section of the Sidi Boukhzar site.

2.3.2. Profile of the University (200m)

This profile (Fig. 1) is located at about 5 km towards the north-western part of Mila town. The section (Fig. 5) made at this point contains clays or marly clays, gray to blackish with traces of gypsum and fossil debris. This basic alternation is surmounted by a clay entity black (20m) not very marly and little sandy.

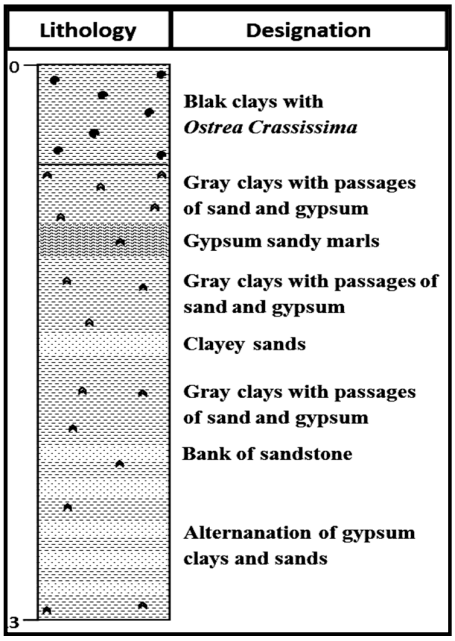
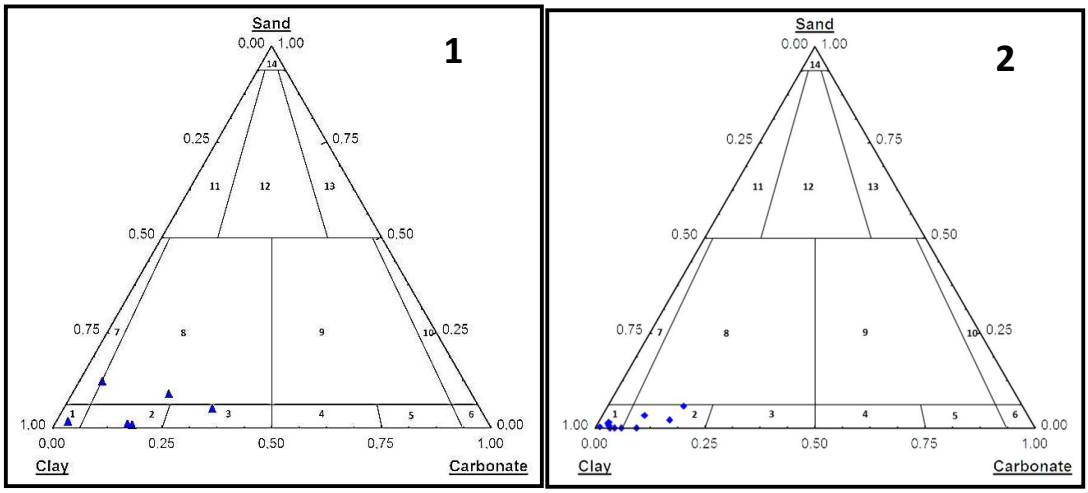


Figure 3: Geological section of the university site.

3-RESULTS AND DISCUSSIONS

3.1. Petrographic (chemical-weight) analysis and classification of rocks

The results obtained from this test are represented on the diagrams below:



1: Sidi Boukhzar site, 2: University site, (1) Clay, (2) Marly Clay, (3) Clayey Marl; (4) Marl; (5) Marly Limestone; (6) Limestone; (7) Sandy Clay; (8) Marl-Sandy Clay; (9) Marl-Sandy Limestone; (10) Sandstone Limestone; Clayey Sandstone (12) Marly Sandstone (13) calcareous Sandstone (14) Sandstone.

Figure 4: Ternary presentation of chemical-weight analysis and classification of sedimentary rocks according to the method of Czerminski.

According to these results, we note the predominance of clay and marl rocksthan sand rock (Fig. 4).

Sidi Boukhzar profile: the group of clay rocks contains 2 to 34% carbonates, 61 to 95% clays and 0.5 to 4.7% sands; the group of marly and sandy clay rocks presents 30 to 82% clay content, 5 to 30% carbonates and 8 to 40% sand.

University profile: the analyzed sediments encountered are presented by clays, marly clays, marl-sandy clays and rarely clay marl (Fig. 3). The group of clay rocks contains 73 to 98% clays, 0.8 to 27% carbonates and 0.1 to 3.4% sands; and the group of marly or sandy clay rocks contains 32 to 74% clay, 6.7 to 20.5 carbonates and 9.2 to 49% sands.

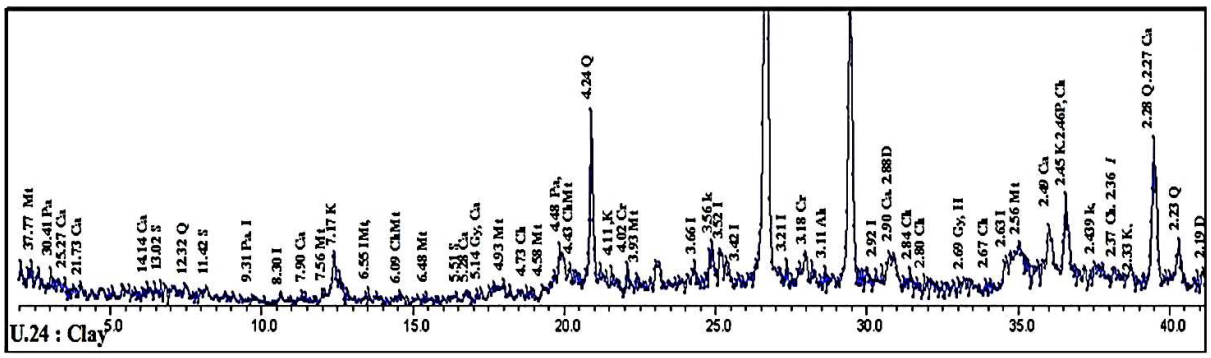
Therefore, referring to the work of [10, 11, 21, 16, 22, 23] clay contents are higher than 75%, which makes it's possible to classify these soils as clays or marl and sometimes sandy clays. The Silica (SiO_2) contents are below than 80%. This percentage is the border between swelling and non-swelling soils [24, 25]. The low to medium calcium carbonate grades (0 to 30%); which is a good mechanical index for the soil resistance [26].

The petrographic analysis of the samples proved different varieties of clayey rocks. For both profiles, these varieties are presented by clays or marly clays and marl-sandy clays with a high rate of clays, a less rate of silica and low carbonate content.

3.2. Diffractometric analysis

The analysis of diffractograms (Fig. 5) reveals that: Calcite is presented in the all samples with it's main peak 3.3 Å. The siderite and ankerite are shown as traces. Quartz is presented in the samples with it's characteristic peak of 3.34 Å. The α-cristobalite (4.5 Å) and α-tridymite (4.8, 3.7 and 2.75 Å) forms are found in most samples. Montmorillonites are mainly calcitic with characteristic peaks between 21.7 Å and 9.7 Å. Chlorites are ferriferous (chamosite). Kaolinite is also present by it's characteristic peaks of 7.14; 4.43Å. The interstratified represented mainly by montmorillonite-illite and montmorillonite- chlorite. Vermiculite and palygorskite traces. Illite is crystallized in small peaks (8.8, 19.8 and 26.97 Å). Gypsum is represented by it's characteristic peaks 11.71; 29.19; 20.60; 33.45; 31.20; 23.47 Å and it's reported sometimes with small peaks. Iron Oxides and Hydroxides are represented as traces by the hematite (3.69 Å), pyrite and iron hydroxides (goethite 4.18Å).

For that, it's noted on Mila region that the calcite is abundant, dolomite and siderite are traces [16], quartz manifests a lot with rate of 49% [17], montmorillonite is the type 2/1 [27] and by attention when carrying out projects [17], Kaolinite is a mineral typical of emerged and altered soils; it's presence in these environments proves the tendency to temporal immersion [27]but the smectite which is very sensitive to the phenomenon of shrinkage-swelling which can manifest itself by differential settlements [10], Chlorite have more than 15% ; so, it's can be swelling [17],Saponite and Vermiculites are likely to fix water therefore, they can swell and also they are capable to lose and to retract giving variations in volume [28]. Illite is reported in traces.



(Ca) calcite (Cha) chamosite (Ch) chlorite (ChMt) chlorite-montmorillonite (ChV) chlorite-vermiculite; (Cr) cristobalite (D) dolomite; (H) Hematite; (I) illite, (IMt) illite-montmorillonite, (Go) goethite, (Gy) gypsum, (K) kaolinite, (Mt) montmorillonite, (Pa) palygorskite, (P) pyrite, (Q) quartz, (S) siderite; (Tr) tridymite

Figure 5: Diffractogram of samples from the University profile.

3.3. Geotechnical analyzes

The study of these clays has been performed as follows:

3.3.1. Determination of the physical and mechanical parameters of the two sites soils

3.3.1.1. Determination of physical parameters

The tables below (Table 1 and 2) summarize the physical parameters results of the examined clays:

Table 1: Physical parameters of Sidi Boukhzar clays [29]

Parameters	Sidi Boukhzar site					
	Site 1	Site 2	Site 3			
	SC1	SC3	SC1	SC3	SC5	SC1
Depth (m)	2.00-3.00	2.00-3.00	4.00-4.50	2.00-3.00	2.00-3.00	2.00-3.00
w (%)	29	31.90	20.50	18.60	21.25	19.90
Sr (%)	100	100	98.50	99.20	98.64	98.76
γh(N/m^3)	1.54	1.56	1.40	1.36	1.49	20.9
e_0 (%)	78.30	86.13	55.4	53.54	65.08	0.54
n	0.44	0.46	0.35	0.35	0.39	0.5

Table 2: Physical parameters of University clays [30].

	University Site					
Parameters	**SC1**	**SC3**	**SC4**	**SC5**	**SC6**	**SC8**
Depth (m)	3.10-8.00	2.30-8.00	1.30-7.20	1.00-4.50	0.65-.50	2.50-8.00
w (%)	17.29	27.76	25.30	18.16	23.19	42.88
Sr (%)	95.11	93.28	88.77	99.11	96.38	90.84
$\gamma h(N/m^3)$	2.12	2.09	2.15	1.75	2.07	2.20
e_0 (%)	54.60	35.60	54.21	69.68	70.9	45.89

These results show a very high soil saturation degree (Sr)(88.77 to 100%), average water content (w) from 17.29% to 42.88%, a dry density (γd) from 1.36 to 1.82 KN/m^3, a wet density (γh) from 1.74 to 2.20 KN/m^3 and a significant vacuum index (e) reached 70% which reflects porosity (n) of 30%.

According to these results we can classify the materials analyzed as medium to stiff clay very saturated with water [26, 31], with a slightly humid to humid hydric state, present a more compact behavior and sometimes more or less loose [32].

3.3.1.1.1. Atterberg limits

The results obtained from this test are summarized on the Casagrande diagram and abacus (Fig.8 and 9).

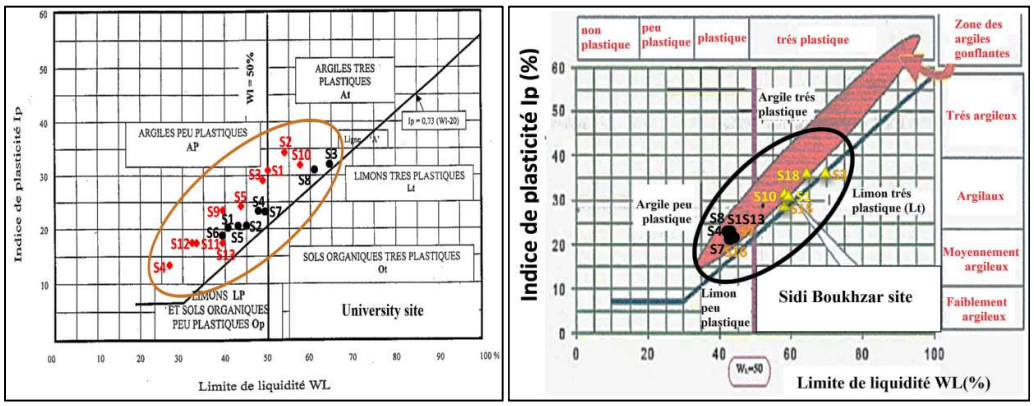


Figure 6: Position of Mila clays on the Casagrande diagram.

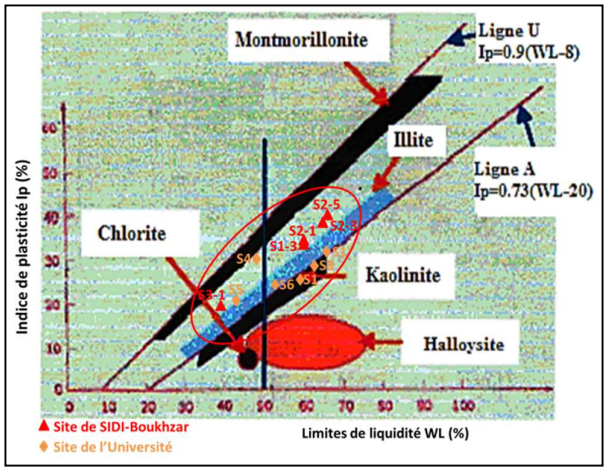


Figure 7: Position of Mila clays on the Casagrand plasticity abacus.

The representation of values Ip and WL obtained from Atterberg limitstest, on the Casagrande diagram and abacus above show that these clays are on the one hand, positioned above the line A on Casagrande diagram, on the other hand, these clays are between the line A and U, on Casagrande abacus. So, Mila clays ranges from slightly plastic (AP) to highly plastic (AT) and belongs to the three major families of clay minerals (montmorillonite, kaolinite and illite) (Fig. 7).

So, referring to the works of Dakshanamurthy & Raman [33], Komornik & David [34], Afès & Didier [13], Afes [12], Sebaai & Aziz [35], Hazmoune[23], Khellaf & *et al.*[16], Khellaf & Bitat[20], Khellaf[14], these clays are swelling because the values of the Atterberg limits obtained are quite large as standards.

3.3.1.1.2. Sedimentometric analysis and clay activity

The results obtained (Fig.8) are represented on Seed diagram and Wiliam and Donaldson diagram.

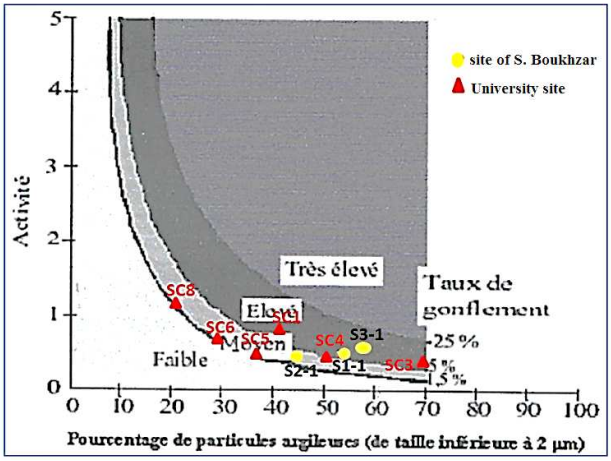


Figure 8: Position of Mila clays on the classification diagram of the swelling potential.

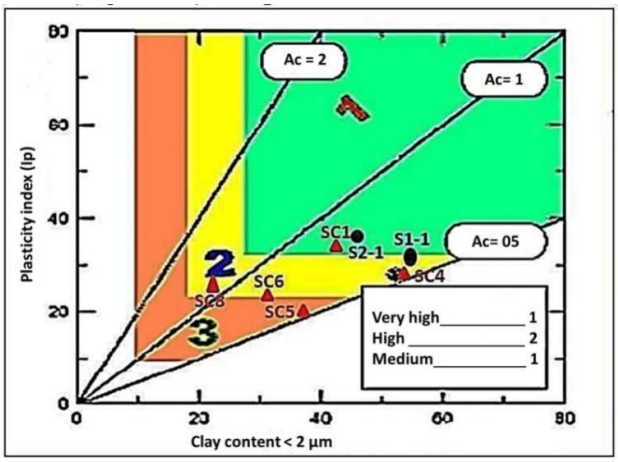


Figure 9: Position of Mila clays on the abacus of William & Donaldson, 1980.

The results obtained from this analyzes carried out on the clays show that the most part have a medium to high swelling potential [14, 16, 35].

3.3.2. Determination of the mechanical parameters for the studied clays

3.3.2.1. Oedometric and straight shear tests

The results obtained are summarized in the tables below (Table 3 and 4).

Table 3: Compressibility characteristic's of Sidi Boukhzar site [29].

Parameters	Site 1		Site 2			Site 3
	SC1	SC3	SC1	SC3	SC5	SC1
Depth (m)	2.00 - 3.00	2.0 3.00	4.00-4.50	2.00 - 3.00	2.00 - 3.00	2.00 - 3.00
Cc (%)	0.21	0.23	0.23	0.24	0.20	0.08
σ'_c (bars)	1.15	1.20	2.00	2.10	1.97	3.10
σ'_{v_0} (bars)	1.43	1.35	2.40	1.97	1.20	3.53
Cg (%)	0.005	0.01	0.03	0.03	0.03	-
Cu (bars)	0.44	0.5	0.40	0.60	0.60	0.40
φ (°)	15	22	8	5	3	16.4

Table 4: Compressibility characteristics of university Site [30]

Parameters	SC1	SC3	SC4	SC6
Depth (m)	3.10-8.00	3.80-800	2.30-8.00	1.30-7.20
Cc (%)	0.20	0.16	0.16	0.13
σ'_c (bars)	2.06	1.95	1.40	1.42
Cg (%)	0.004	0.01	0.008	0.006
Cu (bars)	0.75	0.83	0.69	0.75
ϕ(°)	3.38	2.72	3.38	5.20

The clay samples submitted to the triaxial and oedometer compressibility tests show that all the samples subjected with the undrained and unconsolidated triaxial test (UU) have a low to medium internal friction angle (φ), it's from 2° to 22°, cohesion values (C) less than 1 bar (0.4 to 0.83 bar), the constraint of pre consolidation (σc) has values between 1.20 to 3.10 bar; the coefficient of compressibility (Cc) reveals remarkable variations; it's from 0.13 to 0.24 and the swelling index (Cg) shows high values; it's between 0.05 to 0.1.

Therefore, the results obtained from the triaxial test (C, φ),on the one hand, are weak cohesion and internal friction angle for (UU) test, this is due to low percentage of the fine elements and to high percentage of sand. On the other hand, a weak cohesion and an average angle of internal friction, which due to high proportion of fine sand compared with clays [14, 16,36,37, 23] which proves that all the analyzed facies are medium to stiff and consistent clays [32, 38, 39]. The oedometric test results show a stiff clay consisting of over consolidated, moderately to highly compressible and medium to high swelling potential [14, 16,35, 40, 31, 23, 22]. The variations of these parameters confirm the heterogeneity of area soil[23].

3.3.2.2. Free swelling test

This test has been done only on Sidi-Boukhzar clays; after the determination of the optimum water content "w_{op} = 20.30%" and the maximum dry density "= 1.79g / cm^3", the results obtained are summarized in the following figure (Fig. 12)

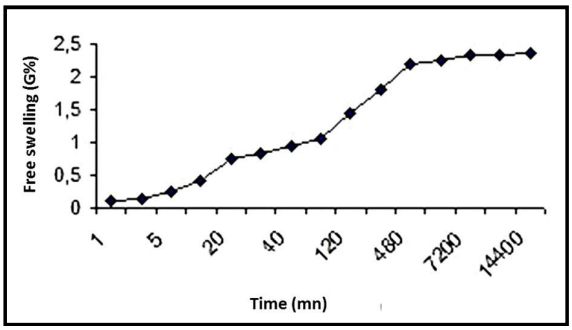


Figure 12: Evolution of free swelling [35]

From the figure, we note that at the beginning of saturation, the soil swells quickly and evolves from 1 to 480 minutes where the swelling rate reaches to 2.5%. After 480 minutes, the swelling stabilizes at 2.5%, which proves the swelling character of examined clays [14,35, 16].

So, the tendency of the sample to swell is neutralized by the application of an increasing load as soon as the vertical displacement reaches 1/100 mm. The value of the load when the sample is stabilized named the swelling pressure [41, 14, 35].

3.3.2.3. Chemical analysis

This analysis allows determining the clays chemical characteristics of Sidi-Boukhzar site. The results are summarized in the table below (Table 5).

Table 5: Results of Chemical analysis for Mila clays [29].

Chemical composition (%)	Site 1	Site 2	Site 3
SiO_2	40.51	43.67	46.30
Al_2O_3	11.13	15.54	13.46
FeO_3	5.03	7.73	6.51
CaO	16.54	10.93	11.77
SO_4	1.64	-	-
Na_2O	Trace	Trace	trace
M.O	0.20	0.15	0.20

The samples selected for the chemical analysis have been taken from various depths which are from 1 to 5 m (depth of foundation anchorage). The results obtained reveal mainly for the important parameters that the soil is clayey with low to medium sulphates content (1 to 3%) and low organic matter contents witch is from 0.15 to 0.20%.

These results show that Sidi Boukhzar soils are less rich in sulphates. Consequently are weakly aggressive to concrete [12, 42, 29]and the presence of these sulphates may have several origins, for example gypsum formation dissolution [43, 23, 44, 45]. Depending on the organic matter contents, these soils can be classified as weakly organic clays (less than 3%) with low to no aggressiveness [46].

4- CONCLUSION

The study area located on the northwest of Mila city is characterized by clays surmounting marl. The various analyzes carried out have given remarkable results.

The petrographic analysis of the samples proved different varieties of clayey rocks for both profiles. These varieties are presented by clays or marly clays and marl-sandy clays with a high rate of clays, better than 75%, a low rate of silica, less than 80% and low carbonates content.

The mineralogical analysis revealed that the Mio-Pliocene serie of Mila region shows abundance of calcium carbonates (calcite), quartz and gypsum (49%). Phyllitous minerals are mainly found in smectite (montmorillonite, vermiculite), relatively more crystalline kaolinite, interbedded (illite-montmorillonite, illite-chlorite and chlorite-montmorillonite) and the chlorite especially magnesian.

Sometimes the presence of fibrous minerals (palygorskite) is a good testimony of a relatively salty sedimentary environment. The presence of these swelling minerals makes the soil constructible with conditions.

All the geotechnical tests (Atterberg limits, water content ...etc.) show a medium to high swelling potential and a high plasticity of the clays. These parameters confirm that the soil of Mila region is building with conditions.

5. RECOMMENDATIONS

In the case of large swellings, it is recommended to treat clays in order to minimize or eliminate the swelling phenomenon. So, we have to minimize water in the soil to keep the foundations stable and protect structures under the repeated effect of this phenomenon driven by temperate climate type of the region.

Acknowledgements

We are most grateful to Dr. JELLID Youcef, SADINE Salah Eddine, BOURAS Noureddine and SEBAAI N.(university of Ghardaïa) for their assistance in the preparation of this article.

REFERENCES

1. Benguerai, A.,K., Benabdeli, 2017. Assessment of Soil Vulnerability to Water Erosion Using GIS and Remote Sensing in the atershed of Fergoug, North-West of Algeria. J. Appl. Environ. Biol. Sci., 7(3) :166-172.
2. Harjinder, S., G.S., Brar, G. S., Mudahar, 2016. Evaluation of the Characteristics of Masonry Bricks Containing Waste Fly Ash. J. Appl. Environ. Biol. Sci., 6(6) :1-7.
3. Benbrahim, F., M., Benslama,A., Kemassi, S., Darem,I., Hamel, F., Chikhi, M.T., Halilat, 2016. Évaluation de la durabilité de la céréaliculture sous pivot par l'étude de la salinisation du sol dans la région d'Ouargla. Ciencia Técnica Vitivinicola.,31(5) : 107-123.
4. Candide, L., 2012. Les glissements de terrain des versants côtiers du Pays d'Auge (Calvados) : Morphologie, fonctionnement et gestion du risque. Thèse de doctorat, université de Caen Basse-Normandie, 317p.
5. Forni, M., 1981. Fondations spéciale et reprise sous-œuvre. Edition Eyrolles, Paris, France, 184p.
6. Gaombalet, J., 2004. Le gonflement des argiles et ses effets sur les ouvrages souterrains de stockage. Thèse de doctorat, École Polytechnique, 326p.
7. Azzouz, F.Z., 2015. Stabilisation des sols argileux de la région de Tlemcen par les sels. Revue El Wahat pour les Recherches et les Études., 8(1) : 108- 117.
8. Benaissa, A., 2003. Glissement de terrain, calcul de stabilité. Edition O.P.U., (Alger), 95 p.
9. Bellatrache, Y., 2012. Comportement des argiles naturelles et traitées d'Ain Amenas en fonction de la teneur en eau. Thèse de Magister, Université Kasdi Merbah – Ouargla, 120p.
10. Athmania, D., 2010. Minéralogie des argiles et phénomène de retrait–gonflement dans le bassin de Mila (Nord Constantinois). Thèse Doctorat, Université de Constantine, 172 p.
11. Athmania, D., A., Benaïssa,M., Bouassida, 2011. Géologie et géotechnique de quelques formations superficielles du Nord-Ouest Constantinois, Algérie. Afrique Science., 07(1) : 105 – 115.
12. Afes, M., 1996. Contribution à la détermination des paramètres de gonflement des sols et étude de l'argile de Mila (Algérie) traitée à la chaux. Thèse de Doctorat, INSA de Lyon, 300p.
13. Afès, M.,G., Didier, 2000. Stabilisation des Sols Gonflants : Cas d'une Argile en Provenance de Mila (Algérie). Bulletin of Engineering and the Environnement., 59(1) : 75-83.
14. Khellaf, K., F., Zeroual N., Sebaai,W., Aziz 2015. L'effet de l'ajout du sable de Sidi Abd el Aziz (Jijel) sur le potentiel du gonflement des argiles de Mila (région d'el kherba). ElWahat pour les Recherches et les Études., 8(2) : 57 – 77.
15. Coiffait, P.E., 1992. Un bassin post- nappe dans son cadre structural : l'exemple du bassin de Constantine (Algérie Nord-Orientale). Thèse doctorat, Université de Nancy, 505p.

16. Khellaf, K., 2009. Cadre géologique, aspect pétro-minéralogique et géotechnique du complexe argilo-marneux de la région Nord-Ouest de la ville de Mila : Boufouh (Mila-Algérie Nord orientale). Thèse Magister, Université, Larbi Tébessi, Tébessa, 156p.
17. Chettah, W., 2009. Investigation des propriétés minéralogiques et géomécaniques des terrains en mouvement dans la ville de Mila « Nord-Est d'Algérie ». Thèse Magister, Université d'el Hadj Lakhdar – Batna –,177 p.
18. Siamak, M., S., Ehsan,S.M.R., Nasserzadeh, 2015. Analytical Study of Challenges and Barriers of Creation of Value through Information Systems in Management and Construction Processes of Projects by Contracting Firms in Tehran. J. Appl. Environ. Biol. Sci., 5(5) : 184-192.
19. Vatan, A., 1967. Manuel de sédimentologie. Éditions TECHNIP, 397p.
20. Khellaf K. Bitat F., 2006. Étude géotechnique et géologique du site des 185 logements (Mila) et proposition de solutions aux problèmes posés. Mémoire d'Ingéniorat, Université de Jijel, 110 p.
21. Lérau, J., 2005. Cours de géotechniques. Institut des sciences appliquées de Toulouse. France, 22p.
22. Souiki, S., 2007. Les argiles du bassin de Constantine-Mila : composition minéralogique, chimique et répartition des gisements. Thèse Magister, Université de Constantine, 129 p.
23. Hazmoune, H., 2008. Approches des études géotechniques liées à la pathologie des ouvrages : étude de cas des 185 logements de Mila. Thèse Magister, Université de Constantine, 86 p.
24. Hachichi, A., J.M., Fleureau, 1999. Caractérisation et stabilisation de quelques sols gonflants d'Algérie. Revue Française de Géotechnique., 86 (1) : 37-51.
25. Hachichi, A., A., Benaissa, S., Bourokba, M., Boudia, 2003. Étude de la stabilisation chimique des sols gonflants de la région d'Oran, Proc. 13th C.R.A. L'implication de la géotechnique dans le développement des infrastructures en Afrique, Marrakech, Marco. 8-11 Dec., pp 371-379.
26. Cordary, D., 1994. Mécanique des sols. Edition Lavoisier. Paris, 380 p.
27. Lebourg, T., 2000. Analyse géologique et mécanique des glissements de terrain dans des moraines de Pyrénées centrales et occidentales (France). Thèse doctorat. Université de Bordeaux, 360 P.
28. Amireche, H., 2001. L'eau, le substrat, la tectonique et l'anthropisation dans les phénomènes érosifs du Tell Nord Constantinois (Algérie). Thèse doctorat, Université de Mentouri- Constantine, 226 p.
29. Laboratoire Nationale de l'Habitat et de Construction, 2000. Rapport d'étude géotechnique complète du POS de Mila. Dossier 133/2000, O.P.G.I, de Mila, 23p.
30. Laboratoire de Géologie et de Géotechnique, 2010. Rapport d'étude géologique et géotechnique des 4000 places pédagogiques du centre universitaire de Mila. D.L.E.P., 26/ES/2010, 29p.
31. Philipponnat, G., 1979. Fondations et ouvrages en Terre. Edition Eyrolles, Paris, 402 p.
32. Philipponnat, G. B., Hubert, 2003. Fondations et ouvrages en terre. Edition Eyrolles, Paris, 548 p.
33. Dakshanamurthy, V., V., Raman, 1973. A simple method of identifying an expansive soil. Soils and Foundations. Japanese Soc. Of Soil Mech. And Foundation Eng., 13(1): 97-104.
34. Komornik, A., D., David, 1969. Prediction of swelling pressure of clays. Journal of Soil Mechanics and Foundation Engineering Division., 95 (1): 209-225.
35. Sebaai, N., W., Aziz, 2008. L'effet de l'ajout du sable de Sidi Abd el Aziz (Jijel) sur le potentiel de gonflement de l'argile d'el kherba (Mila). Mémoire d'ingéniorat, Université Sedik Ben Yahia, Jijel, p109.
36. Bouhenouna, A., 2008. Étude géologique et géotechnique de la digue principale K1 du barrage réservoir d'Oued El Kaïm, wilaya de Mila (Algérie). Thèse Magister, Université Sedik Ben Yahia, Jijel, 171p.
37. Zouaoui, S., 2008. Étude géologique et géotechnique des glissements de terrains dans le bassin néogène de Mila : glissement de Sibari. Thèse Magister, Université El Hadj Lakhdar, Batna, 172p.
38. Costet, J., G., Sanglerat, 1981. Cours pratique de mécanique des sols. Tome I - Plasticité et calcul des tassements. Edition Dunod, Paris, 339 p.
39. Norme Française NF P 94-074, 1994. Sols : Reconnaissance et Essais - Essai à l'appareil triaxial de révolution - Appareillage - Préparation des éprouvettes - Essais (UU) non consolidé non drainé - Essai (CU + U) consolidé non drainé avec mesure de pression interstitielle – Essai (CD) consolidé drainé.
40. Norme Française NF P 94-090-1, 1992. Sols: Reconnaissance et Essais - Essai oedométrique - Partie 1: Essai de compressibilité sur matériaux fins quasi saturés avec chargement par paliers.
41. Mokeddem, Y.,A., Berga, 2011. Caractérisation du Potentiel de Gonflement de l'Argile de la Région d'Abadla – Guir Lotfi. Journal of Science Research., 1(1) : 42-47.
42. Norme Française NF P 18-011, 1992.Sols : Reconnaissance et Essais – Classification des environnements agressifs. Homologuée Juin, 1992, Bull, liaison labo., P., et Ch., 190.
43. Zebouchi, H., 2008. Étude géologique et géotechniques des zones instables du versant Est du barrage de Beni Haroun. Wilaya de Mila. Thèse Magister, Université Sedik Ben Yahia, Jijel, 154 p.
44. Rollings, R.S., J.P., Burkes, M.P., Rollings, 1999. Sulfate Attack on Cement-Stabilized Sand, Journal of Geotechnical and Geoenvironmental Engineering., 125(5) : 364-372.
45. Norme Française NF P 94-047, 1998. Sols. Reconnaissance et Essais - Détermination de la teneur pondérale en matière organique – Méthode par calcination.
46. Laboratoire de Béton et de Mécanique de Sol, 2014. Rapport d'étude géotechnique, Plan d'occupation de sol № 9 Mila, (2ème et 3ème phase). Dossier 32/2012.

J. Appl. Environ. Biol. Sci., 8(2)23-30, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Formal Analysis of Coherent Non-Redundant Partition-based Motif Detection Algorithm for Data Visual Analytics

Sana Yasin[1], Tariq Ali[1], Umar Draz[1], Low Tan Jung[2], M. Ayaz Arshad[3]

[1]CS. Department, (CIIT)Sahiwal, Pakistan
[2]CIS. Department, UTP, Malaysia
[3]Communication & sensor center, UOT, KSA

Received: September 9, 2017
Accepted: December 1, 2017

ABSTRACT

Recently the interest in motif detection increased rapidly in the field of data visual analytics and bioinformatics. The significant improvement of motif detection in data visual analytics, but still many challenges are needed to overcome the issues for visual analytics applications. In most off the publishedwork, the focus is on motif detection as a solution of data visual analytics the role of motif detections and its functional non-functional requirements in the field of the large and complex network are still ignored. This paper introduces a proactive approach with the help of formal specification and analysis of partitioning motif detections algorithm (PMDA). In data visual analytics (DVA), we present a new model in data visual analytics with the use of VDM-SL to describe the formal specification of this algorithm to separate the non-redundant motifs from sparsely connected protein sequences. Various invariants are usedto validate the algorithm in all pre-post conditions confirm the correctness working of the proposed algorithm. VDM-SL is the formal specification language that is used for the implementation of a software system on detail level examination. The PMD algorithm specification is implemented, verified and validated with respect to syntactically and semantically through the VDM-SL toolbox.
KEYWORDS: Motif detection; DVA; PMDA; Verification & Validation; formal specification

I. INTRODUCTION

Data is growing rapidly in visual analytics the analysis of large grasps is playing a well-known role in various fields of visual analysis. Success full visual analysis of graph required appropriate visual presentation. It has captured the attention of public and media and researcher of the particular related field. Data visual analytics[1, 2] has successfullyreplaced the data analytics. A lot of application is present like visual semantic, a visual representation of information, visual decision trees, visual time critical model, concretive and perceptual sciences, and all interdisciplinary field of research due to some limitation in data analytic recently data visual analytics are introduced with some unique technique called motif detections. Basically, themotifis small connected sub-networks that are present inside the network and have to significantly display the higher frequency that would be expected for a random network. Motif has recently gathered attention as a concept to uncover the structure design and principles of complex biological networks [3, 4]. All the biological networks consist of proteins-proteins interaction PPI, DNA sequences, co-expression of genes, the basis of genes, human attraction pattern, DNA graph theory and neural networks. Many tools are used for detection the motifs in different networks. FANMODE is the tool for motif detection that uses for fast motif detections algorithm. In bigger and complex network to abstract the hidden information,FANMODE[5] is used many biological network use FANMODE due to its Rapid response for uncovering the structure design principle and biological networks[6]. The analytics of network motifs has to lead to very interesting result about the area of protein-protein interaction, hierarchal network decomposition, and analysis of temporal gene patterns. To find the motif in the network consists of three computationally sub-tasklike find out all the occurrence of subgraph as an input and in what number, secondly with of these graphs are isomorphic, and at the last, all subgraphexists in some random session with a higher number of repetition patterns[7].

The whole time that isused to spend to find the motif inside the network has thelarge contribution of the second subtask in which find out the topological equivalent isomorphic graph. In order to find the subgraph, the nonuniform network is considered. However, DVA also present in nonuniform fashion there for it is easy to detect the motif of these types of analytics. A topological layout is considered to make the proposed algorithm. The nature of the network is analogous and relative to the graph theory. All the vertices and edges are shows the relationship of data among each other and one another. For example, the vertices represent the data nodes which are assumed as data visual nodes and the edges perform as the relation between the data visual nodes. To find out the motif inside the network is assumed that the repetition of nodes and edges is present in the whole network.

The data visual analytics are yet unable to overcome many functional and operational challenges, particularly for critical and large-scale applications. A major reason is that a focus of today research is basically the performance evaluation of data visual

***Corresponding Author:** Sana Yasin, CS. Department (CIIT)Sahiwal, Pakistan. Email: sanayaseen42@yahoo.com

analytics with motif detections are simulation based. The simulationdoes not confirm the correctness approach which is very important In motif detections and data visual analytical system[4]. However, simulation ensures the qualitative performance of the system. Recently mathematical techniques like formal methods have been used for verification the function attributes of any system and in short the correctness of the approach. The basic function of the formal method transforms the informal to the formal requirement in terms of property and specifications. That's why PDMA is employed in this work to model the data visual analytics as a dynamic approach that transforms the associated formal specification using formal methods. In this work, formal method base technique means VDM-SL is employed as a formal specification language for the implementation of PMDA. The PMD algorithm is based on partitioning approach that first partition the whole data into two submodules with an equal number of repetition patterns. With the help of proposed algorithm motif is find out in each module and extract the hidden information in the form of motifs with a defined wide range of analytics[8, 9].

Up to our best knowledge this kind of work in the field of DVA in firstly described in the formal specification by using VDM-SL. The composite object, sets, operations and some static variables are used to describe the dynamic behaviors of the proposed algorithm. It is to be noted that every aspect of any kind of system can be formalized define with the help of VDM-SL notations.

The rest of this paper is organized as: section II discusses the critical related work and formal specification of the proposed PMDA represented in section III. High-level pseudo code and algorithm are described in section IV. The correctness of the proposed model and its analysis is discussed in section V. At the end conclusion are discussed in section IV.

II. RELATED WORK

The major challenge is to identify the repatriation patterns inside the network, graph or any type of interaction. Many characteristics patterns have enough information of the graph and network that resemble the whole hidden patterns. For example, the protein-protein interaction and DNA sequences have a large graph due to its large sequences. These large sequences do not easy to understand and difficult to translate the hidden information[10]. Many algorithms and techniques are in working stage [11-13]that elaborates the sequences in the form of Motif. Motif has enough information that is easy to understand the whole information and status of the graph. Motif detection is a complete phenomenon in which small cluster networks have large and concise information. To find the motif detection inside the network and any data visual analytics technique is much difficult. In [14] using the technique of motifs the system of active visual analysis for large graph aggregation is performed. To draw the useful insight relationship between graph motif detection technique plays our role. To enhance the graph layout by a graph analysis stage is a difficult task. It might be difficult to understand the hidden structures of the complex network, with motif graph analysis visualization the motif is easily detected the whole scenario that converts the theme of the complex network. The simulation result is shown the motif filtering is the best example to withdraw the complex information from inside the network. In [10] all the major principle and practices about the motif detection is discussed. To find the motif in the biological network there are three fundamental motif detection principles; for example, to find out the motif hierarchy, sub0graph frequency, graph isomerism, significance motif frequency, random graph, association graph and visualization of the graphs. In [15]motif algorithms are discussed for large expression of graphs. A large expression of graph usually presents the protein-protein interaction, co-expression of the genes, DNA sequences and neural networks. To deal these types of field-motif detection is so much beneficial for finding the correct graph patterns about the several or particular disease. All the application of the medical field is discussed in [14]. The working motif centric digital algorithm is presented in which all the function of motifs can be described in the digits form. To calculate about the how many patterns exist inside the network, to find out the how many motifs may be present, gene patterns, DNA bases structures, and the neural information is calculated through this algorithm. The possible graphical results shown are [16]. All the simulation is done with the help of NeMo finder and Mavisto algorithm[7, 17]. Through this technique easily built up the pattern growth tree in which all the particulate and relative information are present as leaf nodes. These sizes of motif also have a unique role to find out the best relationship between the motifs detection.

The Size of motifs is in the form of different patterns where the amount of data is easily available[18]. The neural networks, bioinformatics network where genes repeat our sequences and have repetition patterns. Theses repetition patterns further divide the isomerism scenario where one motif have enough information for one cluster. That is the reason for the large width range there in only need to find the only 2 to 3 motifs. In any repetition case study there is enough to detect the motif with only large range but have a small number of motifs information. The tabular form of the result is discussed[19]. All the challenges of visual data analytics can be removed with motif finding. In the dark and semantic web, there is a large scope of motif finding because all the information that consists of the dark web needs to extract with motifs.

A lot of application is present like information and geospatial analytics, scientific and statistical analytics, knowledge discovery and interaction of informatics, science and bioinformatics, data management, distributed management, presentation of a graph, production of graph and dissemination, cognitive and perceptual science are the major field of visual analytics. The details survey about this field is presented in [7]. The solution of financial data with the visual analytics technique is discussed in [20] in which the related current information is stored in the form of visual analytics. Today the age of big data, the handling of data is becoming the hot issue in which need to separate all the related and unrelated data. All the data-intensive application, challenges, application and related techniques are discussed in [16]. Due to the era of big data, there is enhancing the scope of motif

technique because the entire scene where the amount of data is present, the need of motifs is also increased. Toward the concept of uncovering structural design, the principle of network detection with motif technique also encourage. Among PPI networks, the motif detection technique is so much impressed due to the large and complex scenario of PPI networks. In this paper, the PPI networks are under observation in which find out the motif with the respective wide inclusive range. For experiments, the range of PPI networks can be considered with the zero background knowledge. At the end, the motif tells about the occurrence frequency and the respective range of data that present in PPI networks.[19, 21-23].

Most of the work in this domain is in simulation-based that have no ensured about either the simulation criteria is well suited to the problem. In other words, the proof of correctness is missing in all type of simulation-based work. So; therefore the formal method; due to its abstract and details level explanation of the particular work is used for this proposed approach. The model analysis gives the correctness of the work and all type of syntax and semantic is easily checked in VDM-SL Toolbox. Today the trend of a formal method is increased due to its vast application in every field of life, particularly in acritical system. Many of the work are already formalized in VDM-SL toolbox like formal verification of hybrid connectivity model are discussed in [24, 25]. Towards the formalism of earthquake detection and flood detection with the help of VDM-SL is presented in [25, 26]. To find the motif in its correct operation and alignment inside the network the formal methods play part and parcel role. In this paper; the formal specification of PMDA is used to convert the informal hierarchy of motif detection to the formal layout. This is the first work is done in this domain with the help of formalspecification as up to our best knowledge. At the end, the model analysis is also shown that give the true spirit of this proposed work.

III. MOTIF DETECTION ALGORITHM

This section represents the High-levelpseudo-codefor the motif detection in the structure of the protein that is frequently available in the sequences. It takes proteins sequence as an input and detects the redundant and non-redundant motifs in these sequences respectively. The nature of the algorithm is proactive so that the whole sequence is partition into two submodules.

Algorithm1. The pseudo code of **Partitioning Motif Detection Algorithm (PMDA)**

INPUT: *Set of related Proteins sequences*
OUTPUT: A coherent non-redundant set of motifs per initial input group

1. *Take the set of sequence A,B and C as an input.*
2. $\forall\ sequence\ setS_N for N = 1,2, \dots \dots n$
3. $\forall\ \big(SET\ OF\ SEQUENCES\ (X,Y)\big) \ni M \cong Sn\ \leftrightarrow M(x|y)$
4. *Partitioning sequence: X,Y/2=x || y*
5. $\boldsymbol{If}\ (\boldsymbol{x} \in (\boldsymbol{X},\boldsymbol{Y}) \&\& (Y \in (\boldsymbol{X},\boldsymbol{Y})\ \boldsymbol{Motif\ M_k\ for\ N = 1,2, \dots \dots n}$
6. *Motif Discovery (sequences) // Link each sequence with motif*
7. ***Else***
8. ***Motif doesn't discover***
9. $\forall\ Motif\ M_k\ for\ K = 1,2, \dots \dots n$
10. ***Redundant Motifs*** *(motifs);*
11. $\forall Redundant\ motif\ R_k forK = 1,2, \dots \dots n$
12. *While* R_k*<n Do* ***where*** R_k*=Redundant Motif, Do =Distribution motif*
13. *Split tree* $\boldsymbol{(R_{k \to M\ (x|y\ )}}$
14. ***If*** *Motif <enrichment score* ***than***
15. ***Refined-motifs*** $\boldsymbol{(R_{fK})}$
16. *Motif Integration(motifs)*
17. *This process continues until non-redundant motifs are discovered*
18. ***End While***
19. ***End if***
20. ***End For***

IV. FORMAL SPECIFICATION BY USING VIM-SL

This section presents the formal specification of detection of redundant and non-redundant motifs in proteins structure. Analysis of different motifs in the sequences is done to uncover the structure design and principles of complex biological networks. Various invariants are used to validate the algorithm in all pre-post conditions that confirm the correctness working of proposed

approach that is used to detect the motifs. This specification includes different types of composite objectsand some efficient, proactive operations that detect the best motifs successfully.

```
types
Motif=token;
sequence=token;
non-Redundant motifs=token;
Redundant motif=token;
Link_Type = <Link> | <Not_Link>
Type::motif:Motif
motif:Motif
inv mk_link(motif1,motif2) == motif1 <> motif2;
values
LIMIT:nat=600000;

state PROTEINS of
sequence:set of sequence
sequence _link:set of links
motif_link:set of links
inv mk_PROTEINS(sequence)== card sequence<=LIMIT
inv mk_PROTEINS(sequence,motif_links)
== forall links in set motif_link& link.motif1 in set motif and
link.motif2 in set motifs and forall moif in set sequence
init mk_PROTEINS(sequence)==sequence={}
end
```

Total sequence function returns the total number of sequences that are available for the detection of motifs. This function is very helpful for the motif detection because accurate sequence strength makes the detection process easy.

```
TotalSequences()total:nat
ext rd sequence: set of Motifs
pre true
post  total= card sequence;
```

Remove motifs function facilitate the user to remove some motif from the sequence of the protein. This function is very helpful to find out the best motifs from the sequence because it removes the unnecessary motifs from the sequences. Search motif function provides facility to the user to search out any motif that they want. To search the motifs from the sequence *motif id* is required to give input. This motif search function returns the motifs that are id is matched with the given id.

```
Remove motif (MotifIn:Motif)
ext wr sequence: set of Motifs
post sequence = sequence~ \ {MotifIn}
post dying motifblock= dying motifblock~ union {MotifIn};

Search_Motifs(motifIn:Motifs)query:bool
ext rd sequence: set of sequence
ext rd Motifs: set of Motifs
pre true
post query <=>motifIn in set motif;
```

Redundant motifs detection functions readout all the motifs and checks out the redundant motifs in the sequence. This function gives the Boolean results. It only tells either redundant motif is available in the sequence or not.
Non-redundant motifs work like the redundant motif detection function with a minor difference. Non-redundant motifs detection function returns the Boolean results against the non-redundant motifs and checks its availability in the sequence.

```
Redundant motifs_Detection(motifIn:Motif)query:bool
ext rd Redundant_motifblock: set of Motifs
pre true
post query <=>motifIn in set Redundant_motifblock;

UnRedundant motifs_Detection(motifIn:Motif)query:bool
ext rd unRedundant_motifblock: set of Motifs
pre true
post query <=>motifIn in set unRedundant_motifblock;
```

These two functions create the source and destination motifs in the structure of the protein. Create source motif function take *motif id* as an input and declare it as a source node. Create *destination motif* function take *motif id* as input and declare it as a destination motif. Both these functions are very helpful to establish communication within the motifs. Through these two functions, theseparate biological network can be established that will be able to do communication between the motifs only. The message or control that will be sent by the source motif will be received at the destination motifs.

```
create_source_motif(MotifId:Motif)
ext wr sequence: set of Motifs
pre NetIn not in set sequence and card sequence <1
post sequence= sequence~ union {MotifIn};
post source= source~ union {MotifIn};

create_destinationmotif(MotifId:Motif)
ext wr sequence: set of Motifs
pre NetIn not in set sequence and card sequence <1
post sequence= sequence~ union {MotifIn};
post destination= destination~ union {MotifIn};
```

This function returns the total number of motifs in the sequence that is very helpful to establish communication within the motifs. It helps the user to define the source and destination motifs in the sequence. The user can declare the first detected motif as a source motif and last detected motif as destination motifs.

```
Total_Motif ()output:nat
ext rd Motifs: set of Motifs
pre true
post output=card(Motifs);

Find_Best_Motifs()output:set of Motifs
ext rd Motifs: set of Motifs
pre true
post  total= Best_Motif;
```

Motifs *links function* creates the link between the motifs. This function firstly takes the source motif and its neighboring motifs as an input and creates the link between them. It continues the process of linking till the last destination motif is connected.

```
Motifs_links(source_motif:motif,destination_motifs:motif)


create_link::source_motif:motif
destination_motif:motif;

inv mk_link(source_motif,destination_motif) == source_motif<>destination_motifs
```

V. MODEL ANALYSIS

To check the correctness, consistency and its integration of the proposed algorithm the VDM-SL toolboxwindow is used. VDM-SL provides the platform in this regard that ensures all the correctness of proposed algorithm [27]. The VDM-SLtoolboxprovides

support to check all the related invariants in a different mode. To check all the composite objects, state, function, and operations the VDM-SL checking window provide the syntax check, type check, pretty and integrity check. All the simulation work does not provide the correctness of the model, technique, and algorithm but formal methods are enough flexible and give the proof of the proposed technique or algorithm that is design inside the tool,box. Table 2 describes the verification of the model against all related possible function. It ensures that the proposed algorithm PMDA specification is correctly verified and validated. Table 1 describes the proposed algorithm and its state, function, structures and its operation is well organized in the VDM-SL toolbox. It has been observed that from figure 1 and 2 is the proof of correctness that the proposed algorithm is successfully implemented without any syntax and semantic error.

TABLE 1: ANALYSIS OF STATE, FUNCTIONS, AND OPERATIONS

Composite object, State, Function, and Operations	*Syntax Check*	*Type Check*	*Pretty Check*	*Integrity Check*
Object	Yes	Yes	Yes	Yes
Abstract Motif	Yes	Yes	Yes	Yes
Protein sequence	Yes	Yes	Yes	Yes
Partitioning sequence	Yes	Yes	Yes	Yes
Gapped sequence	Yes	Yes	Yes	Yes
Un-gapped sequence	Yes	Yes	Yes	-
Functions	Yes	Yes	Yes	-
Diagrams & analysis	Yes	Yes	Yes	-
Alternative ID	Yes	Yes	Yes	-
Motif ID	Yes	Yes	Yes	-
Partition and its attributes	Yes	Yes	Yes	-
Protein-protein sequence	Yes	Yes	Yes	Yes
Values/attributes	Yes	Yes	Yes	Yes
Strands	Yes	Yes	Yes	Yes
Motif pair detection	Yes	Yes	Yes	Yes
Location of motifs	Yes	Yes	Yes	Yes
Execution	Yes	Yes	Yes	Yes
Pre/post conditions	Yes	Yes	Yes	-
Validation and verification	Yes	Yes	Yes	-

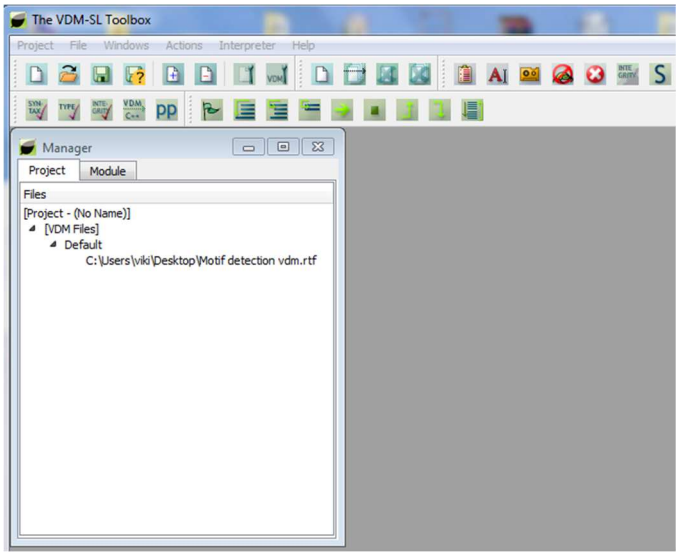


Figure 1: Loading of the project

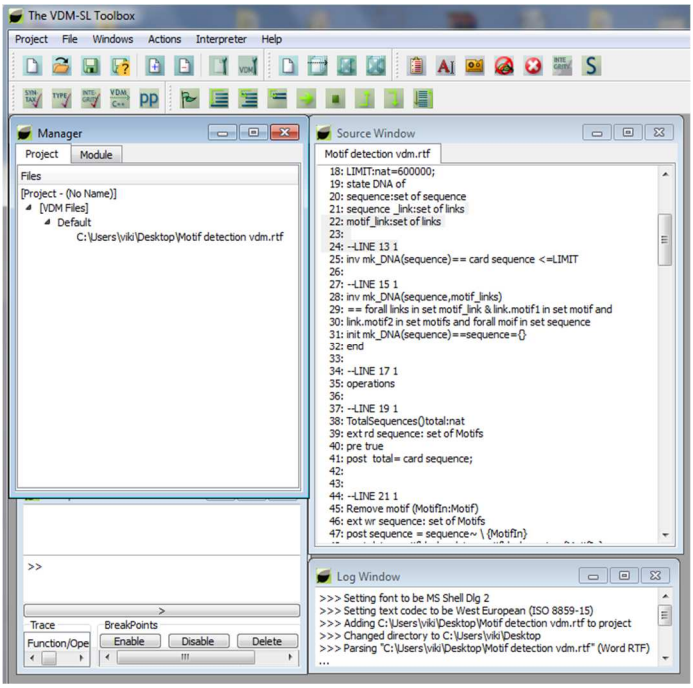


Figure 2: Snapshot of model analysis

VI. CONCLUSION

Data is growing rapidly in visual analytics the analysis of large grasps is playing a well-known role in various fields of visual analysis. In most off the publishedwork, the focus is on motif detection as a solution of data visual analytics the role of motif detections and its functional non-functional requirements in the field of the large and complex network are still ignored. This paper introduces a proactive approach with the help of formal specification and analysis of partitioning motif detections algorithm (PMDA). In data visual analytics (DVA), we present a new model in data visual analytics with the use of VDM-SL to describe the formal specification of this algorithm to separate the non-redundant motifs from sparsely connected protein sequences. Various invariants are used to validate the algorithm in al pre-post conditions confirm the correctness working of the proposed algorithm. VDM-SL is the formal specification language that is used for the implementation of a software system on detail level examination.

Up to our best knowledge this kind of work in the field of DVA in firstly described in the formal specification by using VDM-SL. The proposed PMD algorithm is successfully separate the non-redundant motifs from redundant one in a large sparsely connected proteins sequences. With little bit modification, this algorithm is implemented in any type of scenario where the separations of two modules are required. Through formal methods, it is possible to make the type of algorithm that helps us in the field of big data and data visual analytics technique.

VII. REFERENCES

1. Keim, D.A., et al., *Visual analytics: Scope and challenges*, in *Visual data mining*. 2008, Springer. p. 76-90.
2. Thomas, J.J. and K.A. Cook, *A visual analytics agenda.* IEEE computer graphics and applications, 2006. **26**(1): p. 10-13.
3. Saxton, W. and J. Frank, *Motif detection in quantum noise-limited electron micrographs by cross-correlation.* Ultramicroscopy, 1976. **2**: p. 219-227.
4. Vahdatpour, A., N. Amini, and M. Sarrafzadeh. *Toward Unsupervised Activity Discovery Using Multi-Dimensional Motif Detection in Time Series*. in *IJCAI*. 2009.
5. Wernicke, S. and F. Rasche, *FANMOD: a tool for fast network motif detection.* Bioinformatics, 2006. **22**(9): p. 1152-1153.
6. Andrienko, G., N. Andrienko, and S. Wrobel, *Visual analytics tools for analysis of movement data.* ACM SIGKDD Explorations Newsletter, 2007. **9**(2): p. 38-46.

7. Wong, E., et al., *Biological network motif detection: principles and practice.* Briefings in bioinformatics, 2011. **13**(2): p. 202-215.
8. Steed, C.A., et al., *Big data visual analytics for exploratory earth system simulation analysis.* Computers & Geosciences, 2013. **61**: p. 71-82.
9. Marchal, K., et al., *Genome-specific higher-order background models to improve motif detection.* Trends in microbiology, 2003. **11**(2): p. 61-66.
10. Kayastha, S., et al., *Privileged Structural Motif Detection and Analysis Using Generative Topographic Maps.* Journal of Chemical Information and Modeling, 2017. **57**(5): p. 1218-1232.
11. MacEachren, A.M., *Leveraging Big (Geo) Data with (Geo) Visual Analytics: Place as the Next Frontier*, in *Spatial Data Handling in Big Data Era*. 2017, Springer. p. 139-155.
12. Munshi, A.A. and Y.A. Mohamed. *Cloud-based visual analytics for smart grids big data*. in *Innovative Smart Grid Technologies Conference (ISGT), 2016 IEEE Power & Energy Society*. 2016. IEEE.
13. Nguyen, Q.V., et al., *Special issue on Big Data Visual Analytics*. 2017, Elsevier.
14. Zhou, Z., et al. *The Motif Detection of Turning Points in Stock Time Series*. in *International Conference on Mechatronics and Intelligent Robotics*. 2017. Springer.
15. Viégas, F.B. and M. Wattenberg. *Artistic data visualization: Beyond visual analytics*. in *International Conference on Online Communities and Social Computing*. 2007. Springer.
16. Chen, Y. and Y. Chen, *An Efficient Sampling Algorithm for Network Motif Detection.* Journal of Computational and Graphical Statistics, 2017(just-accepted).
17. Schreiber, F. and H. Schwöbbermeyer, *MAVisto: a tool for the exploration of network motifs.* Bioinformatics, 2005. **21**(17): p. 3572-3574.
18. Thomas-Chollier, M., et al., *RSAT peak-motifs: motif analysis in full-size ChIP-seq datasets.* Nucleic acids research, 2011. **40**(4): p. e31-e31.
19. Milo, R., et al., *Network motifs: simple building blocks of complex networks.* Science, 2002. **298**(5594): p. 824-827.
20. Atay, Y. and H. Kodaz, *Network motif detection in PPI networks and effect of R parameter on system performance.* International Journal of Applied Mathematics, Electronics and Computers, 2016. **4**(3): p. 78-82.
21. Mangan, S. and U. Alon, *Structure and function of the feed-forward loop network motif.* Proceedings of the National Academy of Sciences, 2003. **100**(21): p. 11980-11985.
22. Prokop, J.W., *Functional Motif Discovery in Signaling Biology Using a Deep Sequence-to-Structure-to-Function Analysis.* The FASEB Journal, 2016. **30**(1 Supplement): p. 969.31-969.31.
23. Prytuliak, R., et al., *HH-MOTiF: de novo detection of short linear motifs in proteins by Hidden Markov Model comparisons.* Nucleic Acids Research, 2017.
24. Imran, M. and N.A. Zafar, *Formal specification and validation of a hybrid connectivity restoration algorithm for wireless sensor and actor networks.* Sensors, 2012. **12**(9): p. 11754-11781.
25. Zafar, N.A., *Formal specification and validation of railway network components using Z notation.* IET software, 2009. **3**(4): p. 312-320.
26. Afzaal, H., et al. *Battlefield surveillance formalism using WSANs*. in *Electrical Engineering (ICEE), 2017 International Conference on*. 2017. IEEE.
27. Afzaal, H., N.A. Zafar, and F. Alhumaidan, *Hybrid subnet-based node failure recovery formal procedure in wireless sensor and actor networks.* International Journal of Distributed Sensor Networks, 2017. **13**(4): p. 1550147717704417.

J. Appl. Environ. Biol. Sci., 8(2)31-36, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Design of Integrated Sanitation Facilities in Bojonegoro

Bungku Susilowati* and Eddy S. Soedjono

Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Sepuluh Nopember Institute of Technology Surabaya

Received: October 6, 2017
Accepted: December 21, 2017

ABSTRACT

The availability of land in accordance with the location criteria for sanitation infrastructure development was important. Because the location of inappropriate land has caused the built-up infrastructure to be useless. Land acquisition by the District Government should be carried out appropriately, although it might be possible for land acquisition costs as a consequence of sustainable development. The problem of land availability was the background of the study of sanitation infrastructure development integration on one land in Bojonegoro Sub District of Indonesia. Land use was maximally used for Solid Waste Treatment Facilityand Solid Waste Bank on above the basement, and basement was used as Wastewater Treatment Plant (WWTP). Development planning was carried out with literature review and policies that govern the design criteria of planning. The results of the study in 11 urban villages in Bojonegoro Sub District were five urban villages that did not have sanitation facilities, namely Klangon, Kepatihan, Mojokampung, Karangpacar and Ledok Wetan. Land requirement in each village was ± 600 m2, and land acquisition was required. The result of technical calculation in Karangpacar Urban Village, has been found that the land area for Solid Waste Treatment Facility and Solid Waste Bank with service area of 1 village is ± 600 m2. Furthermore, the basement of the Solid Waste Treatment Facility, covering an area of ± 60 m2 was utilized for WWTP with Anaerobic Baffle Reactor (ABR) system, with a processing capacity of 400 home connection.

KEYWORDS: Location Criteria, Solid Waste Treatment Facility, Wastewater Treatment Plant, Solid Waste Bank

INTRODUCTION

As per 2030 in the Sustainable Development Goals (SDGs) milestone, each country was expected to be able to realize 100% Sanitation Access for its inhabitants (Goal # 6). Indonesia has placed its initial target of achievement at the end of 2019 as mandated by the RPJMN 2015 – 2019 [1]. Bojonegoro sub-district was the administrative center of Bojonegoro District with the condition of waste management with domestic coverage of household waste service non-transported settlement areas to Solid Waste Transfer Facility or Sanitary Landfill less than 2 times a week, averaging ± 35% [2]. And waste management with a 3 R (reuse, reduce and recycle) system is only about 0.5%, is expected to be 10% in the short term, in the medium term to 30% [3]. Furthermore, for wastewater management in the Bojonegoro sub-district is mostly mixed between domestic sewerage channel and environmental drainage, with an average of 85.89% [2]. The Bojonegoro District Government target for Bojonegoro District in its long-term wastewater system is planned to develop a medium-density off-site waste water system [3].

The availability of land was important in any infrastructure development, including in sanitation infrastructure. The various problems that have occurred in the provision of land for the construction of sanitation infrastructure this sector has hampered the achievement of the Government target 100 - 0 - 100 in 2019 [4]. Coordinating Minister for Economic Affairs Darmin Nasution has said the problem of land acquisition has dominated the cause of infrastructure development, reaching 44 percent of reported problems [5].Based on Regulation of Minister of Public Works and Public Housing No. 33 Year 2016, about Planning and Programming Mechanism and Implementation of Infrastructure Development for Sanitary Sector, location for wastewater infrastructure and location of area-scale waste management activities must already exist in the planned area [6]. Therefore, the integration study of sanitation infrastructure development on one land was expected to utilize one field for three sanitation infrastructure, namely Solid Waste Treatment Facility, Wastewater Treatment Plant (WWTP) and Solid Waste Banks. The land that was used as the location of the study was the land that complies with the location criteria based on the existing Standard of Regulations and Policies (NSPK) [7].

Problems of land availability and the achievement of targets in the field of sanitation was the background of this Integrated Infrastructure Development Study on One Area District Bojonegoro. This research was expected to be a reference for the Government of Bojonegoro Regency in planning and programming and implementing the development and management of sanitary infrastructure in one land.

***Corresponding author:** Bungku Susilowati, Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Sepuluh Nopember Institute of Technology Surabaya, email:bungku00@gamil.com

Location criteria for Solid Waste Treatment Facility, WWTP and Solid Waste Bank based on the regulations governing them will be used as reference in analyzing suitable land. The results of the literature study of these regulations, can be summarized matters related to service coverage, land area and site criteria of each sanitation infrastructure, as shown in Table 1.

Table 1. Integration of Sanitation Infrastructure Development

Sanitation Infrastructure	Regulation	Service Coverage	Land Area	Location Criteria
Solid Waste Treatment Facility	Regulation of the Minister of Public Works and People's Housing No.03/2013	At least 400 families	At least 200 m^2	Radius 1 km from service area
WWTP	Regulation of the Minister of Public Works and Public Housing No.04/2017	20 - 50,000 (soul)	Appropriate choice of processing technology	Adjacent to the service area
Solid Waste Bank	Regulation of the Minister of Environment No.13/2012	At least 1 Village (>500 Families)	At least 40 m^2	Can be integrated with 3R

METHODS

Study Area

The research was conducted in Bojonegoro Sub-district, with study locations in 11 urban villages, that are: Jetak, Sumbang, Klangon, Kepatihan, Mojokampung, Kadipaten, Ngrowo, Karangpacar, Banjarjo, Ledok Wetan, and Ledok Kulon Villages. Calculation example of Solid Waste Treatment Facility, WWTP, and Solid Waste Banks, one village was chosen based on technical criteria and recommendation from related institution.

Methods

The method used in this research was quantitative research method. The study used numerical data as a tool to analyze information about what you want to know. The data required in the study were obtained through literature study (secondary data), and survey and interview (primary data). The literature study was carried out by reviewing the Government regulations governing the criteria for the location of sanitation infrastructure development. Criteria for Solid Waste Treatment Facility based on Minister of Public Works Regulation No.3 Year 2013 [8]. Further criteria for WWTP based on Regulation of Minister of Public Works and People's Housing No. 4 Year 2017 [9]. And the criteria of Solid Waste Bank based on Regulation of the Minister of Environment No. 13 Year 2012 [10]. The method of studying the integration of infrastructure development was as shown in Figure 1.

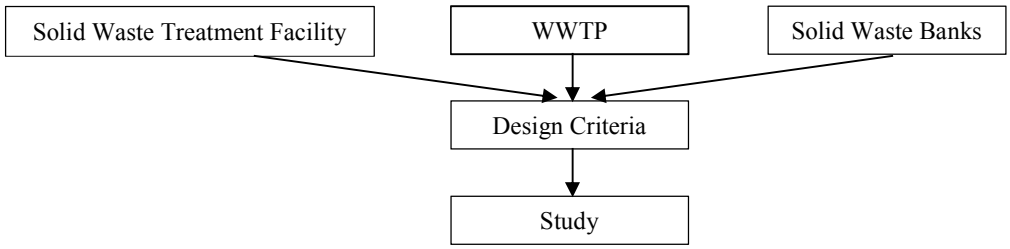


Figure 1. Method of Integration Review

Further surveys and interviews were conducted in the study sites to collect the necessary data. Survey results and interviews were analyzed to determine the condition of waste and waste water management in each urban village. The results of the analysis of sanitation management conditions will be generated villages which require sanitation infrastructure development. The next stage was that the urban villages were analyzed to determine the location of selected land based on the location criteria. Subsequently, one urban village was chosen based on related recommendations. Selected urban village will be analyzed to determine the development planning of Waste Material Facilities and Waste Banks on the upper land, and WWTP on the lower land.

RESULTS AND DISCUSSION

Land for Site Development Plan

Surveys have been conducted in Bojonegoro District, at 11 (eleven) urban villages. Based on the results of the head of urban village interviews in the 11 (eleven) urban villages, it has been analyzed that the wastewater

and waste management conditions in each kelurahan are shown in Table 2. There were still 5 (five) urban villages that did not have Solid Waste Treatment Facility, namely Klangon, Kepatihan, Mojokampung, Karangpacar and Ledok Wetan.

Table 2. Condition of Wastewater and Solid Waste Management in Bojonegoro Sub-district

Village	Management of Domestic Wastewater		Solid Waste Management	
	Number of WWTP	Information	Number of Solid Waste Transfer Facility & Solid Waste Bank	Information
Jetak	1 WWTP with 70 home connections	The rest is still mixed with drainage channels	1 Solid Waste Transfer Facility	No Solid Waste Bank yet
Sumbang	1 WWTP with 60 home connections	The rest is still mixed with drainage channels	1 Solid Waste Transfer Facility& 1 Solid Waste Bank	Solid Waste Transfer Facility is used by other sub-districts as well
Klangon	1 WWTP with 150 home connections	The rest is still mixed with drainage channels	1 Solid Waste Bank	Solid Waste Transfer Facility participates with other Village
Kepatihan	1 WWTP with 60 home connections	The rest is still mixed with drainage channels	1 Solid Waste Bank	Temporary Waste Shelter participates with other Village
Mojokampung	1 WWTP with 67 home connections	The rest is still mixed with drainage channels	There is no Solid Waste Transfer Facility & Solid Waste Bank	Solid Waste Transfer Facility participates with other Village
Kadipaten	1 WWTP with 100 home connections	The rest is still mixed with drainage channels	2 Solid Waste Transfer Facility & 1 Solid Waste Bank	Solid Waste Transfer Facility is used by other sub-districts as well
Ngrowo	1 WWTP with 150 home connections	The rest is still mixed with drainage channels	1 Solid Waste Transfer Facility& 1 Solid Waste Bank	Solid Waste Transfer Facility is used by other sub-districts as well
Karangpacar	1 WWTP with 90 home connections	The rest is still mixed with drainage channels	There is no Solid Waste Transfer Facility & Solid Waste Bank	Solid Waste Transfer Facility participates with other Village
Banjarjo	1 WWTP	The rest is still mixed with drainage channels	1 Solid Waste Treatment Facility	No Solid Waste Bank yet
Ledok Wetan	1 Public Toilet	The rest is still mixed with drainage channels	There is no Solid Waste Transfer Facility & Solid Waste Bank	Solid Waste Transfer Facility participates with other Village
Ledok Kulon	4 WWTP	The rest is still mixed with drainage channels	1 Solid Waste Transfer Facility& 1 Solid Waste Bank	Solid Waste Transfer Facility is used by other sub-districts as well

Furthermore, it was analyzed related to the availability of land to be the location plan of Solid Waste Treatment Facility development, WWTP and Solid Waste Bank, as shown in Table 3. Location of the land in the five urban villages can be seen in Figure 2.

Table 3. Land Availability for Study Sites

Village	Land for TPS 3R, IPALD-T Settlement & Garbage Bank			
	Location Criteria	Land Location	Land Area	Land Status
Klangon	Adjacent to the residential area	Irigasi Walkway	± 600 m^2	Land acquisition is required
Kepatihan	Adjacent to the residential area	Dr. Soetomo Street	± 600 m^2	Land acquisition is required
Mojokampung	Adjacent to the residential area	Ma'ruf Walkway	± 600 m^2	Land acquisition is required
Karangpacar	Adjacent to the residential area	Kuncoro 2 Walkway	± 1500 m^2	Land acquisition is required for road access
Ledok Wetan	Adjacent to the residential area	K. H. Mansyur Street	± 600 m^2	Land acquisition is required

(a). Klangon(b). Kepatihan

(c). Karangpacar **(d). Ledok Wetan** **(e). Mojokampung**

Figure 2. Location of The Land in Five Urban Villages (a) Klangon, (b) Kepatihan, (c) Karangpacar (d) Ledok Wetan, and (e) Mojokampung

The results of analysis in five urban villanges selected Karangpacar Village as study location for calculation of Solid Waste Treatment Facility, WWTP and Solid Waste Bank. This election was based on the recommendation of urban villange preparedness, which has proposed the construction of WWTP at the location in deliberation of urban village development plans.

Solid Waste Treatment Facility and Solid Waste Bank Planning in Karangpacar Urban Village, Bojonegoro Sub-district

Solid Waste Treatment Facility inKarangpacarUrban Villange planned to serve one urban villange, with service area according to administrative boundary Karangpacar Village. Determination of service area based on location criteria at Ministry of Public Works No.03 of 2013 and Handbook of Practical Implementation of TPS 3R [11]. The amount of waste generation is calculated based on the projected population up to 2027 [12]. The amount of waste generation in Bojonegoro sub-district is 2.5 liters / person / day and garbage service reaches 100% of the population, then the projection of waste generation that will be entered into Solid Waste Treatment Facility in 20127 is 13.810 liters / day = 13.81 m3 / day ~ 14 m3 / day.

Based on data on recovery factor [13] and data of waste generation along with its service coverage, it can be calculated recyclable waste and residual waste that will enter Sanitary Landfill with assumption of solid waste composition was as follows in Table 4.

Table 4. Weight of Recyclable Solid Waste Components & Residues

Component	Composition (%)*)	Weight of Solid Waste (kg/day)	Recovery Factor **)	Potential Recycling (kg/day)	Residual Weight (kg/day)
Organic Materials	75%	3035,34	80%	2428,27	607,07
Paper	8%	323,77	40%	129,51	194,26
Glass	1%	40,47	70%	28,33	12,14
Plastic	7%	283,30	50%	141,65	141,65
Cans / Metal	2%	80,94	80%	64,75	16,19
Etc	7%	283,30	-	-	283,30

Source: * Environment Agency of Bojonegoro Regency
**** [13]**

The land needs analysis was calculated based on the amount of waste generation, garbage composition, recovery factor, mass balance, and waste processing at TPS 3R, which was shown in Table 5.

Table 5. Solid Waste Treatment Facility and Solid Waste Bank

Main Facility	Land Area (m2)
Reception & sorting	47
Storage of stalls	45
Composting	340
Leachate shelter	1
Place of residue / container	19
Total Main Facility	452
10% Total Primary Facility	45,2
Supporting Facilities	50
Room Buffer Zone	50
Total Land Requirements	± 600

Implementation of the Reduce, Reuse, Recycle (3R) principle as close as possible to the source of waste was also expected to solve the waste problem in an integrated and comprehensive manner, so that the ultimate goal of the Indonesian Waste Management policy can be properly implemented [14]. Therefore, the location of Solid Waste Treatment Facility was integrated with Solid Waste Bank. In Table 5 there are storage facilities for stalls and supporting facilities in the form of offices, this facility has accommodated the space requirement of Solid Waste Treatment Facility and Solid Waste Bank.

Planning IPALD-T Settlement in Karangpacar Village, Bojonegoro District

Impaired environmental conditions especially in densely populated and coastal areas was due to poor sanitation management and irrelevant used of local sanitation systems in densely populated low-cost areas. These conditions result in environmental pollution, especially water and soil pollution which will then be given special treatment through wastewater management technology with communal system [15]. The centralized processing system becomes the main alternative because local processing systems such as the existing septic tank technology in the community werw generally rarely depleted after more than 15 years of operation, indicating a leak in the tank [16]. Alternative wastewater treatment technology selected was processing using an anaerobic system, whose construction was underground, namely Anaerobic Baffled Reactor (ABR).

Furthermore, WWTP area covered Neighborhood Association.7, 9, 10, 11, 12, 13, 14, 15. The service area was determined based on the ease of construction of its waste water distribution network provided that it was still within the administrative area of the Village. Topography became a very important consideration, because it determines the direction of flow and WWTP design.The calculations used the design criteria from Sasse et al [17]. Based on the result of laboratory test on waste water to be processed, obtained COD value 212 mg/L, BOD 123 mg/L and TSS 112 mg/L. Wastewater parameters to be treated have been included in the domestic wastewater value range of BOD 121 - 151 mg/L and COD 700 - 700 mg/L [18]. WWTP is planned to serve 400 house connections with a population of ± 1,600 inhabitants. Use of clean water = 126 l / org / day.

Based on the design criteria and data above, land requirement for WWTP in Karangpacar Urban Village can be determined. The length of ABR @ 1.5 m with the number of compartments of 11, totaled length of 16.5 m. The width of ABR was 2.5 m so that the area of ABR is 41.25m2. Before entering the ABR, the wastewater went to the settling basin with the depth and width of the tub following the depth and width of the ABR compartment of 2.5 m. So as to get the length of the settling tub was 4.5 m. Construction of WWTP was placed under the wastepaper storage area of the Solid Waste Bank and the compost storage warehouse of Solid Waste Treatment Facility.

Domestic wastewater treatment process with the above planning design was analyzed, to know the concentration of BOD, COD and TSS effluent. The results of the analysis produced astable effluent [19] that has met the wastewater quality standard permitted to be discharged into river water bodies [20], shown in Table 6.

Table 6. Treatment of Domestic Wastewater from Planning Results WWTP in Karangpacar Urban Village

Parameter	Influent Settler	Efficiency Settler	Effluent Settler (Influent ABR)	Efficiency ABR	Effluent ABR	Domestic Wastewater Quality Standard *
BOD	123	37,85%	82,82	76,01%	19,87	30
COD	212	35,71%	146,67	68,24%	46,59	100
TSS	112	-	112	80%	22,4	30

Source: * Regulation of the Minister of LHK No. 68 of 2016

CONCLUSIONS

Bojonegoro Sub-district consisting of 11 urban villages, there were still 5 urban villages that did not have a Solid Waste Transfer Facility, namely Klangon, Kepatihan, Mojokampung, Karangpacar and Ledok Wetan. Land for the sanitation infrastructure location in the five urban villages was planned to be located near the settlement, in accordance with the technical criteria.

Land utilization was integrated with sanitation infrastructure development planned in Karangpacar Urban Village, Bojonegoro Sub-district. The planned sanitation facilities on the land, that was the above basement was planned for Solid Waste Treatment Facility and Solid Waste Bank with service area of one urban village. Land area required ± 600 m2. The location of the land was located near the settlement and in the middle of the urban village, in accordance with the location criteria of Solid Waste Treatment Facility, which had a maximum distance of 1 km from the service area. Basement was planned for WWTP using Anaerobic Baffle Reactor (ABR) processing technology. WWTP wasplanned to serve ± 400 home connections. WWTP with land requirement ± 60 m2, placed under storage areas and compost storage warehouses.

REFERENCES

[1]. Government of the Republic of Indonesia. (2015). Presidential Regulation No. 2 Year 2015 on RPJMN 2015 -2019. Jakarta.

[2]. The Government of Bojonegoro Regency. (2016). City Without Slum (KOTAKU) Profile of Bojonegoro Subdistrict Settlement Bojonegoro Regency 2016. Bojonegoro: Bapeda Bojonegoro District.

[3]. Bojonegoro District Sanitation Working Group. (2015). Bojonegoro District Sanitation Strategy 2015-2019. Bojonegoro.

[4]. Istijono, B. (2014). Land Became a Barrier Factor In Implementing Development For Public Interest. Journal of Civil Engineering Volume 10 No.2 (October 2014) 52-59.

[5]. www.koran-jakarta.com. (2017). Infrastructure Development Is Constrained by Land Problems. Science Direct.

[6]. Ministry of Public Works and People's Housing. (2016). Regulation of the Minister of Public Works and Public Housing No. 33 / PRT / M / 2016 on Planning and Programming Mechanisms and Implementation of Infrastructure Infrastructure Sanitation. Jakarta.

[7]. Ministry of Public Works and People's Housing. (2016). PLP Field Policy and Strategy. Jakarta.

[8]. Ministry of Public Works. (2013). Regulation of the Minister of Public Works No. 03 / PRT / M / 2013 on the Implementation of Infrastructure and Solid Waste Facility in the Handling of Household Wastes and Garbage of Similar Household Waste. Jakarta: Ministry of Public Works.

[9]. Ministry of Public Works and People's Housing. (2017). Regulation of the Minister of Public Works and People's Housing No. 04 / PRT / M / 2017 on the Implementation of the Domestic Wastewater Management System. Jakarta.

[10]. Ministry of Environment. (2012). Regulation of the Minister of Environment Number 13 Year 2012 on Guidelines for the Implementation of Reduce, Reuse and Recycle Through Waste Bank. Jakarta.

[11]. Directorate General of Human Settlements. (2017). TPS Technical Guidelines 3R 2017. Jakarta.

[12]. Central Bureau of Statistics of Bojonegoro Regency. (2016). Regency of Bojonegoro In Figures. Bojonegoro: Central Bureau of Statistics Bojonegoro Regency.

[13]. Tchobanoglous, Theisen, & Vigil. (1993). Integrated Solid Waste Management. Singapore: McGraw-Hill.

[14]. Suryani, A. S. 2014. The Significance of Waste Bank in Waste Management Effectiveness. Center for Assessment, Data Processing and Information (P3DI) Secretariat General DPR RI Volume 5 (June 2014) 52-84.

[15]. Soedjono, Eddy.S. & Damayanti, Alia. (2016) “Evaluation Review and Development Plan of Communal Sanitation System Technology in Gresik Regency, East Java ", PUPTN.

[16]. Soedjono, Eddy.S, Teguh Wibowo, Sarityastuti Santi Saraswati & Cees Keetelaar, (2010) “Reference Book of Sanitation Systems and Technology Options ", Sanitation Development Technical Team (TTPS).

[17]. L Sasse, B. Gutterer, T. Panzerbieter, and T. Reckerzugel, (2009) "Decentralized Wastewater Treatment System and Sanitation in Developing Countries", UK.BORDA.

[18]. Suoth, A.E. & Nazir, E. (2016). Characteristic of Domestic Waste Water (gray water) In One Of Mid Level Residential Area In South Tangerang. Ecolab Volume 10 No.2 (July 2016) 80-88.

[19]. Mangkoedihardjo, S. (2007). Phytotechnology integrity in environmental sanitation for sustainable development. Journal of Applied Sciences Research, 3(10): 1037-1044.

[20]. Ministry of Environment and Forestry. (2016). Regulation of the Minister of Environment and Forestry No. 68 of 2016 on the Quality Standards of Domestic Waste Water. Jakarta.

J. Appl. Environ. Biol. Sci., 8(2)37-45, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

What Do They Think about Themselves? Exploring the Realities about Eunuchs in Pakistan

Aqsa Iram Shahzadi[1], Dr. Shahzad Ali[2]

[1]Assistant Professor, Communication Studies, Bahauddin Zakariya University, Multan
[2*]Associate Professor, Communication Studies, Bahauddin Zakariya University, Multan

Received: September 12, 2017
Accepted: December 13, 2017

ABSTRACT

The study presents an overview of perceptions of eunuchs about themselves through the lenses of exploratory research methodology. Being marginalized section of Pakistani society very less information about them is available. Through semi structured interviews of 104 eunuchs of Pakistan a real fact sheet about eunuchs is established. Findings reveal that although eunuchs are suffering through many problems in the society and they demand a responsible attitude from government and society but they are quite satisfied with in their limited circle of life. Pakistani eunuchs are inarticulate and submissive in their behavior, use abusive language while conversation and emotionally very sensitive. Guru-Chaila relationship defines all the life matter.
KEY WORDS: Transgenders, Pakistan, Perception, Semi structured interviews

INTRODUCTION

Study Background

Society is the basic unit for all the humans living in it that classifies them on the basis of gender (1). Gender is different from sex (2) as gender is named as a lens to see the world (3) while sex is based on the genitals. Gender can be male, female or combination of both (4, 5). Gender is the reflection of behaviors and appearance of someone, while sex is dominated by the anatomy of individual (6). Third sex is a biological term (2) while third gender is a socio cultural phenomenon. People who are neither a male nor a female are named as eunuchs (9). Eunuchs are different from gays, lesbians and bisexuals (6). This is the group which has to perform a third gender role which is totally different from traditional male and female role (7). These people are marginalized by the society (8) with stigma and dealt as a subject of criticism with ill treatment (9).

Eunuchs are also named as inter-sexual or hermaphrodites, who have undefined genitalia organs at the time of the birth. Such people have traits of both sexes male and female (10). Some eunuchs are actually men who castrated themselves mostly at early stage of their lives to have major hormonal transformation (11). Yet in many cases people are unaware about their genital anatomy confusions. They come to know about their confused sex at the time of teenage years when complexities arouse and they have no option to define their sex (12). In high class community such people go for SRS (sex reassignments – surgeries) and hormonal therapies and lead a career oriented life with their gender disabilities (13). In modern world first sexual reassignment surgeries (SRS) were performed in London in 1920 on two homosexuals (4). Due the increase in gender education in West, people are interacting transgender more because they understand gender diversity, as compared to East (8). Yet there are evidences of SRS in East too. Iranian sex change surgeon Dr Mir Jalali is one example of that (14). In Western culture emasculation is a natural act.

Yet the concept of Natural is different in East and West (9). Sex change surgeries are done abundantly in West among transsexuals (15). SRS is not transforming from one sex to another, rather it is the process of fixing one sex according to one's mind (14). In Korean Dynasty it was observed that castrated men live twenty years longer as compared to their peers (16, 17).

Eunuchs have an ancient and complex long recorded history about more than 4000 years old (9). Archeologists discovered five categories of eunuchs in Eastern culture. These are Hindu (*Hijra*), Muslim (*Hijra*), Sumerian (*Enki*), Roman (*Gall*) and Jain / Buddhist (*Napumska*). Roman's god *Cybele* and Hindu *hijra*'s god *Shiva* have a lot of similarities. Eunuchism started from the need to have place in Muslim Royal

***Corresponding Author:** Dr Shahzad Ali, Associate Professor, department of Communication Studies, Bahauddin Zakariya University, Multan, Pakistan. shahzadmasscomm@bzu.edu.pk

Palaces and gradually spread all over (18). During Mughal empire (1526 – 1857) eunuchs enjoyed their golden time (13, 19, 20). They have strong links to *sufi* (saints) and shrines at that time (21).

Eunuchs, in Sub-Continent culture, are mentioned in "*Kama Sutra*". From olden days men had special attraction for gender variant men who wear bright and colorful clothes to represent them as women (22). Historians found evidence that sons of *Nizam*, ruler of a city of Sub-Continent, *Hyderabad,* fought with each other to marry a beautiful *hijra* named *Rehman* (19). *Mughals* divided eunuchs in two communities *Badshahwalla* (King's men) and *Wazirwalla* (Minister's men), both were highly prestigious families among all eunuchs (21). In the Empire, eunuchs were employed to take care of *harams* and some of them became aide of queens. They held very sensitive and important positions in the palaces and their duty was to guard (23, 24) royal *haram* (25). *Haram* is a term applied to those parts of house where male access was forbidden (26). Engaging eunuchs on these jobs secure the sexual lives of royal wives (27). Eunuchs were sexually harmless to the women of *haram* but could done domestic chores efficiently. They were utilized as a mediating entity between men and women in various circumstances (19, 21). They were considered as a special force and walked in front of the prince's rides with pride (28). Yet many eunuchs succeeded in climbing social status and getting positions like body guards, confidential advisors, ministers, even general and admirals (19, 21, 29).

After the termination of *Mughal's* dynesty in Sub-continent, eunuch community suffered a lot. They were criticized for their actions and bodies especially since the British rule in Sub-Continent (9). After 1870, British rulers imposed many laws, including Criminal Tribes Act 1871 and Dramatic Performance Act 1876 which banned eunuchs to work openly and snatched their inheritance and other basic rights. This led them to begging and prostitution as their own families did not accept them (30). Even after Independence, eunuchs do not regain their past eminence (29). Traditionally, they were linked with performing art and performed as temple singers and dancers (20, 31). They also danced at marriage and birth ceremonies to bless fertility. Most of the songs of them were about pregnancy and dances were the reflection of pregnant women (32). Later, when theatre became widespread *hijra* were used in female roles as primarily women were not allowed to perform publicly (33). Hindu kings hired eunuchs as music trainers for their females (34). They remained related to performing art on electronic media of South Asia too (8, 35). In movies, dramas and other programs they are portrayed as beautiful, skilled, entertainers, spiritual and with ritual value of the society (Nergis, S, Personal Communication, September 29, 2013). But gradually they have to lemmatize their activities as people did not even need their prayers now (33). When disrespected, these eunuchs have countless stories of cursing families, of infertility. Families to avoid their nuisance and curse give them money, alms and sweets (4, 9, 13, 21).

In Indo-Pak culture they are not accepted in their own homes (27, 36) and have to bear a cruel reaction from society (9). Most of them are living even below the lines of poverty. They are penalized by the state, declared as criminals, placed at top in wanted lists of police stations and their houses are searched without any reason which destroys their prestige in the society (37). Due to financial scarcity this community yields in sex profession and begging. Although apparently they pretend that their own community discourages such activities (Personal Communication, Reema, 2014, April 24). With the strange sides of blessing and cursing, they adopt prostitution as profession and keep males as their husbands (4, 8). Such bizarre lifestyle may create many health issues but they are well aware of HIV-AIDS and different health concerns (38). Owing to involvement in sexual activities (39), society undermines their highly religious and culturally valued sacred role (40) which also effects their significance in society (9).

Hijra communities have established themselves by adopting those young boys who are excluded or run off their families (37, 39). Majority of them are men who want to gratify their own lust. As lust is considered one of the most influential element for sex between/among men (40). Poverty and sexual penetration by elder men during their adolescence (41) are few strong justifications given by eunuchs to join this community (42). Man who have sex with other man are termed as MSM (43). Some other reasons to become eunuchs are attraction in their society, an easy way to earn money (13), rejection from family (14), fell in love with *hijra* by taking much interests in them due to curiosity, being sold by own parents due to poverty or handed over to *hijra* community out of shame in society (13). The myth that *hijra* community kidnaps the eunuch child from home is not true. All the *hijra* join this community by their own will (44). Yet they are also of the view that they have complete right on any intersexed new born baby (9).

Since longer time, eunuchs are fighting for their identification especially in Indo-Pak societies. In Pakistani society rights are discriminated on the basis of gender by exploiting Islamic laws (45). They were not recognized as national of Pakistan till 2009. When Supreme Court of Pakistan moved an attempt to ensure rights of *hijra* by an order to allow them to identify themselves as a distinct third gender (46) after

eleven months of hearings (13). The initiative of Supreme Court action was the result of the protest of more than hundred eunuchs in front of Secretariat against the illegal charges on them (47). After that many wise eunuchs have activated their activities like leaders (41). Almas Bobby, leader of Pakistan's transgender community fought for their ID card status (48). Resulting that they were given the right of holding ID Card where they can write their third gender instead of men or women (13). Bindiya Rana, another renowned *hijra* established an organization named GIA for the betterment of *hijra* community. She also participated in politics along with other few eunuchs for the first time in Pakistan. They registered them as contestants for election 2013 (49). Yet there is a poor ratio of registered eunuchs in National Database Regulation Authority (46). Pakistan Supreme Court not only considered them as a third gender but also initiate many supportive actions like to be appointed as debt recovery (13). Government was advised to adopt some mechanism like quota for literate eunuchs (41) and to support their fundamental rights. Parents were forbidden to deliver a child to any *guru*. Moreover, *Bait-ul-Mal* and *Benazir* Income Support Programs (Pakistan need based scholarship programs) were bound to support them financially. They were given rights of education, job, sexual security, inheritance right, vocational training and health facility without any fee. Forced castration was also banned by Supreme Court of Pakistan (47). As Islam forbids all human beings to restrain any sort of right of any human being (49).

In spite of orders of Supreme Court in December 2009, eunuchs of Pakistan do not receive their due status (13). There is no single evidence of any sexual minority attaining government job. When they are ill they are placed in male wards and when they commit a crime, they are put in male jail. While traveling they are pushed to male section (47). They also have no access to education, employment and health (30). They want to get education but they are not facilitated by the society and are forced to quit the schools (13, 36). They go for self treatment in case of illness, taking silicon injections and castration without the help of any surgeon (13). The process of castration itself is very painful and inhuman. In most cases this surgery is unhygienic, unscientific and life threatening (50). Eunuchs are facing violence, abuse and rape all over the world. In Pakistan, a eunuch Alisha, working as social activist died after gunshot for six times and then being denied medical treatment at hospital only because of her being a transgender (51, 52). They are deprived of all their basic rights. Although according to law equality is on the basis of citizenship not on the basis of gender yet these laws are firmly violated by the societies in respect to eunuchs (53).

Significance of the Study

Eunuchs are marginalized section of the society, treated as a taboo. Such treatment restricts public not to know about them. Most of the studies conducted on them are from out side. No doubt observation is one of the strongest tool to explore any society. Yet no one can deny that members of the society know very well about them selves. There is very less documented data available, on governmental and academic levels related to eunuchs in Pakistani society. Present study helps further researcher to have a complete demographic data on eunuchs through their own lenses. This will also helpful for general masses to construct a better understanding about gender variant eunuchs with in the social system of Pakistan.

Statement of Problem

Eunuchs do not disclose themselves much in front of others. Society also does not want to know them. All this has created so many confusions about this marginalized section of the society. The basic purpose of the study is to know real stories, routines, backgrounds, life style, problems and sufferings of the eunuchs in Pakistani society through their own point of view. So that a true picture of eunuchs can be drawn.

No research can be conducted in a vacuum. Society is like a social organism, where some part can be less participating than the other. Social science research deals with the social problems with in a society and tries to reform them (54). Eunuchs, being a taboo are neglected in our society and there was no authentic data available about them. So it was necessary to use exploratory cultural analysis for data collection to obtain the objectives of the study. This method needs unbiased approach (55, 56). Cues and patterns were searched instead of evidence. Individuals and groups both were interviewed in their natural atmosphere using so many empirical methods (57). Researcher at a time works as interviewer and observer. Interviewing is the standard method for ethnography in the field (58). After conceptualizing the issues strategies were made. Total 104 eunuchs (by birth, castrated, real men adopting appearance of eunuch) were interviewed through semi structure technique from Punjab, a province of Pakistan (28% from *Multan* (the place of research), 14% *Rawalpindi/Islamabad* (capital of the state) and 12% *Bahawalpur*. Rest belonged to other small areas of the country. Convenient sampling technique was observed with the help of key informer and research suppliers.

1- To investigate the original thoughts of eunuchs about them selves.

RQ 1: What is the original thought of eunuchs of Pakistan about themselves?

Eunuchs admit that they are misfit in the broader culture of the society, yet they also claim to be an important part with in this circle. But they are quite very satisfied what the life they are spending. They are very happy in their limited circle. They knew about their century's old roots. Some very old *Gurus* even have records of their territorial rights given by the king of that time. They have these records in the form of copper plates, as these are ancient one. They revealed in discussions that in olden days when there was kingship in the Sub-Continent, eunuchs had a very high status and king has distributed different areas among them as mentioned by Hooda, (21). They collect alms, *badhai,* gifts with in their area. (9), 4 and 13) mentioned in their studies that eunuchs were use to had alms and gifts from specific places. They were bound not to interfere or collect money in any other eunuch's jurisdiction.

Most of them do not know about their families. Yet those who knew said that family members did not want to maintain contact with them. As along with gender problems, they have to bear cruel reaction from their families especially of father. All male members of their family including brother(s) and uncle(s) repel them, scorn at them, beat them and kick them out of their homes. Occasionally, only mother or some time sister(s) meet them. When they have no safe place at home they wander in the streets where people mock at them, tease them and some use them for their sexual desires. They have to face comments, bad talks from the people around them. An enormous eunuch phobia was observed among the public. People felt fear of their curse. Community maintains a bit relation with them but such intimacy could not be disclosed in the society. As society considered them a taboo so having any sort of involvement with taboo defamed some one. Even Pakistani male dominating society enjoyed the company of eunuchs. In dual standard of society to be eunuch was shameful, having societal relation with eunuch is liable, but establishing physical relations and amused in ceremonies by eunuchs is not actionable, yet secrecy should be maintained. This privacy was not for the betterment of eunuchs, rather this was to keep respectable dignities of the society to be honored. All such situation ruined emotional and physiological lives of the eunuchs.

2- To establish a real fact sheet about eunuchs in Pakistan on the basis of their own perspective.

RQ 2: What are the names, age, socio economic status, education, profession and living style of the eunuchs of Pakistan?

They all have a male name after their birth, but as they disclose themselves as *hijra*, they opt a feminine name. Mostly this name is of any famous filmstar of Pakistan or India *like Chandni, Reema, Boby, Nergis, Mumtaz* etc. Or the name is unusual one that attracts the male gender like *Piari, Raseeli, Chamki, Illaichi, Mitthi* etc. Eunuchs do not know about year of birth. An estimated age group of most of eunuchs is late 30s, *guru* ae of late 40s. No child eunuch is found during data collection and very young *hijra* are less in number.

98% of the eunuchs are uneducated due to their low socio-economic status and because they have to bear harsh attitude of class mates and teachers at school as also discussed by Jamil (59) and Tufail, (36) in their researches. So they leave school. 40% of eunuchs can not read even the Muslim religious book *Quran.* They earn money through begging, alms, dancing and performing at different functions. They danced at the parties, marriage ceremonies and child birth especially of a baby boy. They all love to dance and take it passionately. They are trained in dancing by their *guru*. They do their house course like cooking, washing, sewing, cleaning etc because they can not afford to keep servants. They prefer simple food and do not like hoteling due to less income.

Publicly, they got money through dancing. But due to change in societal culture trend of inviting *hijras* on auspicious occasions has been decreased. So they go to private male parties where they also serve as cheapest prostitute. This is a secret and biggest way of their earning. Eunuchs with low socio economic status are surviving only through prostitution and begging. Such life style puts them and their customers at the high risk of HIV/AIDS. MSM community is already declared vulnerable toward HIV/AIDS (43). Very well established and very few eunuchs have different kind of occupations. They are working as business persons, reformers, politicians, property dealers etc.

All eunuchs belong to different area but living at some other places. Their homes (*Khol*) are very small and ordinary. Most of *Chailas* live on rent. Well established *gurus* have their own homes but they are not also so much big. *Guru's* house or at least his room is fully furnished. Rich *guru* has air conditioner and LED in their rooms. All *guru* and *chailas* have TV set with cable connection in their homes. They considered television as the biggest source of entertainment.

RQ 3: What are the physical characteristics of eunuchs of Pakistan?

Most of the eunuchs are smart and have feminine features included breasts, prominent hips and long head hair. Yet they have broader shoulders, slight hair on beard and moustache, big hands and feet like men. Very few have delicate hands and feet, less facial hair and narrow shoulders. Although their features are womanly, yet their voice is manly. A great majority of eunuchs are very into fashion. Young eunuchs wear excessive make up (*Tarava*) and accessories. Groomed eunuchs are expert in make up. Moreover, high gentry's customers demand well groomed, flaymboyent and stylish shemale to present as their special friend. All eunuchs wear girlish dress (*Firqa*), except very senior *guru* who dress up in a simple *kurta shalwar*, a traditional male dress of Pakistan and avoid make up or jewelry. Yet all of them, either *guru* or *chaila,* carry *dupata* with their dress. Eunuchs who belonged to middle economic class were not too much groomed and clean. They dressed up in casual attire, very tight and vulgar dresses. To attract men they often expose their cleavage. Mostly are thin and tall yet the eunuchs of late forty's are obese. They have brown to black hair. Some up to date and young eunuchs have sticking in their hair too, a process of applying hair dyes. Most of them look fair through make up yet have a dull color complexion.

RQ 4: What sort of behavioral characteristics they have?

Eunuchs have strange behavioral traits. Most of the them are inarticulate and submissive. *Guru* is authoritarian, passed the orders and took all decisions while *Chailas* are passive and bound to obey the order of *guru.* Yet among *chailas,* hierarchy is also followed stricly. Senior *chaila* is close to *guru* and junior *chailas* have to follow even the order of senior *chaila*. *Chailas* have no right to argue against *guru's* instructions. Mostly they are self sufficient and perform their all tasks themselves. They can sew, stitch, cook and even ride a bike at the need of time. Young eunuchs are sexually provocative yet they all pose to be modest. There is a strong jealousy among eunuchs and the biggest factor is a handsome (*Cheesa*) and rich (*Thipar Das*) boy friend (*Giriya*). Latest dresses, lavish accessories and updated make up are also elements of jealousy. They are, mostly, short tempered. They start shouting, clapping speedily and imprecate on very small incidents.

RQ 5: What sort of conversational characteristics eunuchs have?

Language of eunuchs is not refined. They use abusive words during conversation. In manly voices they laugh loudly and clap during their conversation (*Salati*). The young eunuchs are very talkative and spontaneous in conversation. Most of them have no good speaking skills and manners. They use to talk in their own language within their own community they called it f*arsi.* They use this language in front of a stranger to keep something secret. The language is not common and difficult to understand for those who are not eunuch. Some example words they used are, *chaska* (tea), *kary karaan* (get a side silently), *firqa* (female dress), *giriya* (boy friend), *cheesa* (handsome man), *cheesi* (beautiful lady), *khilwa khalonda piey* (be ware, that man is drunk) etc.

RQ 6: What are emotional characteristics of the eunuchs of Pakistan?

Being marginalized section of the society eunuchs are emotionally disturbed individuals. Eunuchs are very emotional in nature. They become sad and happy on very small things. They have feeling of isolation from their parents and with in the larger circle of the society because people do not interact with them. In need of any civil requirement they are treated very disgustingly. But the most astonishing, teasing, ridiculing, insulting and humiliating attitude are of police towards them. At police stations they are harassed sexually, physically and verbally. They are burnt by police officers with burning cigarettes. When they have to travel they also face a lot of problems. People especially females did not allow them to sit with. And when they join male portion, situation is even worse as male do flirt and pass vulgar comments. Contrary to all above they do not take pity on themselves. They are quite happy what they are. They have no any regret from their lives or ALLAH to making them so. They take all the things in their lives normal.

3- To find out general information about eunuchs of Pakistan.

RQ 7: What sort of *Guru-Chaila* Relations exists in this community?

Guru and *Chailas* both are well aware about their duties, responsibilities and rights. They have established their own relationships with in their own community. They name other *chailas* of their own guru as their sisters; they call *guru* of *guru* as grand *guru* (*Dad Guru*). *Guru* declare any of her *chaila(s)* as their daughter(s). Mostly c*haila* live with their *guru.* Or even if they were living alone they have to server their *guru* with money. *Guru* is responsible for food, shelter and all basic necessities of her *chailas*, who were living with her. There are

enormous stories of being in the custody of any *guru.* Many say that their parents themselves handed over them to *guru* due to social pressure or financial constraints. Some say that they themselves went to the *guru* after repulsion and rejection from their homes and society and few tell that they were taken by the *guru* as they took birth. Moreover, when any *guru* wants to own any other's *chaila* than she has to buy that *chaila*. They all are reluctant to tell more about their *guru*. They just exposed the name of their *guru* in very general talks. Yet few revealed that *guru* have a very strict control over them. They snatch their all money and beat them, forbid them to meet their families. Every *guru* has its defined territory or area for business. Her *chailas* move in their allotted areas. No eunuch enters in the territory of other eunuch. If someone does so than it is considered as a great offense.

RQ 8: Is there evidence of involvement of eunuchs in sexual activities?

In their early age eunuchs are sexually abused by some one elder around them. And gradually this practice leads them to work as a sexual worker later. Although deviant sexual behavior is not accepted behavior in societies (40). Yet findings of People's Union for Civil Liberties (39) support the findings. As compared to female sex workers in the Pakistani society, eunuchs are easy to access and economical to utilize. And furthermore, Pakistani male dominating society takes it as an adventure. To gratify their lust they establish sexual relations with eunuchs and declare them as their keeps. They even have strict control over their eunuch friend. If the eunuch who is the keep of any male finds involved with some other guy too then the first lover behaves so brutally. A recent example is case of a transgender beaten by her boyfriend (Express, 13 Novemenber, 2016). Although eunuchs are involved in prostitution but they don't know about safe sex yet they are fully aware about AIDS and confirm that they use all precautions to prevent AIDS during sex (38). On the other side they refuse to be involved in prostitution.

4- To find out perception of eunuchs about media of Pakistan?

RQ 9: How media is treating eunuchs near to them?

They have a list of complaints against media they say that media is not projecting them as they were. Males, who are performing the role of *hijra* on television screen, are not their representatives. Problems of eunuchs are not highlighted by media neither their real picture is portrayed. Real eunuchs are not criminals, street beggars as shown on screen. They collect *badhaiyan,* alms and donation for their survival. Beggars in streets are actually males in disguise of eunuch. Moreover, media is making fun of them. Maximum presentation of eunuchs is hilariously. Roles which were given to the eunuch characters are negative and tokenistic.

CONCLUSION

There is lack of activism, deep silence on sexualities and covert status of this class which are the obstructions in revealing the realities of eunuchs. Eunuchs are not aliens; they are humans so they should be treated like other humans. Quran says "And indeed we have honored the Children of Adam" (49). Study concludes that being gender variant, they are not treated equally in the Pakistani society. Although in Pakistan women also are not given their due rights like men (45), yet eunuchs are marginalized for their basic needs even. *Guru* has very strong control over the all activities of his *chailas*. They present them more feminine from their name to their appearance as compared to masculine. Most of them are unaware about their real family. They have emotionally disturbed and psychologically complexed personalities.

RECOMMENDATIONS AND SUGGESTIONS

Researcher recommend following suggestions for further studies particularly and for society generally. Eunuch child has to suffer through mental and psychological problems through out his life. Parents should understand the predicament of the child who is not behaving in a socially accepting way. Such children should be given proper treatment by a psychiatrist/ psychologist or even a surgeon for necessary treatment, whatever is needed. Parents should have a strict control and check over the friend circle of their children. There should be a keen observation on the association of their offspring with elders, in and out of the family. Media should provide eunuchs with rational and emotional liberation on screen instead of pointing out their lives so that society can also accept them. Researcher suggested that if content related to transgender/eunuchs is made part of the curriculum then there are less exaggerated negative attitudes among the people especially youth (3). Government/ local administration should have to take responsibility to provide job opportunities for eunuchs so that they can survive. Government promised for 2% quota for them in government jobs like other minorities but

practical implementation is not seen. There should be firm enforcement of law and strong penalties on forced/self castration. There should be true representation of eunuchs in the parliament so that their representatives can raise voice for their rights.

REFERENCES

1- Richard, J.W., McKenna, E & Lieberman, T. Eunuchs as a gender identity after castration, (2012), *Journal of Gender Studies, 21*(3), 253-270, Doi: 10.1080/09589236.2012.681178

2- Ivory, H. A., Gibson, R. & Ivory, J. D. Gendered Relationships on Television: Portrayals of Same-Sex and Heterosexual Couples. (2009). *Mass Communication and Society, 12*(2), 170-192. DOI: 10.1080/15205430802169607

3- Walters, A. S. & Rehma, K. Avenue T: Using film as entrée in teaching about transgender. (2013). *Sex education: Sexuality, society and Learning, 13*(3), 336-348. DOI: 10.1080/ 14681811.2012.743460

4- Reicherzer, S., Steves, M., & Patton, J. *Transgenders, Vestidas, Hijra, Kathoey: Responding to cultural expressions of gender identity.* (2007). American Counseling Association, retrieved from www.counselling.org/knowledge-center/visras/by-subject2/vistas-client/docs/default-source/vistas/vistas_2007_reicherzerpptpdf

5- Mullaly, B. Oppression: The focus of structural social work. (2007). *The new structural social work*, 252-286.

6- Ghosh, S., & Walker, L. Sexuality, gender identity. (2006). *E Medicine*. Retrieved from http:// www. emedicine.com/ped/topic2789.htm

7- Schultz, E. A., & Lavenda, R. H. *Cultural anthropology: A perspective on the human condition* (Vol. 1). (2005). Oxford, UK: Oxford University Press, USA.

8- Jha, A. K. Are They Not Humans? Eunuchs: Citizens Without Right. *Eunuchs: Citizens Without Right (December 30, 2011)*. *Social Science Research Network.* Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1990256

9- Jagadish, P. Mainstreaming Third-Gender Healers: The Changing Perceptions of South Asian Hijras. (2013). *Vanderbilt Undergraduate Research Journal*, *9*. DOI: http://dx.doi.org/10.15695/vurj.v9i0.3798

10- Beth, B. Hijras: *The resurgence of interest in the sexual minority*. (2007). Retrieved from http://etransgender.com/viewtopic.chp?t=558

11- Bhullar, D. S., Aggarwal, K. K., Singh, S. P., & Chahal, P. S. Legal implications of forced thir *& Toxicology*, (2012). *12*(1), 50-53. Retrieved from http://www.indianjournals.com/ijor.aspx?target=ijor:jpafmat&volume=12&issue=1&article=012d gender with two case reports. *Journal of Punjab Academy of Forensic Medicine*

12- Dreger, A. D. "Ambiguous Sex"—or Ambivalent Medicine?: Ethical Issues in the Treatment of Intersexuality. (1998). *Hastings Center Report*, *28*(3), 24-35. DOI: 10.2307/3528648

13- Jami, H. Conditions and Status of *Hijras* (Transgender, Transvestites, etc) in Pakistan*:* (2005). *Country Report*. Retrieved from https://openresearch-repository.anu.edu.au/handle/1885/8669

14- Shakerifar, E. Visual Representations of Iranian Transgenders. (2011). *Iranian Studies, 44*(3), 327-339. DOI: 10.1080/00210862.2011.556375

15- Levine, E.M., Shaiova, C.H., &Mihailovic, M. Male to female: The role transformation of transsexuals. (1975). *Archives of Sexual Behavior. 4*(2), 1773-185. Doi: 10.1007/BF15541081

16- Coghlam, A. Eunuchs provide clues to longer life. *New Sciencetist*, (2012, September 25). 215 (2884), 14. Retrieved from http://www.newsscientise.com/article/dn22298-eunuch-provide-clues-to-longer-life/

17- Satirewire, *Men lining up for life – extending castrations.* (2012, September 26). Retrieved from http://www.satirewire.com/content1/?p=429/retrained23-04-2015.

18- Dale, M.S. Understanding emasculation, Western medical perspectives on Chinese eunuchs. (2010). *Social History of Medicine, 23*(1), 38 – 55. DOI:10.1093/shm/hkp 139.

19- Jaffery, Z. *The Invisibles: A tale of Eunuchs of India*. (1996). New York: NY, Vintage

20- Taparia, S. (2011). Emasculated bodies of *Hijras*: Sites of imposed and resisted

and negotiated identities." *Indian Journal of Gender Studies.* 18(2):167-84. Retrieved from http://journals.sagepub.com/doi/abs/10.1177/097152151101800202.

21- Hooda, A. Accepting the third Gender, (2010, March 29). Wordpress.

22- Penrose, W. Hidden in History: Female Homoeroticism and Women of a" Third Nature" in the South Asian Past. (2001). *Journal of the History of Sexuality*, *10*(1), 3-39.

23- Chang, R. T. Kan'gan: Sokkin Seiji no Kōzō [The Eunuch: The Structure of Government by Close Attendants]. By Taisuke Mitamura. Tokyo: Chūō Kōron Sha, 1963. 221.¥ 200. (1965). *The Journal of Asian Studies*,*24*(04), 690-691. DOI: 10.2307/2051123

24- Duparcq, E. Male, Female or Eunuch?, (2010). 20(2), 117 – 119.

25- Hambly, G. A note on the trade in eunuchs in Mughal Bengal. (1974). *Journal of the American Oriental Society*, *94*(1), 125-130. DOI: 10.2307/599739

26- Marmon, S. *Eunuchs and sacred boundaries in Islamic society*. (1995). New York: NY, Oxford University Press.

27- Chatterji, S.A. *Eunuchs of India – Deprived of Human Rights*, (2008), Retrieved from http://www.humanrightsdefence.org/index.php/articles-sp-724795164/361-eunuchs-of-india-deprived-of-human-rights.html

28- Baigum, N. Kuch yadein kuch batein: Shahzadi jahan Ara, (2016, April 4-10). Golden Jubilee Edition, *Weekly Akhbar-e-Jahan*, 10.

29- Gholsorkhi, S. Pari Khan Khanum: A Masterful Safavid Princess. *Iranian Studies*, (1995). *28*(3-4), 143-156. Doi: 10.1080/00210869508701833.

30- Preston, L. W. A Right to Exist: eunuchs and the State in Nineteenth-Century India, (1987). *Modern Asian Studies,* 21(2), 371-387. DOI:10.10171/s0026749x00013853.31- Barendregt, B. (2006). The Changing art of seduction: ritual courtship, performing Prostitutes, *Erotic entertainment, 40* (1), 1-5.

32- Kalsoom, Hijras, the third gender – Nabiha Meher Shaikh [Web Log comment]. (2008, June 24). Retrieved from https://changinguppakistan.wordpress.com/author/klakhani/page/73/

33- Pamment, C. Hijraism: Jostling for a third space in Pakistani politics. (2010). *TDR/The Drama Review*, *54*(2), 29-50. DOI:10.1162/dram.2010.54.2.29

34- Roscoe, W. Priests of the Goddess: Gender Transgression in Ancient Religion. (1996). *History of Religions* 35, no. 3 (1996): 195-230. DOI: 10.1086/463425

35- Cardinal, V. In Bangali There is no Word for Gay. (2010, December 22). *Artthreat Culture & Politics.* http://artthreat.net/2010/12/in-bengali-there -is-no-word-for-gay/

36- Tufail, S. Third Gender and their status in Pakistan. (2006, November 2).

37- Naseem, Q & Vains, B. *From silence to transaction in Khyber Pakhtoon Khawah*. (2016). Retrieved from www.civicus.org/.../2016/From%20silence%20to%20TransAction%20in%20Khyber20%Pakhtoon20%Khawah

38- Kalra, G. Hijras: the unique transgender culture of India. (2012). *International Journal of Culture and Mental Health*, *5*(2), 121-126. DOI:10.1080/17542863.2011.57095

39- People's Union for Civil Liberties. Human rights violation against transgender community. (2003). *India, PUCL-K*. Retrieved from http://ai.eecs.umich.edu/people/conway/TS/PUCL/PUCL%20Report.html

40- Siyoto, S. Analysis of sexual behavior of prisoners in correctional facility, (2016). *Journal of Applied Environmental and Biological Sciences, 6*(7), 134-138

41- Khan, S. Culture, sexualities, and identities: men who have sex with men in India. (2001). *Journal of Homosexuality*, *40*(3-4), 99-115. DOI**:**10.1300/J082v40n03_06

42- McInroy, L. B., & Craig, S. L. Transgender Representation in Offline and Online Media: LGBTQ Youth Perspectives. (2015). *Journal of Human Behavior in the Social Environment*, *25*(6), 606-617. DOI: 10.1080/10911359.2014.995392

43- Rokhmah, D., Dyson, L. & Soedirham, O. The effect of parenting role in forming homosexual behavior and its risk towards HIV and AIDS in young MSM, (2016). *Journal of Applied Environmental and Biological Sciences, 6* (7), 38-44

44- Fayyaz, A. *Social and Familial Status of Hijras of Pakistan*. (2007). (Unpublished Masters Dissertation). Fatimah Jinnah Women University, Rawalpindi, Pakistan.

45- Rehman, H. &Khan, M.A, Equality between man and woman and the spirit of Islam, (2016), *Journal of Applied Environmental and Biological Sciences, 6*(10), 128-132

46- Reuters. Pakistan Court Oks Third Sex for Identity Card; Move an Attempt to Ensure Transgender Rights. (2009, December 25). *Daily News*, Retrieved from www.nydailynews.com/news/world/pakistan_court_oks_sex_identity-cards-move-attempt-ensure-transgendereds-rights-article-1,43243/

47- Ijaz, M *Perception of Eunuchs towards their Legal Protection by Supreme Court of Pakistan*. (2010). (Unpublished Master Thesis). Fatima Jinnah Women University, Rawalpindi, Pakistan.49- Khan, M. A., Rehman, H., Zubair, M. & Khatak, S. The concept of human rights in Islam, (2014), *Journal of Applied Environmental and Biological Sciences, 4*(10), 26-31

48- Frayer, L. Pakistan transgenders in a category of their own NPR. (2012, September 03). [Web long comments]. www.npr.org/2012/09/03/160496712/Pakistan-transgenders-in-a-category-of-their own

49- Syed, I. In Pakistan poll, transgender candidates for the first time. (2013, May 9). *Reuters*. Retrieved from www.uk.reuters.com/article/2013/05/09/uk-Pakistan-elections-transgender-idukBRE9480cQ20130509

50- Talbott, R. F. Imagining the Matthean Eunuch Community: Kyriarchy on the Chopping Block. (2006). *Journal of Feminist Studies in Religion*, *22*(1), 21-43. Retrieved from http://muse.jhu.edu/article/196638

51- Illyas, F. No hospital big enough for transgender people. (2016, June 13).*The Express Tribune,* Retrieved from https://tribune.com.pk/story/1121639/no-hospital-big-enough-transgender-people/

52- Akbar, A. Transgender Alisha succumbs to wounds at Peshawar hospital, (2016, May 25). *Dawn,* Retrieved from https://www.dawn.com/news/1260559

53- Naorin, A. Third Gender: in search of Recognition. (2009, April 3). *LGBTI Bangladesh.* Retrieved from http://lgbtbanglades.wordpress.com/2009/04/03/third-gender-in-search-off-recognition/

54- Park, . R.E. *Research in the social science*. (2006). New Delhi, (Initial): Cosmo Publications.

55- Miller, R. L., & Brewer, J. D. (Eds.). *The AZ of social research: a dictionary of key social science research concepts*. (2003). New York: NY, Sage.

56- Gorard, S. *Quantitative Methods in Social Science: The role of number made easy.* (2003), New York, NY: Continuum.

57- Denzin, N. K., & Lincoln, Y. S. *Handbook of qualitative research*. (1994). Thousand Oaks: CA, Sage Publications, Inc.

58- Bertrand, I., & Hughes, W. P. T. *Media Research methods: Audiences, Institutions, texts.* (2005). New York, NY: Palgrave Macmillan.

59- Jamil, S. *Plight of Marginalized. Issues of third gender regarding their education Right*. (2010). (Unpublished M.A. thesis), Fatimah Jinnah Women University, Rawalpindi.

J. Appl. Environ. Biol. Sci., 8(2)46-52, 2018
© 2018, TextRoad Publication
ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Optimization of Extraction Conditions of Total Flavonoid Content from *Cystoseira. amentacea var. Stricta* Using Response Surface Methodology

Samir Fellous[1], Abd el Halim Boussaa[2], Mohamed Yacine Benzaoui[3], Riad Djellouli[4], Youcef Amar[1],

[1]Laboratory of hydrobiology and pollution, University of Sidi Bel Abbes, Djillali Liabes, 22000, Algeria
[2] Department of cellular and molecular biology, University of abbes laghrour khanchela .40000, Algeria
[3]«Reseau de surveillance environnementale» Laboratory, Sciences faculty, Oran University, 31000, Algeria.
[4]Department of environment, University of Sidi Bel Abbes, Djillali Liabes, 22000, Algeria

Received: September 19, 2017
Accepted: December 12, 2017

ABSTRACT

This work was focused on the optimization of extraction conditions for total flavonoid content (TFC), from brown marine macroalgae *Cystoseira. amentacea var. Stricta* using response surface methodology (RSM). Methanol, an aqueous organic solvent were used, with different concentrations (20%, 50%, 80%, v/v), liquid to solid ratio (1/5, 2.5/5, 4/5), temperatures (20˚C, 40˚C, 60˚C), extraction times (30 - 150 min). Results showed that the optimal value of total flavonoids (23.80 mg of quercetin equivalents/g) from *C. amentacea var. Stricta* was obtained with 80% aqueous methanol, liquid to solid ratio (1/5) at 20˚C for 123.29 min. Fitting experimental data and prediction of the response was done with a second-order equation model which produced a good fit: R^2 = 0.91 for TFC.

KEYWORDS: Macroalgae, *Cystoseira. amentacea var. Stricta,* Total flavonoid content, Response surface methodology

1.INTRODUCTION

Among the class of polyphenols, flavonoids are the most important, their chelating and antioxidant properties, have a valuable health effects, this class of polyphenol contribute greatly to the plants antioxidant capacity [24]. They proceed by free radical scavenging, or blocking the generation of hypervalent metal forms, or by preventing lipid peroxidation [36].
Marine seaweeds can produce a large range of secondary metabolites with wide spectrum of pharmaceutical and biological propriety such as anticancer, anticoagulant, antioxidant, antibacterial and antiviral activities [32] [3]. *Cystoseira* is a genus of brown seaweed, in Algeria, it consist mainly of *Cystoseira amentacea var. Stricta*, a Fucophyceae algae endemic to the Mediterranean, which is subordinate to the infralittoral fringe (level 0 to 0.5 m deep) [6]. The presence of many molecules such as steroids, terpenoids, and alkaloids have been reported by authors in different species of genus Cystoseira, a Mediterranean brown algae, however, little research on pharmacological properties has been done [13][4] [2] [21].
The one-factor-at-a-time method is commonly used for optimization of the extraction processes, nevertheless this approach is time-consuming, expensive and cannot predict optimal conditions in addition to the fact that, it underestimate interactions between factors [1].
RSM a statistical and mathematical tools, are usually used for optimization of extraction parameters, in which response depends on different independent factors [23]. Response surface methodology, generate a mathematical model in a statistical way [5], after processing the quantitative data from an experimental model to create a second order polynomial equation [30].
In the present work, RSM was used to optimize four extraction parameters for TFC, of brown marine macroalgae *C. amentacea var. Stricta* harvested from the western coastline of Algeria.

2. MATERIAL AND METHODS

2.1. Plant materials

The samples of *C. amontaceae var stricta* were collected in spring (april) from an exposed intertidal rocky shore (during low tide) at Ain Defla site (35º50’ 40 N/ 0º28’ 59 O) located on the east of Oran (a coastal town in west of Algeria). Epiphytes, microorganisms, salts, and other suspended materials were removed from fresh samples with fresh water and air dried, then, the dried thalli of *C. amontaceae var stricta*were were grinded by an electric grinder, and kept in a dark place at room temperature.

Corresponding Author: Fellous Samir, Laboratory of hydrobiology and pollution, University of Sidi Bel Abbes, Djillali Liabes, 22000, Algeria. Tel: +213 556883709.e-mail: fellousuniv@gmail.com

2.2. Extraction procedure

Methanol is frequently used for the extraction of secondary metabolite from seaweeds [12] [33] [9]. In order to extract most of the components from seaweed, a solvent with optimum polarity is required [24]. In our study, the grounded sample was submitted to extraction with 100% methanol. Approximately one gram of algal material was extracted in 100 ml of solvent and allowed to agitation during 24h with a rotary shaker. The filtered extract (Whatman no.1 filter paper) was kept at 4°C.

2.3. Total Flavonoid Content (TFC).

The Aluminum chloride ($AlCl_3$) method described by Djeridane et *al*. [16] was used to determine total flavonoid content (TFC) with some modification. About one1 ml of extract was added to the same volume of $AlCl_3$ (2% Methanol) and well mixed using a vortex. The solution was incubated at room temperature in the dark, for 10 min under shaking. The absorbance of the blank against standard and samples was recorded in triplicates at 430 nm with a spectrophotometer. The standard curve was calibrated by Quercetin. The results were showed as miligram of quercetin equivalents/g

2.4. Experimental design

For the extraction optimization of TFC from *C. amontaceae var stricta* sample, Response Surface Methodology was used. It is reported that the yield of total polyphenol and total flavonoids content is affected by numerous parameters [28] [31] [19] [38] [27], it is difficult to identify all the parameters influencing the response, then, factors with an important effects should be selected, [26].

A Box Behnken design was used in this study, with four independent factors coded at three levels (-1, 0 and +1): methanol concentration (X_1), liquid/solid ratio (X_2) temperature (X_3) and time (X_4). The chosen coded and decoded levels for the independent variables are shown in **Table 1:**

Table 1: coded and decoded independent factors

Independent variables	Symbols	Levels		
		-1	0	1
Methanol	X_1	20	50	80
Ratio	X_2	1/5	2.5/5	4/5
Temperature	X_3	20	40	60
Time	X_4	30	90	150

The number of selected experiments determined by RSM was a total of 27 sets and was performed to determine significant factors for the extraction of TFC.

The general second order polynomial model was:

$$Y = \beta 0 + \sum_{i=1}^{4} \beta iXi + \sum_{i=1}^{4} \beta itXi^2 + \sum_{i<j}^{4} \beta ij\ XiXj$$

The regression coefficients are β_0, β_i, β_{ij} and β_{ii} are for intercept, linearity, and interaction square terms, respectively, Y was the dependent response, X_i, X_iX_j and X^2_i represented the coded levels of linear, interaction and quadratic terms of independent factors, respectively.

2.5. Statistical analysis

For statistical analysis of quantitative data, ANOVA using a significant difference test (Fisher's least) at 5%.

3. RESULTS AND DISCUSSION

Drawing response surface plots of the design is the best way to show the effect of the independent variables on the dependent variables. This can be done by varying two factors and keeping constant the two others at the central point [35].

3.1. Fitting the models

The total flavonoid content dry matter extract of *C. amontaceae var stricta* obtained from the 27 sets are shown in **Table 2**. Experimental set of data were subjected to multiple regression analysis, the correlation between extraction factors (methanol, liquid/solid ratio, extraction time and temperature) and measured response (total flavonoid content) fitted the second-order multivariate equation.

Table 2: TFC experimental design.

Run	X_1 (%)	X_2	X_3 (C°)	X_4 (min)	TFC_{exp}	TFC_p
1	50	2.5/5	40	90	10,61	10,12
2	50	2.5/5	20	150	08,43	09,91
3	50	2.5/5	60	30	05,54	04,18
4	20	4/5	40	90	13,79	12,81
5	80	1/5	40	90	16,98	18,08
6	50	2.5/5	20	30	09,47	09,84
7	80	4/5	40	90	03,81	05,19
8	50	2.5/5	60	150	03,89	03,65
9	20	1/5	40	90	13,74	12,47
10	20	2.5/5	40	150	07,75	07,54
11	50	4/5	60	90	04,37	05,75
12	50	4/5	20	90	06,96	07,83
13	50	1/5	20	90	19,35	17,44
14	20	2.5/5	40	30	11,12	10,54
15	80	2.5/5	40	30	06,55	06,77
16	50	2.5/5	40	90	09,90	09,84
17	80	2.5/5	40	150	08,71	09,31
18	50	1/5	60	90	08,99	08,14
19	50	4/5	40	150	06,53	04,46
20	50	1/5	40	30	09,02	10,96
21	80	2.5/5	20	90	15,77	13,51
22	20	2.5/5	20	90	11,43	12,34
23	20	2.5/5	60	90	06,43	08,55
24	80	2.5/5	60	90	06,43	05,38
25	50	1/5	40	150	12,44	12,88
26	50	4/5	40	30	07,42	06,84
27	50	2.5/5	40	90	09,42	09,97

TFC_p : predicted value of TFC, TFC_{exp} : experimental value of TFC

To investigate the models adequacy and identify the significant factors, ANOVA was executed. The response and tested variables relationship are exhibited in the equation below:

$$Y_{(TFC)} = 0,471 - 0,02X_1 - 0,124\ X_2 - 0,117\ X_3 - 0,005\ X_4 - 0,130\ X_1X_2 - 0,043\ X_1X_3 + 0,077\ X_2X_3 + 0,055\ X_1X_4 - 0,043\ X_2X_4 - 0,006\ X_3X_4 + 0,038\ X^2_1 + 0,042\ X^2_2 - 0,039\ X^2_3 - 0,089\ X^2_4.$$

Where X_1 (methanol concentration), X_2 (liquid/material ratio), X_3 (temperature) and X_4 (time) are the independent variables and Y_1 (the total flavonoid content) is the response;

Table 3: Analysis of variance ANOVA

Responses	*Source*	*Degree of freedom*	*Sum of squares*	*Mean square*	*F- value*	*p-Value*
TFC	**Model**	16	0,569	0,035	6,2609	0,0028*
	Residual	10	0,057	0,006		
	Total	26	0,626			
			R^2= 0.91			

3.2. Effect of extraction process on total flavonoid content

Phenolic compounds Isolation, identification, and quantification are influenced by extraction which is an important step in these processes [11]. The most frequently used methodes to prepare plant extracts are solvent extractions, as it is more efficient, easy to use and has large applications, the type of solvents with varying polarities, sample ratio, temperature and extraction time in addition to the physical and chemical characteristics of the samples have a great impact on the yield of extraction [14].

Tableau 4: Regression coefficients of the fitted polynomial equations for TFC

Terme	Estimation	Écart-type	Rapport t	Prob.>|t|
Constante	9,98	1,11	9,03	<,0001*
Methanol(20,80)	-0,5	0,55	-0,91	0,3861
Solvent/sample(1/5, 4/5)	-3,14	0,55	-5,68	0,0002*
Temperature(20,60)	-2,98	0,55	-5,39	0,0003*
Time(30,150)	-0,11	0,55	-0,21	0,8405
Methanol*Solvent/sample	-3,3	0,96	-3,45	0,0062*

Methanol*Temperature	-1,09	0,96	-1,13	0,2835
Solvent/sample*Temperature	1,94	0,96	2,03	0,0699
Methanol*Time	1,38	0,96	1,44	0,1793
Solvent/sample*Time	-1,078	0,96	-1,13	0,2866
Temperature*Time	-0,15	0,96	-0,16	0,8766
Methanol*Methanol	0,95	0,83	1,15	0,2767
Solvent/sample*Solvent/sample	1,07	0,83	1,28	0,2279
Temperature*Temperature	-0,98	0,83	-1,18	0,2656
Time*Time	-2,25	0,83	-2,72	0,0217*

The interaction effect of methanol with sample ration was statistically significant and negative (p = 0.0062) as shown in table 4. The highest value of TFC (23.80 mg of quercetin equivalents/g) was obtained with methanol concentration of 80% **Figure 1(A).** As the polarity of methanol decreased from 0% to 80% the value of TFC increased. In the study of Rajauria *et al.* [24], a highest value of flavonoid expresseed in mg quercetin equivalents/g was obtained with 60% methanol concentration which exhibited a significant *p* value ($p < 0.05$). By contrast, the best concentration for *Calendula officinalis* flowers was obtained with 80% of aqueous methanol [10].

The linear effect of sample ratio was statistically significant and negative with p = 0.0002 (Table 4). Extraction of TFC, as shown in Figure 1(B), was maximal when sample ratio was at 1/5. Normally, the rate of TFC augments with the raise of sample ratio, because more solvent can penetrate cells allowing a large amount of flavonoids to diffuse into the solvent under the higher solvent to sample ratio condition [25]. The high value of TFC obtained with a relatively low sample ratio, may be due to the conjugated effect of long extraction time as shown in Figure 1(B).

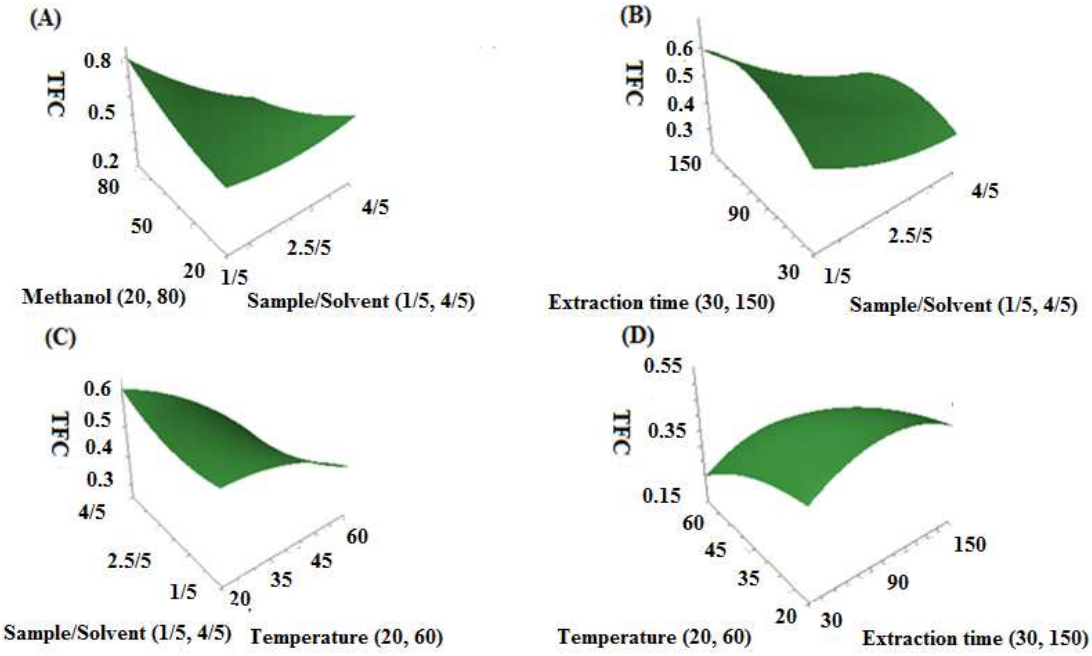


Fig 1: The RSM plots rschowing the effects of (A) methanol concentration and solvent to material ratio (B) Extraction time and solvent to material ratio (C) temperature and solvent to sample ratio (D) temperature and extraction time of TFC from *C. amontaceae var stricta.*

The linear effect of temperature was statistically significant and negative, p= 0.0003) as presented in Table 4. The maximum value of TFC was obtained with temperature of 20°C Figure 1(C). In the investigation of Bouterfas K *et al.* [8], on secondary metabolites from leaves of *Marrubium vulgare* L. (white Horehound), the

optimal value of TFC was obtained with temperature of 20°C. It is reported that, an important diminution of TFC can be caused by extraction temperature higher than 25˚C, then it is recommended to adjust temperature during extraction process to avoid thermal degradation of flavonoid derivatives, mainly hydroxyl groups [15] [7]. Furthermore, cell wall integrity are weaken and plant tissues are softened by mild heating which enhance the release of phenolic compounds [18] [29].
In the present work, the quadratic effect of extraction time was statistically significant and negative with *p value* equal to= 0.0217 (Table 4). The optimum extraction time of TFC in our study was with 123.29 min as shown in Figure 1(D). In other studies, the best extraction time for TFC from some thyme varieties and *Callicarpa nudiflora* leaves was tree hours [22] [37]. In the work of Liu *et al,* [19], on *Gynura medica* leaves, the most suitable extraction time of TFC was 30 min. It's well known that, prolonged extraction time allows the solvent and solute to be in contact during a longer time which favors the mass transfer [17].

3.3. Validation of the model

The aim of this work was the extraction optimization of parametters of flavonoid content from *C. amontaceae var stricta*. The desirability function procedure suggested the following optimal conditions: 80% of methanol concentration, 1/5 of solvent/sample ratio, 20°C of temperature and 123.29 min of time for TFC. A good R^2 value of 0.91 for TFC was obteined which means that, 0.91% can be explained by this model. However, the predicted results (23.80 mg of quercetin equivalents/g) were different to the experimental value (4.98 mg of quercetin equivalents /g). In fact, as reported by Liyana-Pathirana and Shahidi [20], optimisation and exploration of a fitted response surface may generate misleading or poor results, unless the design displays a good fit, hence, it is very important to check the model adequacy. In our study, the *p*-value of the model was 0.003 (Table 3), indicating a significant model fitness [20] [34].

4. CONCLUSION

The methanolic extract of *Cystoseira amentacea var. Stricta*, was analysed for its total flavonoid content following 27 different sets of four independent factors: methanol, solvent/material ratio, extraction time and extraction temperature. The optimum condition of these different factors was obtained using RSM. The second-order polynomial model proposed for *Cystoseira amentacea var. Stricta* extract exhibited a good R^2 value of 0.91 of total flavonoid content.
The present study is not exhaustive therefore, other experimental conditions may be tested as well as, the nature and the number of extractions procedures (ultrasound extractions, ultrafiltration, flash distillation, supercritical fluid). Also, other extraction solvents (ethanol, acetone, ethyl acetate and acetic acid etc.), will be taken into account in our future works.

5. REFERENCES

1. Amado, R.I., Franco, D., Sanchez, M., Zapata, C., Vazquez, J.A., 2014. Optimisation of antioxidant extraction from *Solanum tuberosum*potato peel waste by surface response methodology. *Food Chem*, (165): 290–299.

2. Amico, V., Piatelli, M., Cunsolo, F., Recupero, M. and Ruberto, G., 1990. Etraprenyltoluquinols as chemo-taxonomic markers in the genus Cystoseira: *C. barbarula and C. barbata. Gazz. Chim. Ital.*, (12): 9–12.

3. Athukorala, Y., Lee, K.W., Kim, S.K. and Jeon, Y.J., 2007. Anticoagulant activity of marine green and brown algae collected from Jeju Island in Korea. *Bioresour. Technol.*, (98): 1711 1716.

4. Banaigs, B., Francisco, C., Gonzalez, E. and Fenical, W., 1983. Diterpenoid metabolites from the marine alga *Cystoseira elegans*. *Tetrahedron.*, (39): 629–638.

5. Bas, D. and Boyaci, I. H., 2007. Modeling and optimization I: Usability of response surface methodology. *Journal of Food Engineering.*, (78) : 836–845.

6. Belmokhtar, M.,2012. *Cystoseira amentacea v. stricta :* indicateur de la qualité des eaux côtières de l'ouest algérien. Master's Thesis, Universite d'Oran Es-Senia, Algeria.

7. Biesaga, M. and Pyrzynska, K., 2013. Stability of Bioactive Polyphenols from Honey during Different Extraction Methods. *Food Chemistry.,* (136): 46-54.

8. Bouterfas, K., Mehdadi, Z., Benmansour, D., Meghit, B. K., Bouterfas, M., Latreche, A., 2014. Optimization of Extraction Conditions of Some Phenolic Compounds from White Horehound (*Marrubium vulgare L.*) Leaves. *International Journal of Organic Chemistry.*, (4): 292-308.

9. Budhiyanti, S. A., Raharjo, S., Marseno, D.W. and Lelana, Y.B., 2012. Antioxidant activity of brown algae *Sargassum species* extract from the coastline of java island. *American Journal of Agricultural and Biological Sciences.*, (7): 337-346.

10. Butnariu, M. and Coradini, C.Z., 2012. Evaluation of Biologically Active Compounds from *Calendula officinalis* Flowers Using Spectrophotometry. *Chemistry Central Journal.*, (6) : 35-42.

11. Cacace, J.E., Mazza, G., 2003. Mass transfer process during extraction of phenolic compounds from milled berries. *J. Food Eng.*, (59): 379–389.

12. Chew, Y. L., Lim, Y. Y., Omar, M. and Khoo, K. S., 2008. Antioxidant activity of three edible seaweeds from two areas in South East Asia. *LWT.*, (41): 1067–1072.

13. Combaut, G., Francisco, C., Piovetti, L., Gonzales, E., Teste, G. and Codomier, L., 1980. Acyclic diterpenes in Cystoseira (Pheophycea) from the Mediterranean coast. *Bull. Soc. Chim. Belg.*, (89): 1063–1067.

14. Dai, J. and Mumper, R.J., 2010. Plant Phenolics: Extraction, Analysis and Their Antioxidant and Anticancer Properties. *Molecules.,* (15): 7313-7352.

15. Davidov-Pardo, G., Arozarena, M.R.I. and Marin-Arroyo, M.R., 2011. Stability of Polyphenolic Extracts from Grape Seeds after Thermal Treatments. *European Food Research and Technology.*, (232) : 211-220.

16. Djeridane, A., Yous, M., Nadjemi, B., Boutassouna, D., Stocker, P., Vidal, N., 2006. Antioxidant activity of some Algerian medicinal plants extracts containing phenolic compounds. *Food Chem.*, (97): 654-660.

17. Hilary, Y., Baldosano, H.Y., Castillo, B.G., Elloran, D.H., Bacani, F.T., 2015. Effect of Particle Size, Solvent and Extraction Time on Tannin Extract from *Spondias purpurea* Bark Through Soxhlet Extraction. In Proceedings of the DLSU Research Congress, Vol. 3, De La Salle University, Manila, Philippines March 2-4, 2015.

18. Juntachote, T., Berghofer, E., Bauer, F. and Siebenhandl, S., 2006. The Application of Response Surface Methodology to the Production of Phenolic Extracts of Lemon Grass, Galangal, Holy Basil and Rosemary. *International Journal ofFood Science and Technology.*, (41): 121-133.

19. Liu, H., Du, X., Yuan, Q., Zhu, L., 2009. Optimisation of enzyme assisted extraction of silybin from the seeds of *Silybum marianum*by Box–Behnken experimental design. *Phytochem. Anal.*, (20): 475–483.

20. Liyana-Pathirana, C., Shahidi, F., 2005. Optimization of extraction of phenolic compounds from wheat using response surface methodology. *Food Chem.*, (93): 47–56.

21. Mhadhebi, L., Laroche-Clary, A., Robert, J. and Bouraoui, A., 2011. Antioxidant, anti-inflammatory, and antiproliferative activities of organic fractions from the Mediterranean brown seaweed *Cystoseira sedoides. Can. J. Physiol. Pharmacol.*, (89): 911–921.

22. Mohammedi, Z. and Atik, F., 2011. Impact of Solvent Extraction Type on Total Polyphenols Content and Biological Activity from *Tamarix aphylla* (L.) Karst. *International Journal of Pharma and Bio Sciences.*, (2): 609-615.

23. Pompeu, D.R., Silva, E.M., Rogez, H., 2009. Optimization of solvent extraction of phenolic antioxidants from fruits of *Euterpe oleracea*using response surface methodology. *Bioresour. Technol.,* (100): 6076–6082.

24. Rajauria, G., Jaiswal, A.K., Abu-Ghannam, N., Gupta, S., 2012. Antimicrobial, Antioxidant and Free Radical-Scavenging Capacity of Brown Seaweed *Himanthalia Elongata* from Western Coast of Ireland. *Journal of Food Biochemistry.*, (37): 322–335.

25. Shan, B., Xie, J. H., Zhu, J. H. and Peng, Y., 2012. Ethanol modified supercritical carbon dioxide extraction of flavonoids from *Momordica charantia L.* and its antioxidant activity. *Food and Bioproducts Processing.*, (90): 579–587.

26. Sheng, Z.L., Li, J.C., Li, Y.H., 2011. Optimization of forsythoside extraction from Forsythia suspensa by Box–Behnken design. *Afr. J. Biotechnol.*, (10): 11728–11737.

27. Sheng, Z.L., Wan, P.F., Dong, C.L., Li, Y.H., 2013. Optimization of total flavonoids content extracted from *Flos Populi* using response surface methodology. *Industrial Crops and Products.,* (43): 778– 786.

28. Silva, E., Rogez, H., Larondelle, Y., 2007. Optimization of extraction of phenolics from *Inga edulis*leaves using response surface methodology. *Sep. Purif. Technol.*, (55): 381–387.

29. Spigno, G., Tramelli, L. and De Faveri, D.M., 2007. Effects of Extraction Time, Temperature and Solvent on Concentration and Antioxidant Activity of Grape Marc Phenolics. *Journal of Food Engineering.*, (81): 200-208.

30. Triveni, R., Shamala, T. R. and Rastogi, N. K., 2001. Optimised production and ultilization of exopolysaccharide from *Agrobacterium radiobacter*. *Process Biochemistry.*, (36): 787–795.

31. Turkmen, N., Velioglu, Y. S., Sari, F., Polat, G., 2007. Effect of extraction conditions on measured total polyphenol contents and antioxidant and antibacterial activities of black tea. *Molecules.*, (12): 484-496.

32. Vairappan, C.S., Daitoh, M., Suzuki, M., Abe, T. and Masuda, M., 2001. Antibacterial halogenated metabolites from the Malaysian *Laurencia* species. *Phytochemistry.,* (58) : 291–297

33. Vinayak, R.C., Sabu, A.S., and Chatterji, A., 2011. Bioprospecting of a few brown seaweeds for their cytotoxic and antioxidant activities. *Evidence-Based Complementary and Alternative Medicine.,* (7): 1 – 9.

34. Wang, L., Yang, B., Du, X., Yi, C., 2008. Optimi¿sation of supercritical fluid extraction of flavonoids from *Pueraria lobata*. *Food Chemistry.*, (108): 737–741.

35. Wani, S.M., Jan, N.T., Wani, A., Ahmad, M., Masoodi, F.A., Gani, A., 2015. Optimization of antioxidant activity and total polyphenols of dried apricot fruit extracts (*Prunus armeniaca L.*) using response surface methodology. *Journal of the Saudi Society of Agricultural Sciences.,* (16):119-126.

36. Zaragoza, M.C., Lopez, D., Saiz, M.P., Poquet, M., Perez, J., Puig-Parellada, P.,Marmol, F., Simonetti, P.,Gardana, C., Lerat, Y. *et al*., 2008. Toxicity and antioxidant activity *in vitro* and *in vivo* of two *Fucus vesiculosus* extracts. *J.Agric. Food Chem.,* (56): 7773–7780.

37. Zhekova, G. and Pavlov, D., 2012. Influence of different factors on Tannins and Flavonoids extraction of some Thyme varieties representatives of Thymol, Geraniol and Citral chemotype. *Agricultural Science and Technology.*, (4): 148-153.

38. Zhu, X., Mang, Y., Xie, J., Wang, P., Su, W., 2011. Response surface optimization of mechanochemical-assisted extraction of flavonoids and terpene trilactones from Ginkgo leaves. *Ind. Crop. Prod.*, (34): 1041–1052.

.

J. Appl. Environ. Biol. Sci., 8(2)53-58, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Operational Strategy Analysis of Septage Treatment Plant Performance Improvement in Blitar

Zakiyah Darojat* and Agus Slamet

Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Sepuluh Nopember Institute of Technology Surabaya

Received: October 8, 2017
Accepted: December 29, 2017

ABSTRACT

The Septage Treatment Plant (IPLT) in Blitar Cityhad a design capacity of 30 m^3/day and had been in operation since 1992. However, the design capacity has not been fulfilled as expected. This study aimed to evaluate performance and establish an operational strategy in order that IPLT can operate in accordance with its design capacity. This study was conducted by collecting data of septage production and evaluating the existing septic tank conditions in Blitar City. Quantitative descriptive analysis was used for the determination of operational strategies. The results showed the average quantity of suctioning septage was only 3.5 m^3/day with septage production rate of 0.28 L/person/day. The number of septic tank that meets the SNI standard is 6.7%. The improvement of IPLT performance strategy was done by gradually improving septic tanks and implementation the scheduling of septic tank emptying (LLTT) with the need of 5 transport units. Septic tank repair could be done using investment from the government funds (APBD), grant funds, Corporate Social Responsibility (CSR) and micro credit. IPLT design capacity could be fulfilled after gradual septic tank repair and implementation of LLTT.
KEYWORDS: Septic tank, emptying schedule, design capacity

INTRODUCTION

The Septage treatment plant (IPLT) was one component of the local waste water management system (on site ystem). IPLT was designed only for treating septage from an on-site system and transported using a trucks [1]. The main purpose of septage treatment was to reduce the content of organic substances and eliminate the content of pathogenic microorganisms [2]. One of the pathogenic bacteria possibly present in water contaminated withseptage was Escherichia coli bacteria [3].IPLT had been built as many as 150 units spread across the city. The operating rate of IPLT that had been built only reached 65% and some was no longer operational [4]. The operation of IPLT in Indonesia had several problems including technical and non technical elements. Technical elements related to the supply of sludge into IPLT and building processing units. The non-technical element related to the management of IPLT, the community's knowledge of the obligation to emptying of septic tank. One of the reasons for the unoptimized operational condition of IPLT was the supply of septage had not yet fulfilled the design capacity [5].

Blitar City had an IPLT built in 1992 with a design capacity of 30 m^3/day. It was located in Blitar Sub-District Sukorejo District. Since it was operated from 1992 until 2016, the average number of septage entering IPLT was 0.8 m^3/day, so there was an idle capacity of 98% [6]. It caused the stool suction business did not dump septage into IPLT. It was estimated that low septage production of the community septic tank served as a cubluk was due to cracking or leakage. Well-performing septic tanks generally requiredemptying at regular intervals of time (3 -5 years) due to the accumulation of septage.To ourknowledge, the cause of that condition has not been studied yet.

The low demand for emptying septic tanks in Blitar City had implications on the small local revenue (PAD) ofRp. 14,265,000.-/year. The operational cost and maintenance of IPLT in Kota Blitar was Rp. 40,016,000.-/year [6]. In Blitar there were 27,950 houses having septic tanks [7]. These data suggest that the potential for septage produced by residents of Blitar City should be more considerable.A review of strategies to increase the supply of septage must be done to ensure the sustainability of IPLT operations. Increasing the supply of septage to IPLT could increase the retribution to support the operation and maintenance costs.

METHODS

The research was conducted by quantitative descriptive method. Samples were taken from the management agencies of IPLT, other relevant agencies and communities in the study area. Shooting of field conditions was conducted to determine the condition of the existing septic tank population and the activity of emptying septic tank performed by entrepreneurs.

***Corresponding Author:** Zakiyah Darojat, Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Sepuluh Nopember Institute of Technology Surabaya.
email: zakiyahdarojat16@gamil.com

1. Primary Data Collection
   Primary data was obtained through interviews and the delivery of questionnaires to the respondents. Respondents was households with latrines complete with septic tanks. Primary data required include the size of the septic tank, the number of users, the age and the interval of septic tank emptying. Interviews were also carried out for entrepreneurs. The data obtained include the average amount of emptying septic tank activity and the average volume of septage septic tank. The number of respondents in this study was 200 households.It wascalculated according to Regulation of The Ministerof Public Works No.18/2007 [8]. The formula for determining the number of respondents was explained as follows:

$$n = \frac{Np(1-p)}{(N-1)D + p(1-p)} \quad (1)$$

$$D = \frac{B^2}{t^2} \quad (2)$$

   Description :
   n = number of samples
   N = number of family = 42.934
   p = ratio from element that has the desired properties (p = 0.5)
   B = error rate of each sample (6%)
   t= trust level (95%)

2. Secondary Data Collection
   Secondary data was obtained from the management agency of IPLT and related institutions. Secondary data include data of population in Blitar City, number of septic tank users, number of transportation and capacity of IPLT.

Data analysis

Analysis of survey data

The recapitulated survey results and calculated according to their respective categories. The same answer was collected to determine the percentage of other answers in the same data category.

Analysis debit of IPLT

The analysis of septage production rates was calculated based on the size of the septic tank, the number of occupants house and the emptying septic tank interval. The existing IPLT influent debits was calculated according to Regulation of The Ministerof Public Works and People's Housing No.18/2007 No.4/PRT/M/2017 [9]. The formula was as follows:

$$Q = \% \text{ service} \times P \times q \quad (3)$$

Description :
Q = debit of IPLT (m^3/day)
% = level of service IPLT
P = the number of people served
q = the productions rate of septage from septic tank (liter/person/day)

Analysis of IPLT capacity fulfillment with LLTT

The septage capacity entering IPLT was calculated based on the number of operating and capacity truck. The number of ritations the truck was calculated based on the distance of service.

Financial analysis

Financial analysis was done by calculating the operational and maintenance costs of LLTT implementation. The calculation of user charges was calculated based on the operational cost and maintenance of LLTT divided by the number of septic tanks served.

Evaluation

Evaluation was done by comparing the existing condition with standard. Evaluation of existing septic tank conditions based on SNI 03-2398-2002 [10]. Evaluation of existing condition of IPLT based on IPLT design data. The preparation of IPLT processing capacity fulfillment strategy based on the analysis of existing condition.

RESULTS AND DISCUSSION

Evaluation of Existing Septic Tank Conditions

Based on questionnaire questionnaire data on 200 respondents, 48 respondents stated that they had done emptying septic tank and 152 respondents had not. The average age of the respondent's septic tank was exceeded 10 years. The emptying of septic tanks should be done after the accumulation of septage was estimated to have reached one-third of the volume of the septic tank. This indication that the septic tank of 152 respondents was actually not a septic tank but a pit latrine. So water seep out of the tank and cause contamination of ground water. The effluent of a septic tank that seeps into the ground through the tank wall was more than the drain. This was supported by the results of well water quality testing on several respondent wells proven to be contaminated by Escherichia coli bacteria [11,12]. Septic tanks was considered to be the best waste water treatment, while land and water contamination was still occurring through permeation [13]. The average interval of emptying septic tank according to the respondents who had been drained was 7 years. The average septic tank volume is 3 m^3 and the average number of users is 5 people. The average septage production rate of septic tanks calculated based on the volume of the septic tank divided by the number of users and the emptying septic tank interval. The average rate of septage production from the respondent's septic tank is 0.28 liter/person/day.

Evaluation Existing Conditions of IPLT Influent

The calculation of the quantity of septage produced by residents of Blitar City calculated from the number of activity emptying septic tank in Blitar City. The number of activity emptying septic tank performed by 4 stool suction services in Blitar City can be seen in Table 1.

Table 1. FrequencyOf Septic Tank Emptying

No.	Name of Company	Frequency of septic tank emptying / month (times)
1	CV. Central Jasa	15
2	CV. Sumber Rejeki	12
3	P. Jaelani	10
4	Environment Agency of Blitar City(DLH)	8
Jumlah		45

Based on Table 1, the number of activity emptying septic tank in Blitar City in 1 month was 45 times. The volume of septage averaged 2 m^3 of septic tank. The quantity of septage produced is 45 x 2 m^3 = 90 m3/month or 3.5 m^3/day. Level of service of IPLT Blitar City on existing condition was calculated based on existing septage quantity of existing septage divided by IPLT capacity equal to 11,6%. The number of septic tanks that carried out in 1 year was 624 septic tanks. The calculation was based on the quantity of existing septage divided by the average volume of septage from a septic tank. If the emptying septic tank was done every 3 years, the number of septic tanks carrying out 1,872 septic tanks.

Septic tank who done emptying was a septic tank as per technical requirements. The technical requirements for septic tank construction include building materials must be strong, resistant to acid and watertight [10]. The percentage of standardized septic tanks is 6.7%. Determined based on the ratio of the number of septic tanks that emptying by the total number of septic tanks. The percentage of IPLT services was calculated based on the number of population served to the total population of Blitar City. The percentage of IPLT service in the existing condition is 6.2%.

Septage from emptying septic tank was taken by DLH Blitar City was taken to IPLT. Septage from emptying septic tank was taken by the private sector was taken apart to IPLT. Based on Table 1 could be seen the level of disposal of septage into IPLT. Calculated based on the number of suction activity that discharges septage into IPLT divided by total septage excretion activity. The value is 18%. This value indicates that there was still a small number of suction activity that dumps septage into IPLT.

The comparison of IPLT influent debits based on the design and analysis results (existing) as seen in Table 2.

Table 2. Comparison of Influent Design With Influence Existing

Description	Influent Design	Influent Existing
a. The number of people served	152,097	152,097
b. Level of service IPLT	40%	11.6%
c. The productions rate of septage from septic tank (liter/person/day)	0.5	0.28
d. Disposal of sludge into IPLT	100%	18%
Influent of IPLT (m^3/day)	30	0.89

The quantity of influent from the analysis (existing) is 0.5 m^3/day. This value was smaller compared to the design-based IPLT influent. Factors that cause the difference between the quantity of influent IPLT according to the design and the results of the analysis (existing) are as follows:

1. Percentage of population was done emptying septic tank only 6.2%
2. The production rate of septage used as the basis for calculation in the design of 0.5 liters/person/day. The value was higher when compared with the results of the analysis of 0.28 liters/person/day
3. The factor of the tendency of truck to dispose of septage to IPLT is only 18%.

Restructuring of Septic Tank

Based on the above analysis , the low production of septage frompopulation's septic tank was caused by the construction of septic tank which was not water-resistant.The water can seep out of the tank and reduce the number of septage. Therefore, it was necessary to restructure the population's septic tank by conducting septic tank construction in accordance with the Restructuring of septic tanks Standard not only to support LLTT program which was one of IPLT's capacity fulfillment strategies, but it also to improve public health status. Considering that 80% of the people in Blitar City are using well water to meet their daily needs, whereas well water quality test results showed that several respondents' wells contained Escherichia coli bacteria.

Implementation of septic tank development requires funding source. Some funding sources that could be used for septic tank development activities include: APBD, Local Wastewater Management Grants from the Ministry of Public Work and Housing, CSR and self-help by micro credit. The allocation of funds sourced from APBD for septic tank development was very limited, only for the construction of 30 septic tank units per year. To obtain grant funds, the regions were still struggling to finance the implementation of regional grants because they used reimbursement system. In addition to government funding sources, septic tank development should be funded from CSR. But the cooperation in the field of sanitation thus far was still not yet maximum.It was necessary to create a superior product that can attract the interest of CSR. One of the most effective funding options for septic tank development was microcredit. Through this micro credit,people could divide the cost into several parts. It was not too burdensome and more affordable. Payment could be made on a weekly or monthly basis which was usually done within a period of 1-2 years.

Analysis of septage production by optimizing existing truck

Truck was an important factor in IPLT operations. The truck was used to transport septage from septic tanks to IPLT. The number of truck in Blitar City can be seen in Table 2.

Table 2. Number of Truck

No	Name of Company	Capacity (m^3)	Number (unit)
1	CV. Central Jasa	3,5	1
2	CV. Sumber Rejeki	2	1
3	Environment Agency of Blitar City(DLH)	3,5	1

The volume of septage was sucked of septic tank is 1.5 m^3 per. The number of ritations that could be done in 1 day as much as 2 ritations. 2 units of truck capacity of 3.5 m^3 capable transporting of septage was 12 m^3/day. 1 unit of car with capacity 2 m^3capable transporting of septage 3 m^3/day. The optimization of 3 transport fleets could produce 15 m^3/ day of septagein 2018.

In the year 2018 conducted procurement of 2 units of tank truck capacity 3.5 m^3. The procurement of trucks was done by the Public Works and Spatial Planning Agency and the Environmental Agency of Blitar City. Procurement of trucks could be used for operations in 2019. The number of fleets in 2019 as much as 4 truck capacity of 3.5 m^3 and 1 unit of stool capacity of 2 m^3. The optimization of 5 transport fleets can produce septage of 27 m^3/day by 2019. The result of the analysis of the estimated septage results from the optimization of existing transport fleet operations was presented in Figure 1.

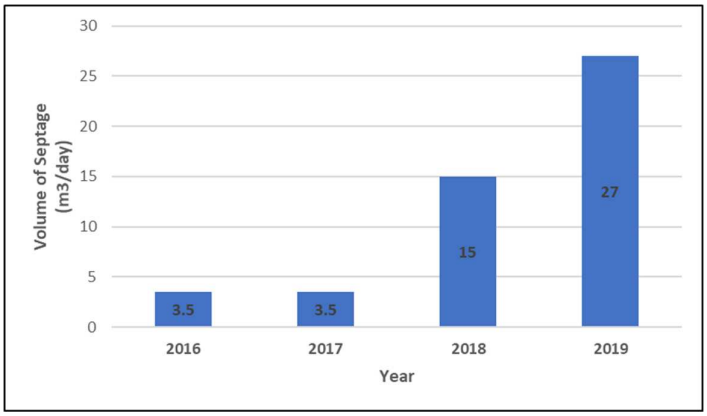


Figure 1. Estimated Production of Septage

Existing truck operations in 2018 focused in the promotion and socialization of planned implementation of the scheduling of septic tank emptying (LLTT). Promotion could be done by providing free sterilization service for 3000 septic tanks and communal WWTP. This is adjusted to the available the truck to emptying septage from septic tank of 15 m^3/day. Blitar City Government must provide operational budget promotion in 2018. Promotional funding could be done through cooperation with CSR.

IPLT Capacity Fulfillment Analysis was withthe scheduling of septic tank emptying (LLTT). The operations of the freight fleet should be supported by activities periodic emptying of septic tank. These activities was the scheduling of septic tank emptyingprograms (LLTT). The concept of LLTT implementation showed the period of emptying, the number of customers and financial estimates. A customer was a building that had a septic tank to be serviced by LLTT. Priority buildings that have potential as LLTT customers was as follows:

1. Government office building
2. School buildings
3. Health facility building
4. Public facility building / market building
5. Commercial building
6. Regular settlement building
7. Residential buildings are solid and irregular.

Number of customers that could be served for 1 LLTT (3 years) period by operating 5 transport fleets as many as 14,976 customers. The calculation of the number of services for the classification of customers each year in 1 LLTT period as in Table 3.

Table 3. Number of services for each customer classification in 1 LLTT period

Customer Classification	Number of services		
	Year 1	Year 2	Year 3
Government office building	17	17	17
School buildings	80	80	79
Health facility building	13	13	13
Public facility building	1	1	1
Commercial building	5	5	5
Residential buildings	4.749	4.749	4.748

Operational Costsand Retribution LLTT

In 2016, revenues received from septic tank emptying levies can not meet the operational costs of IPLT. Revenue from retributions could be sufficient for the operational costs of IPLT by implementing the LLTT program. Cost components for LLTT operations include personnel costs, operating costs of suctioning and transportation, maintenance costs and administrative costs. The cost required to pay the salary of an employee for an LLTT operation is Rp. 178,632,000.00/Year. The cost of suctioning consists of the cost of suction and the cost of fossil fuels of Rp. 563,472,000.00/year. The cost of truck maintenance consists of repair and replacement cost of truck spare parts of Rp. Rp. 76,640,320.00/year. Maintenance cost of processing unit consists of maintenance cost of processing unit, septage removal Rp. 28,829,040.00/year. Office administration costs consist of the cost of purchasing office supplies, influent and effluent testing, promotion and electricity amounting to Rp.

49,500,000.00/year. Based on the calculation of each component of operational and maintenance cost, the total operational cost of LLTT each year is Rp. 897,073,360,00.

The calculation of the basic levy of LLTT was done so the income of LLTT retribution could be sufficient for operational cost of LLTT. The basic levy was the average levy that be charged to LLTT customers but not the levy charged to LLTT customers. Customers levies was calculated based on the basic retribution taking into account the profitability plan. The calculation of basic levy based on operational cost divided by the number of subscribers, which is Rp. 4,992.00/month. The amount of LLTT customer levy was calculated by adding a profit of 10% of the basic LLTT levy, earned a value of Rp. 5,500.00/month. Levy for 1 LLTT (3 years) period of Rp. 198,000.00.Levy based on Peraturan Daerah Kota Blitar No. 7/2017 is Rp. 200,000.00 for once emptying of septic tank [14]. The result of LLTT retribution is smaller than the levy based on Peraturan Daerah Kota Blitar No. 7/2017.

Mechanism of payment of retribution of LLTT implementation could be done in 2 ways, namely regular payment and once payment. One payment is the payment of levies made after the customer receives a septic tank emptying service. Routine payment is the payment of retributions made gradually in the form of monthly payments in the hope of not incriminating customers. The levy payment mechanism is expected to integrate with existing payment systems.

CONCLUSIONS

The low production of septage from septic tanks in Blitar City was due to non-water resistant septic tank construction . Implementation of septic tank recovery program and LLTT could fulfill the design capacity of IPLT in 2019. The operational and maintenance costs of IPLT could be fulfilled from retribution revenue if the LLTT program was running well.

REFERENCES

[1]. The Ministry of Public Works Directorate General of Cipta Karya. 2014 on Guidelines for Scheduling of Septic tank Emptying (LLTT). Jakarta

[2]. Oktarina, Dwi and Haki, Helmi. 2013.Planning Installation of Septage Treatment Plant Pond System in Palembang (Study : IPLT Sukawinata). Civil Engineering Journal. Vol. 1. No.1. ISSN : 2355-374X

[3]. Wibowo, Ari and Andriyani, Rian. 2016. Calculation of the Number of Escherichia Coli Bacteria With Image Processing Through Thresholding Method And Counting Morphology.JITER. Vol. II. No. 3. ISSN : 2407 – 3911.

[4]. Directorate of PPLP DirjenCiptaKarya, Jakarta. 2015.

[5]. Nuraeni, R. and Anggraini, F. 2015. Performance Diagnosis of Septage Processing Instalation (IPLT). Widyariset, Vol. 1 No. 1.

[6]. Environment Agency of Blitar City. 2016.

[7]. Public Health Agency of Blitar City. 2017.

[8]. Ministry of Public Works. 2007.Regulation of Ministry of Public Works No. 18/PRT/M/2007 on Development Drinking Water Supply Sistem. Jakarta

[9]. Ministry of Public Works and People's Housing. 2017. Regulatian of Ministry of Public Works and People's HousingNo.4/PRT/M/2017 on The Implementation of Domestic Waste Water Management System. Jakarta

[10]. National Standardization Agency. 2016. SNI 03-2398-2002. on Procedure of Planning of Septic Tank. Jakarta.

[11]. Public Works and Spatial Planning Agency of Blitar City. 2017.

[12]. Mangkoedihardjo, S. 2010. A new approach for the Surabaya Sewerage and Sanitation Development Programme 2020. Advances in Natural and Applied Sciences, 4(3): 233-235.

[13]. Sudarmadji and Hamdi. 2013. Septic Tank and its Implantation as a Dirty Discharge System on the Surface of a Family Residence. Civil Engineering Journal. Vol. 9, No. 2.

[14]. The Government of Blitar City. 2017. Regulation of The Government of Blitar CityNo. 7/2017 on General Servis Levy. Blitar.

J. Appl. Environ. Biol. Sci., 8(2)59-67, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Exploring Authentic Leadership in Relation to Work Engagement in Public and Private Sector Universities

Said Saeed[1], Prof. Dr. Riasat Ali[2]

[1]PhD Research Scholar, Department of Education, Abdul Wali Khan University Mardan
[2]Department of Education, Abdul Wali Khan University Mardan

Received: October 6, 2017
Accepted: December 19, 2017

ABSTRACT

The study aims at to explore the authentic leadership attributes (ALA) and its impact on work engagement. The objectives of the study were to investigate ALA of leaders and measure relationship between ALA and work engagement at university level. The population of the study was 6975. The sample of the study was 967. The mixed method approach was used to collect information from sample through modified form of ALQ developed by Walumbwa, Avolio, Gardener, Wernsing, & Peterson (2008) and interviews. Analysis was done with percentage, Mean, STD, independent sample t-test, Pearson's rank correlation and thematic analysis. It was found that r value (.426) which was significant at .000 showed significant positive and average level correlations between ALA and work engagement at university level. It is suggested that followers may be involved in positive activities and be provided more leadership opportunities for the achievement of organizational goal and personal development.
KEYWORDS: leadership; authentic leadership attributes; work engagement

INTRODUCTION[1]

The world is rapidly changing and transforming. Quickly changing educational contexts demand adroit leadership retorts. Everything needs refinement and takes a new shape. Similarly, leadership requires fine-tuning and is taking the form of authentic leadership. Authentic leadership is self-awareness, relational transparency, balanced processing and ethical perspective [29], knowledge capital, two way learning and integrity [7], true self [26] and idealized influence [28] is more follower-centered in comparison to most of the recognized leadership models that come into view more leader- centered [21]. The organizations of present time require Authentic leaders to build up authentic leadership (ALs) in their followers for constructive and optimistic decision-making behaviors which comes to an end in encouraging administrative outcomes such as follower leader interactions, follower authentic leadership development, and work engagement. Authentic leader is always cognizant of his natural abilities, recognizes his/her shortcomings and works hard to overcome loopholes [15]. He /she establishes direct relationship with followers for bringing improvement in organizational structure and its values.

Research problem

The new millennium in Pakistan, is shocking and dismal for many people due to the unethical practices in all walks of life. The society is feeling thirst for a new brand of leaders who epitomize an understanding and cognizance of aim and show loyalty to beliefs and ethics. [12] suggested that people require leaders who are the symbols of principles and straightforwardness; and who are the nice agents of the heritage left by their forerunners. The main purpose of this article is to investigate the attributes of authentic leadership and its relationship with work engagement at university level. The previous research works have shown that authenticity and authentic leadership have positive influences on the performance of the human resources.

Research Objectives

The objectives of the study were;

1) To investigate authentic leadership attributes of educational leaders at university level
2) To investigate work engagement at university level

[1] Note: This paper is based on the PhD dissertation of the scholar.

Corresponding Author: Said Saeed, PhD Research Scholar, department of Education, AWKUM, Email. syedsaeed54@gmail.com

3) To measure relationship between authentic leadership attributes and work engagement in public and private sector universities

Research questions

1. What are authentic leadership attributes of educational leaders at university level?
2. What is the existing status of work engagement as organizational development at university level?
3. Is there a relationship between authentic leadership attributes and work engagement in public and private sector universities?

LITERATURE REVIEW

Authentic Leadership (AL) appeared as a fruit of the previous leadership notions. It has universality. As organizations develop, so problems created. The best weapon to handle such type of situation in academic institutions is AL[11]. Leaders in academic circles are forefront workforce [27], properly grooming the next generation to face lurking challenges and intricacies of the time.

The present circumstances are more intricate. Therefore, AL is very necessary in academic organizations to handle such type of complicated problems [6]. The different empirical studies showed the variables of AL i.e. self-awareness (SA), relational transparency (RT), ethical perspective (EP), balance processing information- BPI [29], positive psychological capital, self-truth and authenticity [23]); as well as diverse components of organizational development, org. effectiveness, communication, behavior, psychological capital, pedagogical development, job satisfaction, classroom management, professional development trainings, follower leader interaction, follower AL development and work engagement.

AL is a gathering of self-information, understanding and thoughtfulness to the positioning of other people and a methodological cleverness that proceeds to the interaction of leadership actions [5].AL produces significant transformation in the life of individuals[19]

AL! Thy name is self-identity, self-knowing, followers-knowing, world-knowing and God-knowing. AL is showing truth and feeling fair in his/her dealing with others [12]. AL is all-encompassing and inclusive of both transformational and transactional leadership styles [2].

The authentic leaders have distinguishing qualities of influencing the followers in a way as to enhance the feeling of assurance, devotion, enthusiasm, keenness, perseverance, allegiance, staunchness and inspiring to progress the responsibilities accomplished in the organization perpetually[1]. Ethics and morality of the leader is the crucial component of AL theory [16].

[18] posit that ALs is the product of the aftermath of industrialized management theory, signifying, it is cooperative, interpersonal, and not concentrated on specific spearhead. Answers to organizational challenges and opportunities have been provided by authentic practices and AL theory, for institutional transformation, by admitting how their different and crisscrossing social individualities influence them. Narrative, reflection and other modes focus leaders to examine the roots of their morals, and activities; and to encourage followers [8].

Since the inception of sophisticated technology, fiscal pressures, transnational competition, organizational initiatives, and an ever-growing financial and ethical climate; leaders in both private and public sector universities are meeting a high degree of difficulty in the environment [15]. There is struggle for skills across organizations; upholding worker engagement is challenging; leaders can no longer dependent on their authority to attain their targets [10]. Their workforce also expect to be esteemed, appreciated and supported and to see their leaders as models of truth. At the same time, leaders have to make hard decisions which sometimes go against the outlooks and principles of their followers [25]. The atmosphere in organizations is progressively multifaceted and challenging, and some leaders are not succeeding to cope within it, as apparent by the number of organizations that continue to experience failings. Many leaders are struggling to develop organizations that can operate successfully within multifarious settings; while ensuring that their followers behave ethically [23]. Leaders are as being 'climate engineers'; what they convey through their character, principles, philosophies, fondness, and manners, leaves an influence on those they lead [18].

Authentic Leaders upkeep the welfare of their followers, making availability of advising, shelter, positive response and information that they would otherwise have deficiency [17].

METHODOLOGY

The study was mixed method research in nature. It is the blend of numerical and non-numerical methodologies in one study [9]. Concurrent triangulation design (Convergent Parallel design) was used.

The population was all VCs/ Deans, HEC approved supervisors, heads of departments (HODs), and teaching faculty of public and private sector universities of Khyber Pakhtunkhwa leading and teaching at different levels. HEC website was visited for the identification of the available population in twenty nine (29) public and private sector universities of Khyber Pakhtunkhwa. Twnenty nine (29) vice chancellors / (58) Deans, four hundred and theirty two (432) HODs, seven hundred and seventy two (772) HEC approved supervisors; and five thousand, seven hundred and forty two (5742) assistant professors and lecturers comprised the population of the study.

Simple random and purposive sampling techniques were adopted for selection of leaders and teachers from 13 universities. The human resources sample comprised twelve (12 with 40%) vice chancellors/ Deans, one hundred and ninety five (195 with 45%) HODs, three hundred and fifty (350 with 45%) HEC supervisors and four hundred and ten (410 with 8%) assistant professors and lecturers; total sample of the study was nine hundred and fifty seven (967) from nine (9) public and four (04) private sector universities (45%) of Khyber Pakhtunkhwa.

Questionnaires and in-depth interview were used as research instruments to collect data from the concerned participants and informants.

RESULTS AND DISCUSSION

Mean was applied to analyse the collected data.
The Mean Score= 1.00 --- 1.50 = Strongly Disagree
The Mean Score=1.51---2.50 = Disagree
The Mean Score= 2.51--- 3.50= Undecided
The Mean Score= 3.51--- 4.50= Agree
The Mean Score= 4.51--- 5.00= Strongly Agree

R.Q.1:- What are authentic leadership attributes of educational leaders at university level?

Table 4.1 ***Self-Awareness among university leaders***

S. No	Statements	M	Std
1	I can list my three greatest weak points.	4.54	.669
2	I can list my three greatest strong points.	4.67	.649
3	I seek feedback as a way of understanding who I really am as a person.	4.43	.666
4	I accept the feelings I have about myself.	4.69	.465
5	I consider myself answerable to all.	4.54	.810
6	I remain I am aware of my own loopholes and openly discuss with followers.	4.53	.667
	Overall	4.57	0.65

Table 4.1 shows that respondents are "strongly agreed" with the five statements of self-awareness construct having mean scores 4.54, 4.67, 4.69, 4.54 and 4.53 which come in the (Range from 4.51 to 5.00) among leaders. Statements "*I seek feedback as a way of understanding who I really am as a person"* has the mean scores "4.43" which comes in the range (3.51 – 4.50) indicates that respondents are agreed. The overall mean score 4.57 comes in the range (4.51 - 5.00) shows that all the respondents are strongly agreed with the construct of self-awareness of authentic leadership. The mean scores further show that the most of the leaders at university level are self-aware and have the attribute of self-awareness, which is the prime component of authentic leadership.

However, all the STD scores reflect that all the respondents have convergence in their opinions about the statements of self-awareness construct.

Table 4.2 ***Relational Transparency among university leaders***

S. No	Statements	M	Std
1	I openly share my feelings with others.	4.81	.419
2	I let others know who I truly am as a person.	4.73	.440
3	I rarely present a "false" front to others.	3.54	.720
4	I confess to others for my mistakes.	4.53	.681
5	I almost always consult with my team before decision-making.	4.83	.388
6	I keep positive relations with followers.	4.26	.440
	Overall	4.45	.514

Table 4.2 indicates that respondents are "strongly agreed" (Range from 4.53 to 4.83) with the four statements. Statements "*I rarely present a "false" front to others.*" and "*I keep positive relations with followers.*" have the mean scores "3.54" and "4.26" which demonstrate that the respondents are agreed with two statements. The overall mean score 4.45 follows the range (3.51 - 4.50) shows that all the respondents are agreed with all the statements. The mean scores further show that the leaders at

university level have transparency in their relationship with followers and have the attribute of relational transparency, which is the key component of authentic leadership.
However, most of the STD scores reflect that all the respondents are unanimous on their opinions about the statements.

Table 4.3 ***Balance Processing of Information among university leaders and followers***

S. No	Statements	M	Std
1	I seek others' opinions before making up my own mind.	4.56	.685
2	I listen closely to the ideas of those who disagree with me.	4.74	.539
3	I do not emphasize my own point of view at the expense of others.	4.55	.677
4	I listen carefully to the ideas of others before making decisions.	3.51	.751
5	My followers feel I am genuinely interested in serving them.	3.71	.847
6	I share my information with followers.	4.15	.575
	Overall	4.20	.679

Table 4.3 point to that respondents are “strongly agreed” (Range from 4.55 to 4.74) as come in range of strongly agreed (4.51 to 5.00) with the three statements and “agreed” (Ranged from 3.51 to 4.15) as come in the range (3.50 to 4.50). The overall mean score 4.20 move toward the range (3.51 - 4.50) shows that all the respondents were agreed with all the statements. The mean scores further show that the leaders at university level have the balance processing of information within the outskirts of the university and have the quality of balance processing of information, which is an important component of authentic leadership.
However, the standard deviation scores reflect that all the respondents are undivided in their opinions about the statements of balance processing.

Table 4.4 ***Ethical perspective among university leaders***

S. No	Statements	M	Std
1	My actions reflect my core values.	4.66	.668
2	I do notallow group pressure to control me.	4.67	.660
3	Other people know where I stand on controversial issues.	4.70	.638
4	My moral standards guide me what I see to do as a leader.	4.70	.638
5	I deal ethically with my followers.	4.59	.662
6	I look forward to creating genuine relationship through my association at work.	4.59	.662
	Overall	4.65	0.65

Table 4.4 describes that respondents are “strongly agreed” (Range from 4.59 to 4.70) with the all six statements. The overall mean score 4.65 follows the range (4.51 - 5.00) displays that all the respondents are strongly agreed with all the statements. The mean scores further show that the leaders at university level are ethically strong and have the attribute of ethical perspective, which is a major component of authentic leadership.
However, most of the standard deviation scores reflect that all the respondents are exclusive in their opinions about the statements ethical perspective.

Table 4.5 ***Positive psychological capital among university leaders***

S. No	Statements	M	Std
1	I am optimistic in my performance as role model for my followers.	4.59	.662
2	I share common vision with my associates.	4.49	.809
3	I encourage my co-workers when facing difficulties.	4.49	.809
4	I try to become a model of authentic leadership attributes.	4.48	.809
5	The actions I take are always linked with my values.	4.49	.809
6	I am resilient and won’t be unhappy for long.	4.68	.646
	Overall	4.53	0.75

Table 4.5 refers to that respondents are “agreed” (Range from 4.48 to 4.49) with the four statements. Statements “I am optimistic in my performance as role model for my followers.” and “I am resilient and won’t be unhappy for long” having the mean scores “4.59” and “4.68” which express that the respondents are strongly agreed with these two statements. The overall mean score 4.53 emanates in the range (4.51 - 5.00) shows that all the respondents are strongly agreed with all the statements. The mean scores further show that the leaders at university level are hopeful, self-efficacious, resilient and optimistic; and have the attribute of positive psychological capital, which is a most important component of authentic leadership.
However, the standard deviation scores reflect that all the respondents have the similar opinions about the statements of positive psychological capita

Table 4.6:- *Work engagement among university teachers*

S. No	Statements	M	Std
1	I get motivation from my AL to accomplish my set goals	4.13	0.72
	AL enhances my job performance	4.16	0.73
3	At work, I keep it up, even when things do not go well	4.37	0.66
4	My job inspires me	4.55	0.67
5	I am immersed (get involved deeply) in my work	3.94	0.87
6	Al encourages my persistence even in face of obstacles	4.24	0.62
	Overall	4.23	0.71

Table 4.6 mentions that respondents are "agreed" (Range from 3.94 to 4.37) with five the statements as come in the range (3.51 to 4.50). Statements "My job inspires me" having the mean scores "4.55" which takes place in the range (4.50- 5.00) expresses that the respondents were strongly agreed. The overall mean score 4.23 emanates in the range (3.51 - 4.50) illustrates that all the respondents were agreed with all the statements of work engagement. The mean scores further show that the leaders at university level have the abilities to engage followers in the best of their activities for the development of the organization and well-being of the human resources and believe that work engagement is the best construct for the organizational development and a necessary element for the professional development of the teachers and other followers.
However, the standard deviation scores reflect that all the respondents have the alike opinions about the statements of work engagement.

Table 4.7 *Pearson Product Moment Correlations between self-awareness and work engagement*

Correlations			
		SA	WE
Self-awareness	Pearson Correlation	-	.388**
	Sig. (2-tailed)		.000
	N		967
Work engagement	Pearson Correlation		-
	Sig. (2-tailed)		.000
	N		967
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table illustrates that the self-awareness which is the first construct of authentic leadership has the average correlation for work engagement (r value .388) which is significant at .000

Table 4.8 *Pearson Product Moment Correlations between relational transparency and the components of organizational development*

Correlations			
		RT	WE
Relational Transparency	Pearson Correlation	-	.115**
	Sig. (2-tailed)		.000
	N		967
Work Engagement	Pearson Correlation		-
	Sig. (2-tailed)		.000
	N		967
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table illustrates that the relational transparency which is the most important construct of authentic leadership has the highest correlation for work engagement (r value .115) which is significant at .000.

Table 4.9 *Pearson Product Moment Correlations between balance processing and the components of organizational development*

Correlations			
		BP	WE
Balance processing	Pearson Correlation	-	.129**
	Sig. (2-tailed)		.000
	N		967
Work engagement	Pearson Correlation		-
	Sig. (2-tailed)		.000
	N		967
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table illustrates that the balance processing which is the third construct of authentic leadership has the highest correlation for work engagement (r value .129) which is significant at .000

Table 4.10 ***Pearson Product Moment Correlations between ethical perspective and the components of organizational development***

Correlations			
		EP	WE
Ethical Perspective	Pearson Correlation	-	.177**
	Sig. (2-tailed)		.000
	N		967
Work engagement	Pearson Correlation		- .912**
	Sig. (2-tailed)		.000
	N		967
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table illustrates that the ethical perspective which is the fourth construct of authentic leadership has the highest correlation for work engagement (r value .177) which is significant at .000

Table 4.11 Pearson ***Product Moment Correlations between positive psychological capital and*** **work engagement**

Correlations			
		PPC	WE
Positive Psychological Capital	Pearson Correlation	-	.255**
	Sig. (2-tailed)		.000
	N		967
Work Engagement	Pearson Correlation		- .912**
	Sig. (2-tailed)		.000
	N		967
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table illustrates that the ethical perspective which is the construct of authentic leadership has the highest correlation for work engagement (r value .255) which is significant at .000

Table 4.12 ***Pearson Product Moment Correlations between authentic leadership attributes and*** **work engagement**

Correlations			
		Authentic leadership attributes	Work engagement
Authentic leadership Attributes	Pearson Correlation	-	.426**
	Sig. (2-tailed)		.000
	N		967
Work engagement	Pearson Correlation		-
	Sig. (2-tailed)		
	N	967	967
**. Correlation is significant at the 0.01 level (2-tailed).			

Medium positive correlation between the two variables, $r = .426$, $n = 967$, $P < .000$, not as much of .05 indicating the statistical significance of the results. Cohen (1988) suggests the following guidelines: small correlation (r=.10 to .29) medium correlation (r=.30 to .49) large correlation (r=.50 to 1.0) (pp.79-81). In the light of this suggestion, there is medium correlation (r=.426) between authentic leadership attributes and work engagement.

Table 4.13 ***Sector-wise correlation between authentic leadership attributes and*** **work engagement** ***in public and private sectors***

Correlations						
	Type of organization (binned)	**N**	**Mean**	**Std deviation**	**r value**	**Sig. level**
Authentic leadership attributes	Public		140.8170	7.52612		
Work engagement		483			.355	.000
Authentic leadership attributes	Private		134.0424	14.96052		
Work engagement		484			.519	.000

**. Correlation is significant at the 0.01 level (2-tailed).

The above table illustrates the mean, STD deviation, Pearson correlations and significance of the authentic leadership attributes and organizational development (teacher professional development) from sector-wise perspective. The mean score of the authentic leadership attributes and teacher professional development in public and private sector universities was 140.8170 and 134.0424 with standard deviation 7.52612 and 14.96052. The r value between authentic leadership attributes and teacher professional development in public sector universities is (r = .355) which shows medium relationship which is highly significant as shown by the significant level (.000). The r value between authentic leadership attributes and teacher professional development in private sector universities is (r = .519) which is indicative of large correlations as suggested by Cohen (1988) that small correlation ranges from (.10 to .29) medium correlation (.30 to .49) and large correlation (.50 to 1.0) which is highly significant as shown by the significant level (.000).These values show that relationship between authentic leadership attributes and teacher professional development in private sector universities is higher than public sector universities.

Major findings of the study were;

1. There were five statements in self-awareness construct of authentic leadership. The overall mean score (4.57) showed that majority of university leaders were aware and strongly agreed on this construct of authentic leadership. (table 4.1)
2. There were six statements on relational transparency where the overall mean score was (4.45) which reflected that majority of university leaders were aware and transparent in relations; and agreed that relational transparency was an important construct of authentic leadership. (table 4.2)
3. The overall mean score (4.20) of authentic leaders and followers interactions showed that majority of the respondents were aware and agreed that balance processing of information was an important construct of authentic leadership. (table 4.3)
4. Majority of the respondents were aware and strongly agreed that ethical perspective of authentic leadership was an important construct as shown by the cumulative mean score (4.65) of all six statements on the construct. (table 4.4)
5. The overall mean score (4.53) showed that majority of university leaders were strongly agreed that positive psychological capital was an important component of authentic leadership. (table 4.5)
6. The overall mean score (4.23) illustrates that all the respondents were agreed with all the statements of work engagement. The mean scores further show that the leaders at university level have the abilities to engage followers in the best of their activities for the development of the organization and well-being of the human resources and believe that work engagement is the best construct for the organizational development.
7. The r values (.388, .115, .129, .177 and .255) which were significant at .000 showed significant positive correlation with work engagement (table 4.7, 4.8. 4.9, 4.10 & 4.11)
8. The r value (.426) which was significant at .000 showed significant positive and average level correlations between authentic leadership and work engagement at university level. (table 4.12)
9. The r value (.355) which was significant at .000 showed a significant positive and average level correlation in public sector universities between authentic leadership and work engagement at university level. (table 4.13)
10. The r value (.519) which was significant at .000 showed a significant positive and average level correlation in private sector universities between authentic leadership and organizational development at university level. (table 4.13)
11. Most of the qualitative data support the quantitative data as all the major themes of the qualitative data such as self-awareness, relational transparency, ethical perspectives, positive psychological capital, and balance processing of information of authentic leadership supported the quantitative authentic leadership constructs taken from literature of empirical studies. Similarly, major themes emerged from qualitative data on work engagement supported the quantitative constructs taken from research studies.

The present study adds to the authentic leadership literature by documenting empirical support of relationship between authentic leadership and work engagement. All hypothesized relations were supported by the data, as expected authentic leadership attributes self-awareness, relational transparency, ethical perspective and balance processing information [29]were significantly positively related to work engagement[3];[23]. This finding was consistent with [29], who found self-awareness, relational transparency, ethical perspective and balance processing of information as the constructs of authentic leadership.

It was found that positive psychological capital attribute of authentic leadership to be significantly positively related to work engagement. This finding is in line with previous research of [24].

Leaders who are professed to be more moral and make righteous decisions will be professed as caring more about their followers [7]. Furthermore, AL has got a strong relation to enhanced task performance [20]and performance at both the group and organizational levels [14], in part, because persons who are authentic are able to efficiently use balanced processing of information and establish consistency between their sayings and actions [29]. [11]) present a "conceptual framework for authentic leader and follower development" in which the development of followership is the result of Authentic Leadership. *"a pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development"* [24], p. 62).

Recommendations

In the light of findings of the study following recommendations were made;

Authentic Leadership must be the theoretical lens through which all educational leadership development is perceived and developed. Since [6] defines that Authentic Leadership *"is a metaphor for professionally effective, ethically sound, and consciously reflective practices in educational administration"*, therefore, it is time for universities to encourage, motivate, progress and develop authentic leaders. Organizations in my country desires educational leaders who, while at the forward-facing line of defense is grooming and educating a new generation through authentic leadership as it is considered the architect of morality, are not guaranteed by position and prestige, but who lead by the attributes of Authentic Leadership. In reality, what this researcher actually learned from the study is that followers wish for authentic leadership in their universities.

Followers may be involved in positive activities for the achievement of organizational goal. It is suggested that more leadership opportunities be provided for workers, with the intention also to provide greater incentives to the professional.

It may be well to conduct research study on the authentic leadership at primary level, secondary level and college level both at private and public sectors as these areas are in great need of authentic leadership because these sectors suffered a lot due to unethical attitude of the leaders.

It is concluded from the interviews that theoretically leaders are very strong but in practice they are lagging behind. One interviewee remarked *"(HAM GUFTAAR K HERO HAN LAKEN KIRDAAR K ZERO). It means that speech-wise we are heroes but character-wise we are zeroes."* Therefore it is recommended that all leaders and teachers must work in disciplined ranks to repel evil. They must choose between Good and evil, with their consequences in the coming life. If they did well, they did well for themselves; if they did evil, they did it against themselves.

REFERENCES

[1] Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leader's impact follower attitudes and behaviors. The Leadership Quarterly, 15(3), 801–823.

[2] Avolio, B. J., & Gardner, W. L. (2005). Authentic Leadership Development: Getting to the root of positive forms of leadership. The Leadership Quarterly(16), 315-338. Retrieved December 20, 2015

[3] Banks, G. C., McCauley, K. D., Gardner, W. L., & Guler, C. E. (2016). A meta-analytic review of authentic and transformational leadership: A test for redundancy. The Leadership Quarterly, 27(4), 634-652.

[4] Begley, P. T. (2006). Self-knowledge, capacity and sensitivity: Prerequisites to authentic leadership by school principals. Journal of Educational Administration, 44 (6), 570–589.

[5] Bento, A. V., & Ribeiro, M. I. (2013, November). Authentic Leadership in School Organizations. European Scientic Journal, 9(31), 121-130. Retrieved March 6, 2017

[6] Bhindi, N. (2003). Practising creative leadership: Pipe dream or possibility? Journal of Educational Administration 44(6), 570-590.

[7] Brown, M. E. & Trevino, L.K. (2006). Ethical leadership: A review and future directions. Leadership Quarterly, 17, 595-616.

[8] Chávez, A. F., & Sanlo, R. (2013). Identity and leadership: Informing our lives, informing our practice.

[9] Creswell, J. W. (2013). "Steps in Conducting a Scholarly Mixed Methods Study" DBER Speaker Series. Paper48.http://digitalcommons.unl.edu/dberspeakers/48

[10] Francisco, M. B., Gonzales, D. R., & Vargas, S. M. (2015, November). Student Engagement: Association with teachers and peers as Motivators. International Journal of Education Investigation, 2(11), 1-17. Retrieved February 3, 2017

[11] Gardner, W.L., Avolio, B.J., Luthans, F., May, D.R., Walumbwa, F., (2005). Can you see the real me? A self-based model of authentic leader and follower development The Leadership Quarterly, 16, 343-372.

[12] George, W. (2003). Authentic leadership: Rediscovering the secrets to creating lasting value. San Francisco: Jossey-Bass.

[13] Guerrero, S., Lapalme, M. È., & Séguin, M. (2015). Board chair authentic leadership and nonexecutives' motivation and commitment. Journal of Leadership & Organizational Studies, 22(1), 88-101.

[14] Hannah, S. T., Walumbwa, F. O., & Fry, L. (2011a). Leadership in action teams: Team leader and members' authenticity, authenticity strength, and team outcomes.

[15] Hassan, A., & Ahmed, F. (2011). Authentic leadership, trust and work engagement. International Journal of Human and Social Sciences, 6(3), 164-170.

[16] Hester, J. P., & Killian, D. R. (2011). The leader as moral agent: Praise, blame, and the artificial person. The Journal of Values Based Leadership, 4, 93–104.

[17] Hsieh. C.C. & Dan-Shang Wang, D.S (2015) Does supervisor-perceived authentic leadership influence employee work engagement through employee-perceived authentic leadership and employee trust? The International Journal of Human Resource Management, 26 (18), 2329-2348.

[18] Huang, L., & Luthans, F. (2013). Authentic leadership and follower voice: The mediating role of voice self-efficacy in the leader-member exchange context. Unpublished study. J Mix Method Res, 1, 77-100.

[19] Kotlyar, I., & Karakowsky, L. (2007). Falling Over Ourselves to Follow the Leader. Journal of Leadership & Organizational Studies, 14(1), 38-49.

[20] Leroy, HAnseel, F., Gardner, W. L., &Sels, L. (2015). Authentic leadership, authentic followership, basic need satisfaction, and work role performance: A cross-level study. Journal of Management, 41(6), 1677-1697.

[21] Luthans, F., Youssef, C.M., Avolio, B.J. (2007). *Psychological Capital: developing the human competitive edge*. Oxford University Press, Oxford.

[22] Miralles, C., Navarro, J., & Unger, D. (2015). Daily work events and state work engagement: The mediating role of affect/Eventosdiarios y work engagement: El rolmediadordelafecto. *Revista de Psicología Social*, *30*(2), 264-294.

[23] Nonaka, I., & Takeuchi, H. (2011). The wise leader. *Harvard business review*, *89*(5), 58-67.

[24] Rego, A. Vitória, A. Magalhães, A, Ribeiro, N. & e Cunha, M. P. (2013). "Are authentic leaders associated with more virtuous, committed and potent teams?" *The Leadership Quarterly*, *24*(1), 61–79.

[25] Rich, B. L., Lepine, J. A., & Crawford, E. R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of management journal*, *53*(3), 617-635.

[26] Ridley, D. (2012). *The literature review: A step-by-step guide for students*. Sage.

[27] Scheurich, J., & Shikla, L. (2003). *Leadership for equity and excellence: Creating high-achievement classrooms, schools, and districts.* Thousand Oaks, CA: Corwin Press.

[28] Spillane, J. P. (2005, June). Distributed leadership. In *The educational forum, 69* (2), 143-150.Taylor & Francis Group.

[29] Walumbwa, F. O., Avolio, B. J., Gardner, W. L., Wernsing, T. S., & Peterson, S. J. (2008). Authentic leadership: Development and validation of a theory-based measure. *Journal of management*, *34*(1), 89-126.

J. Appl. Environ. Biol. Sci., 8(2)68-73, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Assessment of Work Stress among Police in Pakistan

Dr. Asad Afzal Humayon[1], Shoaib Raza[2*], Hina Amir[3], Muhammad Sajjad Hussain[4], Noor ul Ain Ansari[5]

COMSATS institute of Information Technology, Vehari, Pakistan[1&2]
COMSATS institute of Information Technology, Lahore, Pakistan[3]
Islamia University Bahawalpur, Pakistan[4]
COMSATS institute of Information Technology, Virtual Campus, Pakistan[5]

Received: October 18, 2017
Accepted: December 21, 2017

ABSTRACT

Police work stress has never been in sharper attention. Since police work is extremely stressful as they are constantly facing threat. The purpose of this empirical study was to assess the level of work load, work environment, and personal conflict in relationship with work stress among police force. This study was conducted in Punjab province of Pakistan at police department of district Vehari. An analysis was done on 120 police employees using Self-selection sampling technique. Robbins stress model was used as underpinning theory to support the relationships. It was found that 97% employees reported high stress in their police job. The result also showed that work load was the most significant factor to impact work stress. Therefore, to reduce work stress among police different dynamics of three factors should be considered.
KEY WORDS: Work load, Work environment, Personal conflict, Police department, Pakistan

INTRODUCTION

Like in many countries, the Government of Pakistan has spent large amount of money in order to function the police department [29]. Police are more responsive to change, more answerable to the people and more responsive to criticism than almost any incident in the Pakistan. The idea of policing in peace keeping of a country empowers the operations of police exceptionally demanding and fundamental for the advancement of any country [12]. Pakistan is a country that is distinguished by extremely stressful work situation owing to restricted resources and unnecessary work overload [5]. For last many years, police are being affected by stressful job negatively. Because police force have a great responsibility in this country so their satisfaction is essential for social development. Stress is quite a new trend at workplace of daily life and has become necessary effect on the society [2].

Society has been shifting rapidly but not the police. Sharp and psychologically charged behaviour is not desirable in today's society. Job stress is a regular problem in every employments and it affects on work performance [23]. In most situation cost related to stress affect both the employee and the organization [35-10]. Strict organizational formation, shift job, too much overtime, lack of career advancement, workplace favoritism, pressure to solve issue, and conflicts among colleague can also cause severe police stress [9]. Although different levels of stress are found in more or less all professions, police work has long been termed as a high stress, and critical profession [1-6].

Problem statement

Many issues experienced every day by police. Police work is an exceptionally unsafe activity in which officers can experience rough lawbreakers or need to utilize lethal power over the duration of their work. Besides, the bureaucratic mind of the police departments is an origin of stress and disappointment among officers. It is exceptionally challenging to work as police employees in the province of Punjab where they may expose the higher level of stress. In light of police records, there were many employees whom had dared to commit suicide or asked for transfers to other cities. This study intended to identify the factors that help to cope with work stress in the Punjab police force. By specifying these variables, the researcher trusts that it may enable the police department to recognize the issues with the police that significant counteractive might be made to overcome these difficulties. Hence, this study will try to cover the gap on issues that discussed above, and will look into the police stress at work place taking its work load, work environment and personal conflict consequences into account that have not so far been studied, within perspective of police department employees in Vehari.

***Corresponding Author:** Shoaib Raza, COMSATS institute of Information Technology, Vehari, Pakistan.
Email: shoaib.raza.rs@gmail.com

Justification of Research

Government of Pakistan has been taking serious actions to update the police services in Punjab [29]. While doing review, researcher noticed that in many studies police work stress has been integrated into research design with less theoretical justification. These facts provided a further justification to recognize the problems so that pertinent corrective actions may be taken to overwhelm these challenges. Keeping in perspective of the above truth researcher has distinguished that there is gap in Police department of Vehari i.e. the greater part of the employees are over stressed to work in an efficient way.

Significance of the study

The importance of this research is to underline the present situation in regard to the reason for stress among police officials at work that influences their day by day lives. The results ideally have the capacity to shed a few impacts with the stressors among police particularly in Vehari district. Therefore this study contributes knowledge about work stress and helps to develop a model. Thus this study is also significant to many other fields including healthcare and academicians.

LITERATURE

Police Work Stress

Stress among police is a phenomenon that happens when police work excessively over time and experience much worry because of absence of rest. This may cause great health and safety problems in police force such as unnecessary shift works, unhealthy food choice, and lack of exercise. Stress usually shows the feeling when one is stuck with a problem that is incapable to tackle. Therefore, employee starts feeling pressured by that problem. The word stress was first defined by Selye is the force or pressure exerts upon a material object or individual which oppose and attempt to maintain its original state [32]. So stress is a threat or challenge to one's wellbeing [11]. Stress not just influences the physical, mental and monetary balance of an employee yet in addition bosses too. Desired outcomes can't be come out from employees who are fatigued or stress, as they lose their stamina and mind full thinking. Police work stress may also come from the routine activities engaged at work, lack of inter-personal relationships, and daily living circumstances [12].These experiences compel some of police officers to involve in certain practices that are symptoms of stress for example high consumption of alcoholic drinks, intentional self killing, and marital divorce [33].Another study reveals that police officers reflected severe depression, anxiety, and stress, while female police officers are greater in number than their counterparts[14]. Broadly, the job of a police officer is very stressful [28].

Work Load and Police Work Stress

A large portion of the policemen remain overworked and have to live away from their families on daily basis. It regularly prompts rude behavior on duty employees. Therefore, workload can be defined as the physical or additional mental requirement related with an assignment to complete it. As organizations have become an important source of stress, and workloads and work related deadlines have increased variously [2]. Therefore, every organization is struggling to achieve its goals according to day to day shifting needs of new information technology world, such as, recruiting efficient employees, making new policies to increase the effectiveness and productivity [18]. Further, police stations are always over loaded with different tasks that increase stress and carry striking change in health system and work role. A study proved that work stress experienced by employees at work in which an individual is troubled with an excessive workload [25]. Workloads are some of the policing stress issues that increase the turnover rates among the police employees [16], and would be reasoning factor of their performance. Thus police stressors within organization can be characterized as undue workload [9], inherent and accepted by police force a result of stress. Based on the above discussion the first hypothesis is:

H_1: Workload has positive relationship with police work stress.

Work Environment and Police Work Stress

Work environment refers to the complex working conditions of a worker that relate to stress [12]. The stressful conditions include for example low lighting, air quality, cleanliness, pollution, acoustic, equipment, working hours, shift work, office politics, motivation, information, productivity, unfavorable or hostile environment, law and order environment, and torture environment fit each worker [31-29]. Workers with this pressure environment conceive stress, nervous tension [24-8]. Some studies have proved that rapidly changing environment caused employees to face physical and mental hazards which may affect of stress [3]. Most of the Police staff has to face very negative work environments. As police officers reported that physical environment is a great source of stress. Therefore, the

work environment has direct impact on their capability to work on assignments that they are asked to do so, and it affects on the health, productivity, and well being of employees [17]. The second hypothesis has been proposed below:

H_2: Inadequate work environment has positive relationship with police work stress.

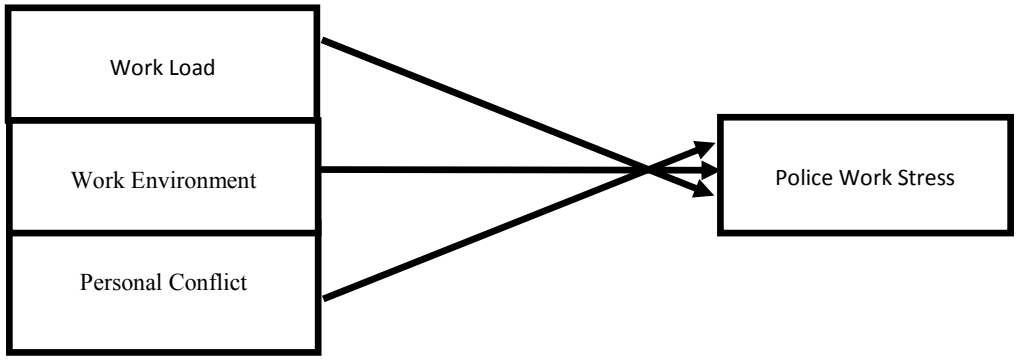
Personal Conflict and Police Work Stress

It is noted that Police officers who are psychologically exhausted tend to cause tensions by their job and react to issues at home or office with anger or anxiety. It has been noted also that seniors habitually treat their assistants in a ragged and abusive style. These outside stressful incidents can crash the quality, performance and overall satisfaction of relationships. In this way they spend less time with each other which is supposed to live with their counterparts. In a study revealed that supervisors have conflicting intention and generally autocratic mind are less considers their workers' wellbeing thus proved less results from subordinates [4]. Many studies have examined that conflicts over role caused a serious police stress [9-26]. They work in conflict situations, face hostile members of the society and deal with the certain political demands of public life [34].Further, a police officer without support of friend or family is more susceptible to police stressors [19].From above discussion third hypothesis derived:

H_3: Personal conflict has positive relationship with police work stress.

Robbins (2003) studied that when stress factors (environmental, organizational, and individual) act on specific individuals eventually it leads to different stress results [27]. Therefore underpinning theory of Robbins stress model has been used in this study to support the relationship.

Research Framework



METHODOLOGY

A quantitative technique was applied. Descriptive analysis was used to determine the level of stress among police force. Pearson correlation analysis was used to check the relationship among variables. Multi regression analysis was tested to find the most leading factor affecting work stress among police. Prior permission was taken from higher authority to collect the data. After getting permission a survey technique was used to collect the primary data on 5 point Likert scale with 1 = No Stress, 2 = Low Stress, 3 = Moderate Stress, 4 = High Stress, 5 = Very High Stress. SPSS-22 was used to test the hypothesis. The target population consisted of all police force working in city district Vehari, Punjab. Total 150 questionnaires were distributed and after carefully checking 30 incomplete questionnaires eliminated from the study. Therefore, a sample of 120 police employees was engaged in this study through Self-selection sampling technique. A self-administered questionnaire was used to examine the hypotheses.

Analysis

Table1 Respondents' Profile

Demographic	Classification	Frequency	Percentage (%)
Sex	Male	105	87.5
	Female	15	12.5
Age	Less than 24	22	18.34
	25-45	77	64.16
	46 and above	21	17.5
Ranks	SHO	7	5.83
	SI	16	13.33
	ASI	48	40.00
	HC	32	26.67
	Constable	17	14.17
Working Experience	Less than 5 years	22	18.33
	6 – 21 years	83	69.17
	22 years and above	15	12.5

Table 2 Level of Stress, Descriptive statistics, Reliabilities and Pearson Correlation of Variables

Variable	Low Stressor	Moderate Stressor	High Stressor	Mean	Standard Deviation	α	1	2	3	4
1. Work Stress	1	3	116	3.61	.363	.810	1			
2. Work Load	1	12	107	3.82	.422	.868	.860**	1		
3.Inadequate Work Environment	5	88	27	3.69	.438	.831	.679**	.542**	1	
4. Personal Conflict	6	71	43	3.40	.451	.879	.435**	.699**	.795**	1

** Significant Correlation at the 0.01 level (1-tailed).
* Significant Correlation at the 0.05 level (1-tailed).

Table 3 Test of Multiple Linear Regression Analysis

Variables	Beta	Sig.
Work Load	.349	.000
Inadequate Work Environment	.310	.003
Personal Conflict	.283	.000
R^2	.712	
Adjusted R^2	.705	
F value	3.610	
P value	.000	

***p<.05, **p<.01**

RESULTS AND DISCUSSION

Table 1 of police personal profiles showed that despite their work engagement they were very responsive to and cooperated in this survey. The male participants were greater 105(87.5%) than female participants 15(12.5%). Further, police age group 25-45 participated a lot with 77(64.16%) because their strength is greater in number. All the police rank officers participated in this study but ASI ratio was highest and total 48(40%) participated followed by HC whose participation ratio was 32 (26.67%). Similarly working experience group between 6-21 years was 83 (69.17%) which is highest in this study. Table 2 shows that 116 (97%) respondents agreed that they are facing high stress and exhausted. Next, work load is the highest source of stressor for respondents 107 (89%). Then, inadequate work environment show the moderate result 88 (73.33%) that police is feeling as compare to other institutions. After that, 71 (59%) police respondents believe that personal conflict has become high for example health, financial, and marriage life issues. Further table 2 shows the mean and standard deviation of variables where mean score is highest for work load (3.82) and S.D (.422). Similarly, the lowest mean is (3.40) for personal conflict and S.D (.451). Table 2 shows that reliability (α) of all the variables is more than 0.8 means scales were reliable to measure. The correlation test shows that work load is the high positive correlation stress ($r = .860$, $p < .01$) with work to enhance the stress among police force. The inadequate work environment also has the medium positive correlation ($r = .679$, $p < .01$) with work stress. This means ugly environment like regularly changes in policies, staff shortage, lack of leadership, dishonesty, 24 hrs duty and no job description, and leave restrictions are moderately source to raise the stress level. While, personal conflict also has medium positive correlation ($r = .435$, $p < .01$) with work stress. It becomes difficult to handle conflict in police department if an officer behaves negatively. Due to this they have also

momentous high rate of health issues. Table 3 shows R^2 value .712 shows that 71.2% of variation in work stress among police is explained by all the studied independent variables. It means that there is need of 28.8% more factors to explain work stress among police force. Further table 3 shows the regression values of all the variables are positive. The first regression value of work load (β = .349) has the strongest contribution to narrate the police stress. The second regression tested that inadequate work environment has (β = .310) which is the second highest contributor. The third and final regression examined that (β = .283) has low but significant contributor in work stress. The results show that work load has most of all contribution as it has the highest Beta value. All the variables are significant factors among police force. Thus, all the hypotheses (H_1, H_2, and H_3) are significant and accepted in this study.

The results are significant with positive correlation with work stress. The current study examined the work load in an attempt to find their opinion on causes of stress. The significant result is aligned with previous studies of [21-13]. Similarly inadequate work environment is commonly reported by police staff on daily basis and a study concluded these environmental issues lead to work dissatisfaction [20]. There is a serious need to avoid irritating environment since it affects employees' ability and so distress productivity levels[22]. Conflict during job starts when employee desires to get success, and has contrary demands competing against each other. Same is the case in police department where roles conflict among serve to society, law enforcing, buildup morale and meet individual responsibilities act like stressors. The findings show that personal conflict is high among police. The result also has support from previous research where it has significant correlation between conflict and stress [7]. In addition to financial matter also force employees to work extra for family welfare, but also cause of stress and tiredness to them [15].

Recommendation for future research

This research can be stretched out to wide scope on state level. It would likewise be intriguing to think about the variables that impact stress in urban versus provincial territories. Consequently more study should incorporate other organizations and individual factors

Conclusion

The present study addressed an important issue on police work stress and exposed the complexity of the situation. The study of 120 police employees was conducted in district Vehari of Punjab province of Pakistan. Majorities confirmed that workload had high impact on their daily life stress. In addition to working with coworkers, shortages of staff and lack of police rest are the most critical factors that contribute stress in working environment. As training alone cannot transform the behavior so there is need to change the police culture such as employee and boss relationships should be constructive. Therefore, proper stress management, training, reward and promotion opportunities can also contribute significantly to become an ideal workplace for police.

REFERENCES

[1] Anshel, M. (2000) 'A conceptual model and implications for coping with stressful events in police work', Criminal Justice and Behavior, 27, 375-400. URL at http://cjb.sagepub.com/content/27/3/375.full.pdf+htm Available at: cees.mak.ac.ug/sites/default/files/ public cations/Besigwa.doc, 1-35.

[2] Bano, B., & Jha, R. K. (2012). Organizational role stress among public and private sector employees: a comparative study.

[3] Begley, T. M., & Cazjka, J. M. (1993). Panel analysis of the moderating effects of commitment on job satisfaction, intent to quit, and health following organizational change. Journal of Applied Psychology, 78, 552–556.

[4] Besigwa, E.T.(2011). Quality of supervion and employees performance in mairye estates ltd,

[5] Bouckenooghe, D., Raja, U., Butt, A. N., Abbas, M., & Bilgrami, S. (2017). Unpacking the curvilinear relationship between negative affectivity, performance, and turnover intentions: The moderating effect of time-related work stress. *Journal of Management & Organization*, *23*(3), 373-391.

[6] Brown, J. M., and Campbell, E. A. (1994) 'Stress and policing: Sources and strategies', New York: John Wiley.

[7] Burke, R. J. (2003). Work experiences, stress and health among managerial women: Research and practice. *The handbook of work and health psychology*, 259.

[8] Caplan, R.D., Cobb, S., & French, J.R.P. (1975). Job demands and worker health: main effects and occupational difference. Washington. Dc: US Department of Health Education and Welfare.

[9] Collins, P. and Gibbs, C. (2003) 'Stress in police officers: A study of the origins, prevalence and severity of stress related symptoms within a county police force', Occupational Medicine, 53, 256-264.

[10] Cooper, C.L. and Marshall, J. (1976) 'Occupational source of stress: A review of the literature relating to coronary heart disease and mental ill health', Journal of Occupational Psychology 49(1). 11-28.
[11] Gardazi, S. F., Mobeen, N., & Gardazi, S. A. A. (2016). Causes of Stress and Burnout among Working Mothers in Pakistan. *The Qualitative Report*, *21*(5), 916.
[12] Gyamfi, G. D. (2014). Influence of job stress on job satisfaction: Empirical evidence from Ghana Police Service. *International Business Research*, *7*(9), 108.
[13] Hamim, N. (2015). Workload and work stress on caring behavior in nurse on nursing services. *International Journal of Human Resource Studies*, *5*(3), 148-160.
[14] Husain, W., Sajad, R., & Rehman, A. (2014). Depression, Anxiety and stress among female and male police officers. *Pakistan Journal of clinical psychology*, *13*(1), 3-14.
[15] Ivie, D., & Garland, B. (2011). Stress and burnout in policing: does military experience matter?. *Policing: An International Journal of Police Strategies & Management*, *34*(1), 49-66.
[16] Julseth, J., Ruiz, J., & Hummer, D. (2011, Autumn). Municipal police officer job satisfaction in Pennsylvania: A study of organizational development in small police departments. International Journal of Police Science & Management, 13(3), 243–254. http://dx.doi.org/10.1350/ijps.2011.13.3.228
[17] KEMBOI, P. C. (2016). DETERMINANTS OF EMPLOYEE JOB SATISFACTION IN PUBLIC SECURITY SECTOR IN KENYA: A CASE OF NATIONAL POLICE SERVICE. *Strategic Journal of Business & Change Management*, *3*(2).
[18] Khan, K., & Imtiaz, A. (2013). Occupational Stressors and Employee Performance in Service Sector of Lahore, Pakistan. *Journal of Research (Humanities)*.
[19] Kirschman, E. (2006) 'I Love a Cop: What Police families Need to Know', (Revised edition) New York, NY, USA: Guilford press, 2006. pp.66. URL at http://site.ebrary.com/lib/tromsoub/docDetail.action?docID=10176567 accessed at 05/03/2011
[20] Leaman, A. 1995. Dissatisfaction and office productivity. *Facilities* 13(2): 13-19.
[21] Leka, S., Griffiths, A., Cox, T., & World Health Organization. (2003). Work organisation and stress: Systematic problem approaches for employers, managers and trade union representatives.
[22] Makhbul, Z. M., Senik, Z. C., & Abdullah, N. (2013). Ergonomics and Stress at the Workplace: Engineering Contributions to Social Sciences. *Jurnal Pengurusan*, *37*(1), 125-131.
[23] Materson, I. (2007). Stress at work: A managerial perspective. Human Stress press, Inc.
[24] Michie, S. (2002). Causes and management of stress at work. Occupational. Environ. Med.59: 67–72.
[25] Mojoyinola, J. K. (2008). Effects of job stress on health, personal and work behaviour of nurses in public hospitals in Ibadan Metropolis, Nigeria. *Ethno-Med*, *2*(2), 143-148.
[26] Pratt, L.I. and Barling, j. (1988) 'Differentiating between daily events, acute and chronic stressors: a framework and its implications. In J.J. Hurrell, L.R. Murphy, S.L.Sauter and C.L. Cooper (Eds.), Occupational stress: Issues and developments in research. London: Taylor & Francis.
[27] Robbins, S. P. (2003). Organizational behavior: international edition. *New Jersey: Prentice Hall*.
[28] Roberts, N. A., & Levenson, R. W. (2001). The remains of the workday: Impact of job stress and exhaustion on marital interaction in police couples. Journal of Marriage and Family, 63, 1052-1067.
[29] SARPD. (2014). Statutory Annaul Rport Police Department.
[30] Sayesh, K., J. (2014). Stress in Police Officers. IOSR Jotrrnal ofHzlmanities and Social Science. 19(10). 39-40
[31] Schult, D. P., & Schultz, S. E. (2006). Psychology and work today (9th ed.). Upper Saddle River, NJ: Pearson Education Inc.
[32] Selye, H. (1936). A syndrome produced by diverse nocuous agents. Nature, 138(3479), 32.
[33] Storch, J. E., & Panzerella, R. (1996). Police stress: State-trait anxiety in relation to occupational and personal stressors. Journal of Criminal Justice, 24(2), 99–107. http://dx.doi.org/10.1016/0047-2352(95)00058-5
[34] Violanti, J. M., Castellano, C., O'Rourke, J., & Paton, D. (2006). Proximity to the 9/11 terrorist attack and suicide ideation in police officers. Traumatology, 12, 248– 254.
[35] Zehra, S. Z., Ather, M., & Zehra, B. (2017). A Correlation between Workplace Stress and Organizational Commitment: Doctors response from Public and Private Hospitals in Karachi, Pakistan.

J. Appl. Environ. Biol. Sci., 8(2)74-79, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

A Comparative Study of Stimulus Pull of Modified Hand Test

Fayyaz Ahmed Anjum[1], Dr. Iffat Batool[2], Muhammad Umar Fayyaz[3]

[1]PhD Scholar at Government College University, Lahore, Pakistan
[2] Assistant Professor, Government College University, Lahore
[3] Behavior Therapist at ASAS International School, Islamabad, Pakistan

Received: September 18, 2017
Accepted: December 11, 2017

ABSTRACT

In qualitative analysis of Hand Test expected stimulus pull had been identified by Edwin E Wagner in 1983, the author of Hand test based on responses obtained by participants. The study based on American sample of 1020 participants included normal adults, air force pilots, college students, student nurses, high school students, children, schizophrenics, patients with organicity, organic psychosis, neurotics, depressed patients, mental retards, male pay roles, male prisoners, female prisoners and delinquents. In line with the previous study, the present study was carried out on 500 participants whose age ranges from 10 to 80 years with mean age 34.46 and SD (17.37). These participants were further bifurcated into 350 normal, 50 with adjustment problems, 50 neurotic participants with anxiety related disorders, obsessive compulsive and phobic disorders and 50 psychotic participants diagnosed by psychologist/clinical psychologists. Data was collected as per standardized procedures and scored according to the scoring categories offered by its author. Most of the stimulus pull have been in the same direction as suggested by its author e.g. Stimulus no1, 2, 3, 4 6, 7, 8 and 10. Certain differences and variations were also noted which are perhaps due to cultural variation, exhibition and acquisition responses have lesser frequency count. Additional four stimuli were added in accordance with traditional procedure of test construction and their pull have also been suggested after frequency count and percentages.

KEYWORDS: Interpersonal, Environmental, Maladjustive, Withdrawal

INTRODUCTION

Hand test is a projective and diagnostic technique developed by Edwin E Wagner in 1962 and laternorms for children and adolescents were also developed in 1983.The study based on American sample of 1020 participants included normal adults, air force pilots, college students, student nurses, high school students, children, schizophrenics, patients with organicity, organic psychosis, neurotics, depressed patients, mental retards, male parolees, male prisoners, female prisoners and delinquents in its 3rd revision study was conducted on 1688 participants which included imbeciles morons, three separate groups of normal children, technical high school boys, dyslexic children, three groups of delinquents and technicians, students, junior high school, neurological handicapped and entire police department and the author claimed that the test was based on best representative norms from all over the world. The test consists of 10 stimuli which portray simple drawing of hands and the subjects are instructed to tell what these hands looked like to perform an activity. Whereas the 10thstimulus is blank and is an invitation to imagination. In the modified version of Hand Test four new stimuli were added to have cultural input, as these hand cues are often used by population of Pakistan either in non-verbal communication or to support for verbal interaction. These Four stimulus were carefully selected by a panel of committee of professionals that to first by collecting data of 100 participants i.e. 50 normal and 50 abnormal on a total of 10 stimuli based on their capacity to elicit responses in more number of quantitative scoring categories already spelled out [8]. [4] advocates for the development of new projective techniques on the plea firstly it should have specific pull (area of measurement). Secondly it should measure defense mechanism. Thirdly it should have a relative structure so that a subject has some support to respond according to his perception about the stimulus. Instead of total unstructured and ambiguous stimulus. [1] claimed that no single test is entirely a culture free and it gives some advantage to its inhabitants because the content constancy of stimulus is perceived differently by people belonging to different cultures and the meaning they attached to stimuli, any stimuli during the process of development of a test, it may be an attempt by its originator to cover responses of wide range of that population but not of people belonging to other cultures. This phenomenon was also observed by the present author while collecting data on modified version of Hand Test. The same content is perceived entirely differently by people of different ages, professions and cultural

***Corresponding Author:** Fayyaz Ahmed Anjum, PhD Scholar at Government College University, Lahore, Pakistan. Email: Fayyazahmed66@yahoo.com Contact: +923314092976

backgrounds. Difference of exposure and experience also have effect while giving response to different stimuli, difference was also noted in response of persons belonging to sub cultures. Only few studies have been carried out on the issue of stimulus pull previously. The first study was done by the author Wagner himself [8] and he suggested different stimulus based responses of participants, for example; stimulus four was identified as father percept, stimulus six prominent pull is associated with aggression and stimulus nine for psychosexual orientation.[2] had suggested themes for various stimulus of Thematic Apperception Test for instance stimulus one possess the theme for self-construct conflicts with authority and sexual behavior, 7BM have three parts, father son relations and derivatives and 8BM contains theme for aggression conflicts with authority and health related issues for need achievement. [5] had also commented and gave importance for the stimulus constancy (The ability to evoke responses in the specific area). Pakistani and American sample was compared based on different themes in stimulus, similarities and differences were found in the need of participants belonging to different cultures. For instance; the United States sample was low on need for dependence and high on assertiveness and aggression as compared to Pakistan sample. The second study on stimulus pull was conducted in 1969[7] but was done in comparison of individual versus group administration and their ability to elicit responses in terms of stimulus pull and it was concluded that there was little difference found in two types of administration.

Statement of Problem

The study was required to find similarities and differences in responses on stimuli already devised by Edwin E Wagner, the original author of Hand Test as well as additional stimuli developed by the present author on sample belonging to different cultures.

Justification of Research

Since little literature was available about stimulus pull (constancy), the ability to evoke responses in specific dimensions among various variables of Hand Test. It was considered viable to contribute in the area where literature was almost silent except first study done by its author and one off was carried out by [7]. Moreover, it was considered that the present study would be instrumental in determining specific personality aspects of different cultures.

Significant of the Study

The present study conducted about determining stimuli pull after a gap of more than 30 years is likely to instigate other researchers to carry out research on this aspect, on sample belonging to other cultures with original as well as Modified Hand Test.

METHODOLOGY

Sample

The sample of this study consisted of 500 participants which is further bifurcated into four major groups i.e. normal which were 350 with equal proportion of males and females, their age ranging from 10 to 80 years with the mean age of 37.01 and (SD) 18.6. The second group consisted of 50 participants i.e. 42 males and 8 females their age ranging 11 to 46 years with mean age of 20.43 and SD (10.8), these participants had adjustment problems at home as well as educational institutions and at educational institutions as reported by their teachers and administrative staff. The third group consisted of neurotic/anxiety related disorder participants and had three sub groups in it with almost equal number of males and females, in neurotic/ anxiety related disorders their age ranging from 16 to 37 with mean age 34 and SD (9), in neurotic Obsessive Compulsive Disorder, their age ranged from 23 to 30 years with mean age as 36 and SD (9), in neurotic fear their age ranged from 11 to 45 years mean age as 28 and SD (12). They were diagnosed patients of anxiety disorder, obsessive compulsive disorder, phobic and panic disorder. The fourth group consisted of 50 psychotic patients with almost equal number of males and females and were diagnosed patients of schizophrenia age ranging from 16 to 57 years with mean age as 31 and SD (11), bipolar age ranging from 21 to 56 years old with mean age as 35 and SD (10) and depression age ranging from 15 to 54 years with mean age as 30 and SD (10), they all were diagnosed by Psychiatrists and Clinical Psychologists. Positive and Negative Symptom scale[3] was also administered but only as a screening tool.

Instrument

The original hand test was developed by [8]. Later, it was revised in 1983. Couple of efforts have already been made to enhance the stimulus of Hand test previously with the plea to enhance its reliability [4] and to make it more appropriate with children, women and elderly people with reference to abuse. [6]Modified Hand Test with additional four stimuli and total of 14 stimuli was administered in individual setting, participants were instructed to tell what these hands look like to perform an activity, and the last 14th stimulus is blank and an invitation to

imagination. The participant's verbatim was recorded. Subject's responses are scored across fifteen scoring categories which comes under major four domains as under.

Interpersonal

This domain of personality has six sub categories which includes affection (to exchange love and support), dependence (to seek support and help from others), communication (to tell someone about something, to give understanding to someone) These three sub categories are considered as socially desirable traits. [8] whereas direction (directing others to do what is being ordered or required in a way to influence others to obey one's command) and aggression (to inflict, insult or an injury) these two are considered as socially undesirable traits. Acting out ratio which is specific for this test and is famous amongst clinicians and researchers. The fifth category is exhibition where the stimulus is perceived as showing narcissistic attitude. About 60 % responses in interpersonal main category but in scattered fashion is an indication of normal protocol.

Environmental

It consists of action (stimulus is perceived as to perform an activity, acquisition (the stimulus is perceived in the process of trying and the task has not yet been completed and passive (denoting fall of psychic energy). About 40 percent responses in this category are an indication of normal protocol and both interpersonal and environmental categories constitute 80 to 90 percent responses of a normal individual [8].

Maladjustive

It comprises of tension (feels and express pressure e.g. holding a thing tightly), crippled (it is represented by an injury to one's own hand/ fingers) and fear (indicating avoidance because danger is ahead, these are typical of neurotic protocol.

Withdrawal

This constitutes of description (instead of performing an activity, it is just to describe a response comes in the form of description of the position of the hand), fail (people fail to give any response, it is an indication of shock or difficulty in area which is taped by the stimulus pull) and bizarre (stimulus is perceived indicating less contact with reality and typical of psychotic population)

Procedure

The instrument was administered individually in accordance with standardized procedures but in Urdu as per agreement with Western Psychological Services. The scoring booklet was translated into Urdu by a panel of experts. Only psychotic subjects were offered with the example of Hand shake to take advantage of testing the limits procedure [9] and prompt was also offered only in the beginning but was not followed later. After an interval of 100 seconds the new stimulus was presented, and no response was scored as fail. Percentages were computed after frequency count against each stimulus with reference to quantitative scoring categories along with their qualitative analysis as mentioned in revised manual, 1983.

RESULTS

The comparison of stimulus pull is being carried out by comparing stimulus pull suggested by its author Wagner [8] in the form of qualitative analysis with frequency count and percentages. The result of present study is appended below.

Table 1

Shows percentages of responses according to quantitative scoring categories and an indication of stimuluss pull based on 500 sample of Pakistani Participants.

Stimulus no	Aff %	Dep%	Com%	Exb%	Dir%	Agg %	Act%	Acq%	Pas%	Ten%	Crip%	Fear%	Des%	Fail%	Biz%
1	23.9	9.89	9.20	0.00	23.40	19.96	9.20	0.34	.17	0.00	1.04	0.52	1.90	1.04	0.86
2	2.25	2.25	9.36	0.94	14.79	13.30	34.46	4.31	1.87	2.06	3.18	1.12	7.12	2.43	.56
3	0.94	0.56	59.06	0.19	23.4	5.47	7.36	0.00	0.19	0.19	0.38	0.57	1.13	0.00	0.57
4	56.30	1.88	6.69	0.19	6.78	3.58	14.68	1.13	1.51	0.19	1.51	0.56	3.20	0.75	0.75
5	9.68	2.05	4.28	2.61	5.26	0.56	18.81	1.49	12.29	1.31	23.46	0.19	7.45	6.52	2.23
6	8.77	0.53	5.79	0.18	2.28	49.82	11.05	0.72	0.72	16.49	1.23	0.00	1.58	0.18	0.72
7	38.61	8.47	8.47	1.13	6.78	2.64	19.02	0.00	5.65	1.32	0.94	0.38	4.14	1.69	0.79
8	9.62	1.13	3.21	0.18	1.26	2.34	69.62	3.24	0.72	1.80	1.08	0.00	2.88	1.8	0.36
9	3.38	4.14	8.65	0.38	3.20	2.44	3.20	1.88	2.63	2.44	11.09	0.56	10.34	10.15	1.13
10	4.32	3.78	30.81	0.54	16.04	5.05	17.84	0.18	0.18	7.75	1.08	0.00	8.08	.3.78	0.36
11	17.14	0.38	8.57	0.38	3.05	9.33	37.90	0.38	1.33	8.19	2.48	0.38	0.57	4.95	0.95
12	64.17	1.14	10.15	0.00	0.38	1.34	12.26	0.19	0.57	1.90	0.57	0.00	4.21	1.72	1.34
13	3.19	62.78	2.26	1.88	0.93	20.68	0.75	0.92	0.18	1.13	0.00	3.10	0.09	1.30	0.00
14	22.70	9.34	6.85	1.17	3.72	6.46	22.31	0.39	0.98	1.17	0.39	0.00	5.87	0.18	0.59

Note: Aff=Affection, Dep= Dependence, Com= Communication, Exb= Exhibition, Dir= Direction, Agg= Aggression, Act= Action, Acq= Acquisition, Pas= Passive, Ten= Tension, Crip= Crippled, Des= Description and Biz= Bizarre

DISCUSSION

The comparison of stimulus pull was offered by Edwin E Wagner based on frequency count and percentages computed on five hundred sample suggested quite interesting results. Stimulus wise comparison is appended below.

1. Stimulus number one the pull suggested earlier was of affection, direction and communication, whereas in the present context these are found as affection 23.9 %, direction 23.4 % followed by aggression 12 %, communication is only 10 %. This is an indication that this sample is relatively more aggressive as compared to their American counterparts who have better communication skills, on the average same pattern is observed in terms of stimulus pull.
2. Stimulus number two pull had been suggested for action and acquisition scoring categories, probability of any neurotic shock was also expected on this stimulus. The same has been identified in the result of present study as the leading response scoring categories remained as action 34 % followed by direction 15 % and aggression 13 %, however very few percentage i.e. 4 % was computed on acquisition category.
3. Stimulus number three the pull suggested earlier for in the hierarchy of communication, direction and action. It is interesting to note that the same pattern has been emerged in the present study and the leading scoring category remained as communication 31 %, direction 23 % and action 7 % respectively.
4. Stimulus number four no strong pull was suggested by its author and is an indication of masculine and percept of father. It is to point out that majority of present sample has achieved with leading responses in affection 56% followed by action 14.68 and communication and direction both with 7 %. Higher percentage in affection category indicates the percept of father perception and positive relationship with authority and father figure.
5. Stimulus number five the pull had been suggested for environmental and that too for passivity. In the present context the leading scoring category remained as crippled 23.46, action 19 and passive 12%, somewhat different results have been observed, however the third leading category remained the same as was suggested earlier. Pull suggested for environmental category has been validated.
6. Stimulus number six the suggested pull is for aggression and action responses where as in the present context it remained the same with leading being aggression 50%, tension 16 % and action 11 %. It is to highlight that tension responses also have the connotation of aggression because it was observed that a sort of effort to control the expression of aggression was projected in the form of tension responses.
7. Stimulus number seven no pull had been suggested and it is expected that any response would be a reaction of the strong pull of aggression percept in stimulus no 6, the same has been observed in the present context as leading scoring category on this stimulus remained as affection 39 %, followed by action 19% and communication and dependence both with 8%. The leading affection response is an indication of reaction and recomposing offered by participants.
8. Stimulus number 8 the pull has been suggested towards action moreover it was commented that it is an easy stimulus and the same pattern of responses have been observed as leading scoring categories remained as action 70 % followed by affection 10% and acquisition and communication both with 3 %. This is perhaps the only stimulus where acquisition responses come in somewhat reasonable proportion.
9. Stimulus number nine it was suggested that it is a difficult stimulus and implication for psychosexual area the same pattern have been observed where the leading scoring categories remained as action 37%, crippled 11 % and description and fail both with 10 % and 10 % respectively. Description is a kind of response where participants just describe the stimulus instead of giving a proper response. Hence fail and description provided an evidence for avoidance and psycho-sexual conflicts, if both combined it becomes the second leading category and is an indication of difficult stimulus and the same has also been suggested.
10. Stimulus number ten it had been suggested the most difficult one and responses predict the future goals of the individual, in the present context the leading scoring category remained as affection 23%, action 22 followed by fail with 18%. The result is in line with the prediction of the author of Hand Test because in the present study it emerged as most difficult stimulus to perceive. Moreover, it also indicates about the behavioral pattern of participants of Pakistan as the last activity is expected to be undone. It is to be noted in the present study stimulus no 14 is considered as stimulus no 10

Suggested Stimulus Pull for addition four stimulus

11. The suggested pull for stimulus no 11 are communication with 30.8 % followed by action 17.84 % and direction 16.04%
12. Suggested pull is action 37.9 % followed by affection 17.14% and aggression 9.33%.

13. Suggested pull is affection 64.17%, followed by action 12.26 and communication with 10.15 %.
14. Strong pull for dependence with 62.78 % followed by action with 20.68% and affection 3.19 %

Limitation and Recommendations

Only few researches have been carried out about Hand Test on this aspect of stimuli pull where as the present study is the first of its kind on Modified Hand Test. However, researches on stimulus pull have been carried out on other projective techniques like Thematic Apperception Test and Rorschach. Researches are encouraged to conduct studies to determine stimuli pull and specific aspects of personality on variety of samples (heterogenous and homogenous) as well as its validation with other personality tests.

Conclusion

Almost all the stimuli pull suggested earlier by Edwin E Wagner in 1962-1883 have been confirmed and validated. It is also an indication of soundness of the measure of hand test across different samples with diverse cultures, it is suggested that the new pull suggested/expected for addition stimulus may be validated in future studies.

REFERENCES

[1] Anastasi, A. (1997). Psychology, psychologists, and psychological testing. American Psychologist, 22(4), 297.

[2] Bellak, L., & Bellak, S. S. (1949). Children's Apperception Test. Larchmont, NY: CPS

[3] Kay, S. R., Flszbein, A., & Opfer, L. A. (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophrenia bulletin, 13(2), 261.

[4] Hardesty, R. A. (1973). The use of the Modified Hand Test and pictorial study of the values to differentiate between successful and unsuccessful educable mentally retarded work-study students (Unpublished Doctoral dissertation). The University of Oklahoma.

[5] Kline, P. (1986). *A handbook of test construction: Introduction to psychometric design*. Methuen.

[6] Raees, S. (1993). Norming of the Thematic Apperception Test in Pakistan (Doctoral dissertation, University of Karachi, Karachi).

[7] Sergio, Jessica A. "Differences among abused and non-abused younger and older adults as measured by the Hand Test." PhD diss., University of North Texas, 2010.

[8] Taylor, J. F. (1969). Group Administration of the Hand Test: Effects on Stimulus Pull and Responses. *Journal of Projective Techniques and Personality Assessment*, *33*(3), 243-246.

[9] Wagner, E. E. (1962). The Hand Test: Manual for administration, scoring, and interpretation. Mark James Company.

[10] Wechsler, D. (1981). WAIS-R manual: Wechsler adult intelligence scale-revised. Psychological Corporation.

J. Appl. Environ. Biol. Sci., 8(2)80-87, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Influence of Application of Dicel Learning Model and Social Attitudes upon Learning Outcomes of Indonesian Food Management Course

Susilowati*, Luthfiyah Nurlaela, Mustaji

Pascasarjana Universitas Negeri Surabaya (UNESA)

Received: November 1, 2017
Accepted: January 4, 2018

ABSTRACT

This study aims to (1) examine differences in student learning outcomes of Indonesian food management courses by applying DICEL learning model and conventional learning model, (2) examine differences in student learning outcomes in Indonesian food management course for students who have high social attitudes and students who have low social attitudes, (3) examine the interaction between the application of DICEL learning model and social attitudes toward learning outcomes in Indonesian foodmanagement courses. The research used a quasi-experimental design. The population was the students of Culinary Arts Program of UNESA and UNIPA, with research sample, the students of Culinary Arts Program of UNESA and UNIPA of class. Determination: (1) the experimental class was taught using DICEL learning model (X1); (2) the control class was taught using the conventional learning model (X2). Data collection techniques: a. Objective test (Pretest and postest) for measuring student's test result. b. Social attitude questionnaire. c. Observation including: (1) student's attitude when doing practice, (2) practice results of making basic spice and practical application of basic spice for cuisine from various region in Indonesia.The results of the research shows that (1) there are differences of students learning outcomes in Indonesian foodmanagement courses using DICEL learning model and conventional learning model, (2) there is difference of student learning outcomes in Indonesian foodmanagement course for students who have high and low social attitudes, (3) there is interaction of application of DICEL model and the social attitudes toward the student learning outcomes in Indonesian food management course.

KEYWORDS: Learning Model, Social Attitude, Learning Outcomes

INTRODUCTION

Indonesian foodmanagement Indonesia is one of the courses that must be taken by the students of Culinary Arts Concentration. The purpose of this course is to enable the students to understand, review and master the skills ranging from the ability to explain the understanding of Indonesian spices and herbs, to classify the Indonesian spices, and to process the basic seasoning and apply basic flavors of various Indonesian cuisine[1] Seasoning in Indonesian cuisine plays a very important role, because the taste of the cuisine is dependent upon how one mixes spices mixes. The students, however, whose schools backgrounds are general or Islamic High Schools never learn about spices They therefore less understand about the various kinds and functions spices for Indonesian cuisine. In order to achieve the above objectives, it is necessary to implement learning based on learning achievement[2]. The good strategies, learning methods and assessments are undeniably necessary.

The teaching model is part of a teaching method along with other instrument factors need to be taken into account in order to improve the quality of education. DICEL is learning by combining three learning models: directinstruction, collaborative learning and e-learning. All three models can be developed to improve student learning outcomes.

Social attitude is needed by people who are involved in the field of Culinary Arts, such as honest, trustworthy words, actions, and work, discipline, responsibility, attitude tolerance and actions, mutual cooperation work with others to achieve mutual goals with other people, share duties and help to be sincere, polite and courteous. The employee recruitment in industrial world doesn not only look for employees who have high intellectual ability, but also consider the social attitude, because with high intellectual ability and high social attitude in work, will determine the success of a work industry.

Based on the above description of the problem, it can be concluded that the learning of Indonesian food management needs to be implemented optimally, with the design of learning models

***Corresponding author:** Susilowati, Pascasarjana Universitas Negeri Surabaya (UNESA)
email: susilowati@unipasby.ac.id

relevant to the expected competencies, tailored to the development of science and technology today. The formulation of problems that is raised by the researchers are: (1) is there any difference in student learning outcomes in the Indonesian foodmanagement courses learning by using the DICEL learning model and by the conventional learning model?, (2) is there any difference in student learning outcomes in Indonesian foodmanagementcourse between the students who have high social attitudes and the ones with low social attitudes?. And (3) is there an interaction of application of DICEL learning model and social attitude toeards the student learning outcomes in Indonesian foodmanagement course?

Learning model

Learning model is a plan or pattern used as a guide in planning the learning in the classroom or in tutorial. The learning model refers to the approach to be used, including learning objectives, learning activities, learning environment and classroom management.

DICEL is learning by combining three models of learning, they are directinstruction, collaborative learning, and e-learning. The combination of these three models will be applied in lectures at the Home Economics Department of University of PGRI Adi BuanaSurabaya for the Indonesian foodmanagement course.Direct Intruction or direct learning is generally designed specifically for developing learning activities on the part of students related to aspects of procedural knowledge (knowledge of how to do things) and declarative knowledge (knowledge of something which can be fact, concept, principle or generalization) [3].Founders of social constructivism known for the theory of "Zone of Proximal Development" (ZPD). *Proximal* in simple language means "next" Vygotsky observes, when learners are given a task for themselves, they will work as well as they collaborate[4]. Opinion stating that students will be easier to find and understand difficult concepts when they can discuss with their friends[5].Learning in the 21st century will rely heavily on information technology especially the use of computers[6]. This change directly involves the process of teaching and learning and education. The development of computer and internet technology in the education system has improved the teaching and learning stages. Learning strategies employ computers and the internet in education as well as opinions. Similarly, the research results by Niam Wahzudik show that today's learning is not only limited to the space and time, and scheduled face-to-face. Due to the progressively advanced science and technology there have been new changes in the learning system that more utilize the internet facilities. Define e-learning with the term Web-based Training (WBT) because it is more oriented to the function of training. WBT is an integrated learning practice through the internet so that learning can directly access what competencies which will be specifically studied in accordance with the learning levels[3].

Social Attitudes

Attitude is the individual consciousness that determines the real action in social activities. In the process of learning this attitude is necessary, considering the shift of paradigm of honesty in the test. In the 2013 curriculum the attitude component becomes its own assessment, only the teacher should be assessed. The attitude assessment according to the curriculum of 2013 is: a) honest, b) discipline, c) responsibility, d) tolerance, e) working together, f) polite, and g) confident [7].

Based on the research results there were differences in learning outcomes that were not significant between groups of students who had high social skills and the students who had low social skills. There was no significant effect of interaction between achievement motivation and social skills on learning outcomes[8].

Learning outcomes

Learning outcomes according, are the abilities learners have as a result of learning actions and can be observed through the learner's performance. According to some experts, there are various types of learning outcomes [9]. One of them is that there are five types of learning outcomes: intellectual skills, cognitive strategy, verbal information, motor skills, and attitude [10].

Assessment of learning outcomes is intended to determine whether or not the graduate competency standards have been established. Competence can be used to discover the standard level of students' mastery of the materials in various subjects as a whole concerning intellectual, social, creativity, and skills aspects. This assessment is also intended to maintain the quality of organizational education institutions, whose assessment is determined from the aspects of learning outcomes in a sustainable manner. There are three domains that are measured to be the result of learning they are cognitive, affective, and psychomotor domains.

METHODS

The present research employed the quasi-experimental design[11], with the variables a) the independent variables of the learning models, b) the moderator variable of social attitudes having two dimensions namely (1) high social attitude (2) low social attitude and c) dependent variable of student learning outcomes referring to cognitive, affective and psychomotor aspects. The population in the study was all students of Culinary Arts Departments (UNESA and UNIPA); while the samples were students of Culinary Arts Departments of class of 2015 of UNESA and Home Economics Department of UNIPA divided into an experiment class, a control class and test classes (x1, x2, and x3 classes). The research was conducted in UNESA and UNIPA of the third semester (form August 2016 to March 2017).

Data collection techniques: a. Objective test (Pretest and postest) for measuring student's test result. b. Social attitude questionnaire. c. Observation including: (1) student's attitude when doing practice, (2) practice results of making basic spice and practical application of basic spice for cuisine from various region in Indonesia.The data were analyzed by two factor variant analyses, the statistical technique used SPSS version 21. The test of null hypothesis (Ho) is done at 5% significance level.

RESULTS

A. DescriptiveResults Research

The data collected is obtained from the results of tests and observation and question form sheets that serve as data in this study. The results of the data collection of the applying DICEL learning model and conventional and social attitude of the raw score is converted to a raw score.

Table 1. DescriptiveData ofStudent Learning Outcomes of Application of DICEL Learning Model and Social Attitudes

LEARNING MODEL	ATTITUDE CATEGORIES	Mean	Std. Deviation	N
DICEL	Low	104.63	4.68	19
	High	111.25	3.80	24
	Total	108.33	5.33	43
CONVENTIONAL	Low	104.21	3.50	28
	High	103.79	8.16	14
	Total	104.07	5.41	42
Total	Low	104.38	3.98	47
	High	108.50	6.76	38
	Total	106.22	5.75	85

From the above table, 24 students obtained the average learning result of 111.25 with DICEL learning model and high social attitude category, 19 students obtained the average of learning result value of 104.63 with DICEL learning model and low social attitude category. Twenty eight students earned an average of 104.21 learning outcomes with conventional learning model and high social attitude category, 14 students gained an average of 103.79 learning outcomes with conventional learning model and low social attitude category.

B. Analysis of Student Learning Outcomes

Analysis of test results of student's learning differences in courses management of Indonesia food which applying DICEL learning model and conventional learning model.

1. Distribution Normality Test

Normality test done to see whether data in the form of knowledge learning outcomes tests on experimental classes and control classes Gaussian or not. Test of normality on score pretesexperimental class and class control using test Kolmogorov-Smirnov.

Tabel 2.Cognitive Learning Results Normality test on Classroom Experiments and Classroom Control

One-Sample Kolmogorov-Smirnov Test	
Kolmogorov-Smirnov Z	1.01
Asymp. Sig. (2-tailed)	0.26

2. Homogenity

Test homogeneity test done to test whether students are learning with a learning model DICEL group experiments and dibelajarkan students with models direct instruktion in the control group is homogeneous. Test results of its homogeneity pretes learned knowledge is done through the

test Levene's Test.

Tabel 3.Test of Homogenity Cognitive Learning Results in Class experiments and Classroom Control

Levene's Test of Equality of Error Variances[a]			
Dependent Variable:Pretes_Eksperimen_Kontrol			
F	**df1**	**df2**	**Sig.**
2.55	3	81	0.06

In the table above, the significance value (sig.)=0.06 was obtained. The value of significance was then compared to the critical value, so it obtained 0.06>0.05 which means significant. Thus the data obtained from the results of research met the homogeneity.

C. Hypothesis Testing

In this study are described in statistical calculation results to test hypotheses 1, 2 and 3, which uses SPSS analyzed by two factor variant analyses techniques with the program with the results as described below in.

Tabel 4. Student Learning Outcomes by Application of Model learning and Social Attitude

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	850.76[a]	3	283.59	11.94	0.00
Intercept	89195.00	1	891951.00	37551.10	0.00
MODEL	308.37	1	308.37	12.98	0.00
KAttitudes	190.20	1	190.20	8.01	0.01
MODEL * KAttitudes	246.52	1	246.52	10.38	0.00
Error	1923.99	81	23.75		
Total	961867.00	85			
Corrected Total	2774.75	84			

The first hypothesis, F statisticsof 12.98 and the probability of 0.00was smaller than the real level of 0.05, Ho was then rejected and Hawas accepted, meaning that there were differences in student learning outcomes in Indonesian FoodManagement course learned using the DICEL learning model and the conventional learning model.

The second hypothesis, F statistics of 8.01 and probability of 0.00was smaller than the real level of 0.05 thus Ho was s rejected and Ha accepted. Thus it can be concluded that there were differences in student learning outcomes in the course of Food Management Indonesia for students who had high social attitudes and students who had low social attitudes.

The third Hypothesis, F statistics was equal to 10.38 and probability was equal to 0.02which was smaller than real level 0.05 Ho was thus rejected, meaning that there was interaction of application of DICEL model and social attitudes towardsthe results of student learning in Indonesian Food Management course.

DISCUSSION

Effect of Learning Model upon Learning Outcomes

The results showed that there were significant differences in the student learning outcomes of Indonesian foodmanagement courses between those treated using the DICEL model and the conventional model. From the result of analysis of two factor variances (see Table 4) it obtained F statistics equal to 12.98 and the value of probability significance equal to 0.00 that was still far below level of significance equal to .05. Thus, the DICEL learning model had a significant difference from the one of the conventional model. It means that the DICEL learning model had an effect on the learning results compared to the conventional model.

Having been viewed from the mean scores, the learning outcomes of the group of students with the application of the DICEL learning model was 111.25 higher than the mean scores of the students with the application of the conventional learning model, i.e. 103.79. This means that the application of the DICEL learning model had a better effect on the learning outcomes. The influence of the learning model shows that the main influence (main effect) was strong on the acquisition of learning outcomes.

The students who studied with the DICEL model got more superior learning achievement compared to the students who studied with the conventional model.

The DICEL learning model is advantageous to be apply to the learning, because this model consists of three models of learning consisting of the model of Direct Instruction) based on the idea of contructivism that more give the concepts, e.g. aspects of procedural knowledge (knowledge of how to do something) and declarative knowledge (knowledge of something can be a well-structured fact, concept, principle or generalization) that can be learned step by step, in accordance with the characteristics of Indonesian Food Management courses that require an understanding of procedural concepts, so that students will be more receptive in learning the materials. Thus the impact of this teaching is the achievement of the completeness of academic content and skills and ability of the students. This is in line with the research[12] that the groups of children who used direct instruction modification model were different in terms of learning acquisition of drawing clove-motif ornaments from the children using the conventional drawing models. The main purpose of the direct learning model was to maximize the use of student learning time[13].

Collaborative learning islearning based on constructivism that learning is an effort to give meaning by the students in their experience through assimilation and accommodation toward the direction of the formation of cognitive structure[14]. The lessons implemented position students as subjects actively engaged in thinking activities by developing insights about themselves and their environment. In this instance, the students are studying and working in a process[15]. Lecturers collaboratively study the important messages about the environment with various interpretations and provide opportunities for students to develop their ideas widely. The step is carried out to improve the ability of students in adjusting to their environment. Unlike the conventional learning that emphasizes more information transfer, the collaborative learning emphasizes the importance of learning in context, realistic problem solving in situations of meaningful tasks and interaction with other students. While the Collaborative Learning model constitutes a group that work together for the intended purpose.Collaborative Learning as a group working together for the intended purpose is in line [16], that lecturers can use collaborative learning in the classroom, to improve the ability to facilitate the achievement of student learning outcomes.Indicated that the groups of students who studied with the collaborative learning patterns had higher learning achievement than those who studied with the competitive learning patterns, thus enhancedthe cooperative skills and increasedthestudents' active participation in learning[17]. The students were given the opportunity to solve problems collaboratively in groups that would proceed for practice. This is consistentindicating that the collaboration skills are indispensable in today's life. Now, success is not the fruit of competition, but of collaboration[18]. It also suits the demands of the working world, that work will get maximum results if a work can be done together.

E-Learning, accordingto[6], is learning in the 21st century which relies heavily on the information technology, in particular the use of computers. This change directly involves the process of teaching and learning and education. The development of computer and internet technology in the education system has improved the teaching and learning stages[18]. The learning strategy uses computers and the internet in education which is relevant[19], that e-learning is the use of the computer. Define e-learning as the term Web-based Training because it is more oriented to training functions. WBT as an integrated learning practice through the internet so that learning can directly access what competencies will be specifically studied according to the learning level [3], while in tune with the courses that require to follow the development of computer and internet technology in the education system. By using the computer-assisted learning strategies and the internet in education the student learning outcomes will considerably improve, in line[20], suggesting that the instructional techniques on critical thinking with online dispositions can foster creativity in the discussion environment. This is the advantage of this model if applied to the Indonesian Food Management course which demands students to make spices and apply it to various cuisines in Indonesia, where currently cooking and recipe tutorials are very lively on the internet.

Thus the DICEL learning model is very suitable to apply to the courses which require practices, particularly foodmanagement. Students begin to learn from the skill gradually by forming a group to complete the task and utilize the internet as a source of learning, then students practice to get maximum results.

The Effect of Social Attitudes on Learning Outcomes

From result of analysis (Table 4), it obtained that F statistics was equal to 8.01 and the value of probability significance equal to 0.01 being still far below level of significance equal to 0.05. Thus there

were differences in student learning outcomes of the course of Indonesian foodmanagement for the students who had high social attitudes and the students who had low social attitudes.

The social attitudes had a significant effect on the student learning outcomes. When viewed from the average score (Table 2) the learning outcomes of the students having a high social attitude of 108.50 was higher than the mean score of the low social attitudes of 104.38. This means that the social attitudes had an effect on the learning outcomes. According Witherington, an attitude is a tendency to think or feel in a certain way or according to certain rules, by working together in groups that will help other students who are less able to complete the task. Responsibility, mutual respecst are also things that must be maintained in the group work.

Argues that individuals try to control their lives not only through individual self-efficacy, but also collective efficacy[21]. The collective efficacy is the belief of society that their joint efforts can produce certain social changes. Self efficacy and collective efficacy together complement each other to change the human lifestyle. It is in line[22], that there was a significant difference in the history of high school students who have negative social attitudes.Posits that the positive attitude affecting the student achievement in mathematics subjects [23]. This is in line study suggesting that students who had a positive attitude toward learning outcomessolved problems much better than those who had negative attitudes toward the Math lessons [24]. Social attitudes are potential that is already owned by each student either high social attitudes or low social attitudes can affect learning outcomes. This potential is difficult to change just like that, but it takes practice in the learning process so that it will improve student learning outcomes.

Interaction of DICEL model implementation and social attitudes toward learning outcomes

From the result of two-factor analysis of variance (Table 4), it obtained F statistics equal to 5.28 and value of probability equal to 0.02 smaller than real level of .05. It means that there was interaction of application of the DICEL model and the social attitudes to the result of student learning in Indonesian Food Management course. According[25], interaction is a matter of mutual action[26].cites that interaction is a two-way process that involves actions or deeds of communication and communication,whereas[27]argues that interaction is a reciprocal activity.

The research result showed that variables of the DICEL learning model and social attitudes are synergistic. It was meant to build mutual influence, so it was more advantageous if applied together or not in separation. If it were in separation it could have had a negative effect on the learning outcomes. These results also showed that the positive influence of the two factors was interdependent or influence each other on the student learning outcomes.

Attitudes emerge because of stimulus. The formation of an attitude is much influenced by the stimulation of the social and cultural environments, for instance, family, norms, religious groups, and customs. The close relationship between attitudes and behavior is supported by the notion of attitude suggesting that attitude is a tendency to act.

Some studies attempting at relating attitudes to behaviors showed somewhat different results, indicating only small relationships or even negative relationships. Who investigated the attitude towards labor [25], cited that a positive attitude considerably affects the achievement of students in mathematics subjects[22]. This is in line with the research, revealing that students who had a positive attitude towards learning outcomes solved problems far better than the students who had a negative attitude to the subjects of mathematics [23].

CONCLUSION

1. There were differences in student learning outcomes of Indonesian foodmanagement course learned by using the DICEL learning model andthe conventional learning model. It can be said that the DICEL learning model had an effect on the learning results compared to the conventional model proving that the DICEL learning model was superior to the conventional model.
2. There were differences in student learning outcomes of Indonesian foodmanagement course of the students who had high social attitudes and the students who had low social attitudes. The students' social attitudes had a significant influence on the student learning outcomes.
3. There was interaction of application of the DICEL learning model and the social attitudes towards the student learning outcomes of Indonesian foodmanagement course.

REFERENCES

[1]. UNIPA Surabaya. (2015). *Buku pedoman akademik Tahun ajaran 2015-2016*. Surabaya: UNIPA Press.

[2]. Direktorat Pembelajaran dan Kemahasiswaan Direktorat Jenderal Pendidikan Tinggi Kementerian Pendidikan dan Kebudayaan. (2014). *Undang Undang Dikti 12/2012 tentang Pendidikan Tinggi.* Jakarta: Depdikbud.

[3]. Conrad, K., & Training Links. (2000). *Intructional design for web based training amherst*. Boston: HRD Press.

[4]. Vygotsky's. (2003). *Educational theory in cultural context learning in doing: social, cognitive and computational perspective.* Cambridge:Cambridge University Press.

[5]. Slavin, R. E. (1995). *Cooperative learning*: *Theory, research, and practice* (2nd ed.). Boston: Allyn and Bacon.

[6]. Daim, M. (1997) *Ucap utama pendidikan Malaysia di abad 21.* (Persidangan Discovery Malaysia Shah Alam Juni 3-5). http://jpnjohor.moe.gov. my/jpnjohor.

[7]. Struktur Kurikulum 2013 SMK/MAK (*Sekolah Menengah Kejuruan/Madrasah Aliyah Kejuruan) Berdasarkan Permendikbud Nomor 70 Tahun 2013*. Jakarta: Depdikbud.

[8]. Asri, A. S. (2012). *Pengaruh model pembelajaran kooperatif (Jigsaw dan TGT), motivasi berprestasi, dan keterampilan sosial terhadap hasil belajar PKn Sekolah Dasar*. Unpublished Dissertation. Universitas Negeri Malang. http://karya-ilmiah.um.ac.id/ index.php/disertasi/article/view/17634.

[9]. Gagne, Robert., Briggs, L. J., & Wager, W.W. (1992). *Principles of instruktional design(4th ed.).* New York: Harcourt Brace Jovanovich College Publishers.

[10]. Gagne, Robert. (1985). *The conditions of learning (4th ed)*. New York: Holt, Rinehart, & Winston.

[11]. Tuckman. (1999). *Conducting educational research.* Texas:Harcour Brace Collage publishers, 302 Conmerce Street, suite 3700 Fort Worth, TX 76102.

[12]. Tumurang, Hetty, J. (2009). *Pengaruh model pembelajaran (modifikasi direct instruction dan menggambar konvensional) dan tingkat kreativitas terhadap perolehan belajar menggambar ornamen Kelas V sekolah dasar.* (Disertasi yang tidak dipublikasikan). Universitas Negeri Malang.

[13]. Joyce, Bruce., Weil, Marrsha., Calhoun, Emil. (2011). *Models of teaching* New York: Boston.

[14]. Sudana, Degeng. (2001). *Teori belajar dan strategi pembelajaran*. Surabaya: Citra Raya.

[15]. Woolfolk, A.E., & Nicolich, L.M. (1984). *Educational psychology for teaching*. New Jersey: Prentice Hall, 240.

[16]. Eklund, J., & Kwan, V. (2000). *Enhancing collaborative learning in primary education through the Australian schools web challenge*. Retrieved from http://ausweb.scu.edu. au/aw2k/paper/eklund/index.html.

[17]. Gokhale, Anuradha A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education*, 7(1), 22-30.

[18]. Mustaji. (2013). *Jika aku menjadi pendesain pembelajaran kontruktivistik* (Pidato Pengukuan Guru Besar). Universitas Negeri Surabaya.

[19]. Piskuric, G. M. (2003). *Preparing learners for e-learning*. Greensboro: Jossey-Bass.

[20]. Kalelioğlu, F., & Gülbahar, Y. (2014). The effect of instructional techniques on critical thinking and critical thinking dispositions in online discussion. *Journal Educational Technology & Society*, 17(1), 248–258.

[21]. Alwisol, (2006), *Psikologi kepribadian*. Malang: UMM Press.

[22]. Naijan. (2014). Pengaruh metode pembelajaran dan sikap sosial terhadap hasil belajar sejarah siswa sman 12 Tanggerang selatan. *Jurnal Pendidikan Sejarah.*

https://www.neliti.com/id/publications/122640/pengaruh-metode-pembelaja- ran-dan-sikap-sosial-terhadap-hasil-belajar-sejarah-sis.

[23]. Michelle A., Villeneuve, Shulha, Lyn, M. (2012). Learning together for effektive collaboration in school-based occupational therapy practice. *Canadian Journal of occupational therapy*, 79(5), 293-302.

[24]. Sudarman, O. H. (2015). *Eksperimen pembelajaran matematika pada bangun ruang sisi lengkung dengan menggunakan pendekatan realistic mathematic education ditinjau dari motivasi belajar siswa kelas ix smp negeri 1 colomadu tahun ajaran 2015/2016*, http://eprints.ums.ac.id/38896/1/NASKAH%20 PUBLIKASI.pdf.

[25]. Badan Pengembangan & Pembinaan Bahasa. (2016). *Kamus besar bahasa indonesia online lengkap*. Kementerian Pendidikan dan Kebudayaan Republik Indonesia.

[26]. Roestiyah. (2001). *Strategi belajar mengajar*. Jakarta: Rineka Cipta.

[27]. Zahra. (2014). *Dasar-dasar proses belajar mengajar*. Jakarta: Sinar Baru Algesindo.

J. Appl. Environ. Biol. Sci., 8(2)88-95, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Effects of Non-Integer Order Derivative over the Slippage of Fractionalized Second Order Fluid Flow

Kashif Ali Abro[1*], Sanaullah Dehraj[2], Saleem Ahmed Naich[3], Imran Qasim Memon[4]

[1,4]Department of Basic Sciences and Related Studies, Mehran University of Engineering Technology, Jamshoro, Pakistan
[2]Department of Mathematics and Statistics, Quaid-E-Awam University of Engineering Technology, Nawabshah, Pakistan
[3]Department of Basic Engineering, Sindh Agriculture University Tando Jam, Pakistan

Received: September 14, 2017
Accepted: December 11, 2017

ABSTRACT

This article is dedicatedly analyzed for the investigation of exponential flow over the slippage of fractionalized second order fluid under the influence of exponential plate. Fractionalized second order fluid is analyzed for the expression of velocity and shear stress profiles under the existence and nonexistence of slip effects. The general solutions are perused with help of discrete Laplace transform along with its inverse and expressed in the form of newly defined generalized hyper geometric function. The contrast among the solutions has been declared for ordinary as well as fractional types of fluid. All the solutions satisfy usual conditions (natural, boundary and initial conditions) for verification as well. Finally, Rheology of slippage, viscosity, fractional parameters, material parameters and few others have been underlined in order to bring physical aspects through graphical depictions.
KEY WORDS: Non-integer derivative, Slippage, Second Order Fluid, Discrete Transforms, depictions of Graphs.

1. INTRODUCTION

Numerous constitutive models for partial differential equations have been suggested for non-Newtonians fluids due to their typical and diverse structures [20-21]. In general, models of non-Newtonians fluids are divided in three brands; they are (i) the integral brand (ii) the rate brand and (iii) the differential brand. The best brand amongst them is the differential brand so called n^{th}grade model. In brevity, the n^{th}grade model has gotten huge importance due its various industrial and technological applications. In this manuscript, the second grade fluid commonly known as a simplest subclass lies in the category of differential brand. For second grade fluid one can optimistically expect the prediction regarding differences among normal stress for steady exponential flow over a rigid boundary [1-3].In this manuscript, the assumptions of slippage are analyzed under the influence of exponential plate. In continuation, it is well known fact that the slip boundary assumptions are adequate for characteristics of Newtonian fluids but in comparison these assumptions are not sufficient for all characteristics of non-Newtonian fluids. In general, impacts of slippage on non-Newtonian fluids have not attained much interest. Despite slip effects occurs in many technological applications and experimental observations for instance, polymer melts, emulsions, fractional wave diffusions, non-linear creeping, micro and nano channels and several others. To best of our knowledge, the literature regarding no slip conditions for second grade fluid includes. Fetecau and Corina[4] has investigated solutions for unsteady unidirectional flow without considering slip effects for second grade fluid. Hayat et al. [5]has achieved analytical solution in cylindrical geometries for second grade fluid in the absence of slip assumptions. Investigation of first problem of stoke's without slip effects in presence of porous medium for second grade fluid is perused by Tan and Masuoka [6]. Kashif [7] has considered influences of magnetohydrodynamics flow for second grade fluid in nonexistence of slippage. Free convection unsteady flows on vertical oscillating plate over second grade fluid have been obtained by Farhad[8]. Athar et al.[9]has tracedout rotational flow through circular cylinder for second grade fluid using Caputo fractional derivatives. Generalized second grade fluid flow between two parallel plates with fractional calculus approach has been investigated by Tan and Mingyu [10]. Mohamad et al [11] analyzed heated generalized second grade fluid by implementing a new spectral collocation technique in which they acquired high accuracy via certain numerical tests. They focused the results obtained for multi-dimensional fractional stokes' first problem. Samiulhaq et al. [12] observed a porous flow of a second-grade fluid induced by an infinite plate between two side walls that exerts an accelerated shear stress. They investigated exact solutions by using Laplace transform, finite Fourier cosine and sine transform on governing partial differential equation to have solutions for velocity field and shear stress. Furthermore, the concept of fractional calculus has focused the attention of researchers in exploring the enormous applications for modeling of the fluid mechanics with non-local phenomenon. The fractional approach is widely used in the many engineering and scientific fields because of its remarkable expansion in providing the results, either it is used in numerical or differentials schemes. The most common non-integer order fractional derivatives with singular kernel, Riemann-Liouville and Caputo derivative both of them are better in dealing mathematical problems and they have effective results from applications point of view [2-21].In concision, we include here recent literature referenced in [13-17].Motivated by above research work, we

Corresponding Author: Kashif Ali Abro, Department of Basic Sciences and Related Studies, Mehran University of Engineering Technology, Jamshoro, Pakistan. email: kashif.abro@faculty.muet.edu.pk

are interested for the investigation of exponential flow over the slippage of fractionalized second order fluid under the influence of exponential plate. Fractionalized second order fluid is analyzed for the expression of velocity and shear stress profiles under the existence and nonexistence of slip effects. The general solutions are perused with help of discrete Laplace transform along with its inverse and expressed in the form of newly defined generalized hyper geometric function. The contrast among the solutions has been declared for ordinary as well as fractional types of fluid. All the solutions satisfy usual conditions (natural, boundary and initial conditions) for verification as well. Finally, Rheology of slippage, viscosity, fractional parameters, material parameters and few others have been underlined in order to bring physical aspects through graphical depictions.

2. Formulation of Problem with Governing Equations

Flow equations for incompressible fluid include in the nonexistence of body forces are[18]

$$\rho\frac{\partial \boldsymbol{V}}{\partial t}+\rho(\boldsymbol{V}.\nabla)\boldsymbol{V}-\nabla.\boldsymbol{T}=0,\qquad \nabla.\boldsymbol{V}=0, \tag{1}$$

Where, $t,\nabla,\boldsymbol{V},\rho,\boldsymbol{T}$are time, gradient operator, velocity of fluid, density of fluid, Cauchy stress tensor respectively and the cauchy stress $\boldsymbol{T}$given by

$$\boldsymbol{T}=-\boldsymbol{pI}+\boldsymbol{S},\qquad \boldsymbol{S}=\alpha_2\boldsymbol{A}_1^2+\alpha_1\boldsymbol{A_2}+\mu\boldsymbol{A_1}, \tag{2}$$

here, $\boldsymbol{A_1},\boldsymbol{A_2},\alpha_1,\alpha_2,\mu,\boldsymbol{S},-\boldsymbol{pI}$are kinematic tensors, normal stress moduli, dynamic viscosity, extra tensor, hydrostatic pressure. The kinematic tensors are expresed as

$$\begin{aligned}\boldsymbol{A_1}&=\nabla.\mathrm{V}+(\nabla.\mathrm{V})^T\\ \boldsymbol{A_2}&=\boldsymbol{A_1}(\nabla.\mathrm{V})+\boldsymbol{A_1}(\nabla.\mathrm{V})^T+\frac{d\boldsymbol{A_1}}{dt},\end{aligned} \tag{3}$$

For the problem under consideration, it is assumed for velocity field $\boldsymbol{V}$ and extra-stress tensor $\boldsymbol{S}$ of the form

$$\boldsymbol{S}=\boldsymbol{S}(y,t),\quad \boldsymbol{V}=\boldsymbol{V}(y,t)=u(y,t)\boldsymbol{i}\,, \tag{4}$$

For these flows the constraint of incompressibility is automatically satisfied. If the fluid is at rest up to the moment $t = 0$, then

$$\boldsymbol{S}=(y,0)=0,\quad \boldsymbol{V}=(y,0)=0\,, \tag{5}$$

we obtained governing differential equations for second grade flow

$$\frac{\partial V(y,t)}{\partial t}-\frac{\partial^2 V(y,t)}{\partial y^2}\left(\alpha\frac{\partial}{\partial t}+\nu\right)=0, \tag{6}$$

$$\tau(y,t)-\frac{\partial V(y,t)}{\partial y}\left(\mu+\alpha_1\frac{\partial}{\partial t}\right)=0. \tag{7}$$

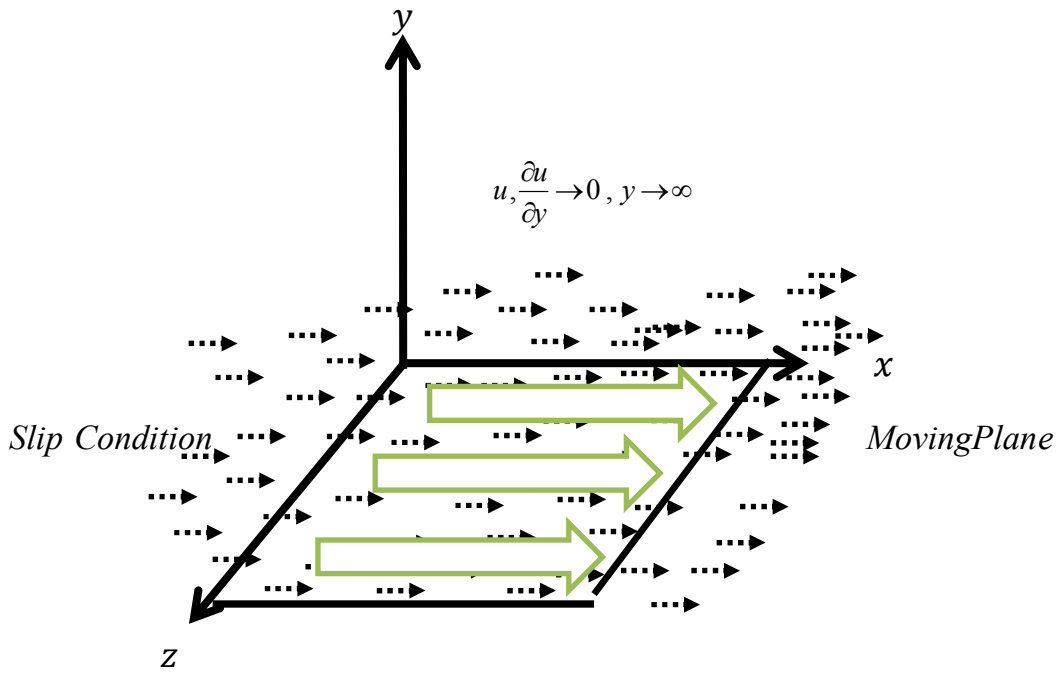
where, $\alpha=\alpha_1/\rho$ and $\nu=\mu/\rho$ are kinematic viscosity and $\alpha=\frac{\alpha_1}{\rho}$ the viscoelastic parameter of second grade fluid. using caputo operatorfor the fractional parameter is $0<\delta<1$ and the fractional differential operator D_t^δ is described as [19]

$$D_t^\delta W(t)=\begin{cases}\dfrac{1}{\Gamma(1-\delta)}\displaystyle\int_0^t\frac{W'(Y)}{(t-Y)^\delta}dY, & 0<\delta<1\\ \dfrac{dW(t)}{dt}, & \delta=1\end{cases}, \tag{8}$$

$$\frac{\partial V(y,t)}{\partial t}-\frac{\partial^2 V(y,t)}{\partial y^2}\left(\alpha D_t^\delta+\nu\right)=0, \tag{9}$$

$$\tau(y,t)-\frac{\partial V(y,t)}{\partial y}\left(\mu+\alpha_1 D_t^\delta\right)=0. \tag{10}$$

Assume that an unsteady fractionalized fluid of order second possessing the space lying over an interminably amplified plane having its location in xz plane and vertical to y- axis. At the very initial, the fluid is at rest and the occasion $t=0^+$ the plane begins to waver in its own particular plane. Here we accept the presence of slip limit between the speed of the fluid at the plane. Because of shear, the liquid over the plane is steadily moved as described in goemetry of the problem:



Depiction of Geometry of the problem

The fitting initial and boundary conditions are

$$V(y,t), \frac{\partial V(y,t)}{\partial t} \to 0 \quad \text{as} \quad y \to \infty \quad and \quad t > 0, \tag{11}$$

$$V(0,t) = \Omega H(t) Exp(bt) + \chi V_t(y,t)|_{y=0} \quad t \geq 0. \tag{12}$$

$$V(y,0) = 0, \qquad \tau(y,0) = 0, \qquad y > 0, \tag{13}$$

are mollified as natural, boundary and initial conditions.

3. Exploration of Velocity Field

Applying Laplace trasform to equation (9) and keeing in consideration equations (11) and (13), we found

$$\frac{s}{(\alpha s^{\delta} + \nu)} V(y,s) = \frac{\partial^2 V(y,t)}{\partial y^2}, \tag{14}$$

Using bounary conditions in equation (14), we have

$$V(y,s) = \frac{\Omega e^{-y\sqrt{\frac{s}{(\alpha s^{\delta}+\nu)}}}}{(s-b)\left\{1 + \chi\sqrt{\frac{s}{(\alpha s^{\delta}+\nu)}}\right\}}, \tag{15}$$

Before applying discrete Laplace transform, firstly we rework on equation (15) for series form as

$$V(y,s) = \frac{\Omega}{(s-b)} + \Omega \sum_{\varepsilon=0}^{\infty} (b)^{\varepsilon} \sum_{\rho=1}^{\infty} \left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho} \sum_{\vartheta=0}^{\infty} \left(\frac{-\nu}{\alpha}\right)^{\vartheta} \frac{\Gamma\left(\varepsilon + \frac{\rho}{2}\right)}{\vartheta!\,\Gamma\left(\frac{\rho}{2}\right)} \frac{1}{s^{(\delta-1)\frac{\rho}{2} + \vartheta\delta + \varepsilon + 1}} + \Lambda \sum_{\varepsilon=0}^{\infty} (b)^{\varepsilon} \sum_{\rho=0}^{\infty} \left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}$$
$$\times \sum_{\vartheta=0}^{\infty} \left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta} \frac{\Gamma\left(\varsigma + \frac{\vartheta+\rho}{2}\right)}{\varsigma!\,\Gamma\left(\frac{\vartheta+\rho}{2}\right)} \frac{1}{s^{(\delta-1)\left(\frac{\vartheta+\rho}{2}\right) + \delta\varsigma + \varepsilon + 1}}, \tag{16}$$

Inverting equation (16) by Laplace Transfrom, we attain

$$V(y,t)=\Omega H(t)e^{bt}+\Omega H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=1}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\vartheta=0}^{\infty}\frac{\left(\frac{-\nu}{\alpha}t^{\delta}\right)^{\vartheta}\Gamma\left(\varepsilon+\frac{\rho}{2}\right)t^{(\delta-1)\frac{\rho}{2}+\varepsilon}}{\vartheta!\,\Gamma\left(\frac{\rho}{2}\right)\Gamma\left((\delta-1)\frac{\rho}{2}+\vartheta\delta+\varepsilon+1\right)}+\Omega\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}$$
$$\times\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\varsigma=0}^{\infty}\frac{\left(\frac{-\nu}{\alpha}t^{\delta}\right)^{\varsigma}\Gamma\left(\varsigma+\frac{\vartheta+\rho}{2}\right)t^{(\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\varepsilon}}{\varsigma!\,\Gamma\left(\frac{\vartheta+\rho}{2}\right)\Gamma\left((\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\delta\varsigma+\varepsilon+1\right)},\tag{17}$$

expressing equation (17) in terms of wright generalized Hyper-geometric function, we get simple expression for velocity as

$$V(y,t)=\Omega H(t)e^{bt}+\Omega H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=1}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}{}_1\Psi_2\left[-\frac{\nu t^{\delta}}{\alpha}\middle|\begin{matrix}\left(\frac{\rho}{2},1\right)\\ \left(\frac{\rho}{2},0\right),\left((\delta-1)\frac{\rho}{2}+\varepsilon+1,\delta\right)\end{matrix}\right]t^{(\delta-1)\frac{\rho}{2}+\varepsilon}$$
$$+\Omega\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}{}_1\Psi_2\left[-\frac{\nu t^{\delta}}{\alpha}\middle|\begin{matrix}\left(\frac{\vartheta+\rho}{2},1\right)\\ \left(\frac{\vartheta+\rho}{2},0\right),\left((\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\varepsilon+1,\delta\right)\end{matrix}\right]t^{(\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\varepsilon}.\tag{18}$$

Where, the property of wright generalized Hyper-geometric function is

$$\sum_{i}^{\infty}\frac{(-B)^{i}\prod_{k=1}^{\alpha}\Gamma(c_k+C_k i)}{i!\,\prod_{k=1}^{\beta}\Gamma(d_k+D_k i)}={}_{\alpha}\boldsymbol{\Psi}_{\boldsymbol{\beta}}\left[B\middle|\begin{matrix}(f_1,F_1),(f_2,F_2),\dots,(f_{\alpha},F_{\alpha})\\ (g_1,G_1),(g_2,G_2),\dots,(g_{\beta},G_{\beta})\end{matrix}\right].$$

4. Exploration of Shear Stress

Applying Laplace trasform to equation (10) and keeing in consideration equations (11) and (13), we found

$$\bar{\tau}(y,s)-\frac{\partial\bar{V}(y,s)}{\partial y}\left(\alpha_1 s^{\delta}+\mu\right)=0,\tag{19}$$

Substituting the value of $\frac{\partial\bar{V}(y,s)}{\partial y}$ in equation (19), we get

$$\bar{\tau}(y,s)=\frac{-\Omega\,\rho\,e^{-y\sqrt{\frac{s}{(\alpha s^{\delta}+\nu)}}}\sqrt{(\alpha s^{\delta}+\nu)}}{(s-b)\left\{1+\chi\sqrt{\frac{r}{(\alpha s^{\delta}+\nu)}}\right\}},\tag{20}$$

Before applying Laplace transform, firstly we rework on equation (20) for series form as

$$\bar{\tau}(y,s)=-\Omega\sqrt{\alpha}\,\rho\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}\sum_{\varsigma=0}^{\infty}\frac{\left(\frac{-\nu}{\alpha}\right)^{\varsigma}\Gamma\left(\varsigma+\frac{\vartheta+\rho-1}{2}\right)}{\varsigma!\,\Gamma\left(\frac{\vartheta+\rho-1}{2}\right)s^{(\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\delta\varsigma+\varepsilon}},\tag{21}$$

applying Laplace transform to equation (21) and expressing it in the format of wright generalized Hyper-geometric function, we get simple expression for shear stress as

$$\tau(y,t)=-\Omega\sqrt{\alpha}\,\rho\,H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}$$
$$\times\ {}_1\Psi_2\left[-\frac{\nu}{\alpha}t^{\delta}\middle|\begin{matrix}\left(\frac{\vartheta+\rho-1}{2},1\right)\\ \left(\frac{\vartheta+\rho-1}{2},0\right),\left((\delta-1)\left(\frac{\vartheta+\rho-1}{2}\right)+\varepsilon,\delta\right)\end{matrix}\right]t^{(\delta-1)\left(\frac{\vartheta+\rho}{2}\right)+\varepsilon}.\tag{22}$$

Equations (18) and (22) are the solutions of velocity and shear stress respectively satisfying initial and boundary conditions as well.

5. Special Solutions

Solutions of second grade fluid in the absence of slippage if $\chi \to 0$

Permitting$\chi \to 0$ in equations (18) and (22), we acquire

$$V(y,t) = \Omega H(t)e^{bt} + \Omega H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\vartheta=1}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta} \times {}_1\Psi_2\left[-\frac{\nu}{\alpha}t^{\delta}\middle|\begin{matrix}\left(\frac{\vartheta}{2},1\right)\\ \left(\frac{\vartheta}{2},0\right),\left((\delta-1)\left(\frac{\vartheta}{2}\right)+\varepsilon+1,\delta\right)\end{matrix}\right]t^{(\delta-1)\left(\frac{\vartheta}{2}\right)+\varepsilon}. \quad (23)$$

$$\tau(y,t) = -\Omega\sqrt{\alpha}\,\rho\,H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta} \times {}_1\Psi_2\left[-\frac{\nu}{\alpha}t^{\delta}\middle|\begin{matrix}\left(\frac{\vartheta-1}{2},1\right)\\ \left(\frac{\vartheta-1}{2},0\right),\left((\delta-1)\left(\frac{\vartheta-1}{2}\right)+\varepsilon,\delta\right)\end{matrix}\right]. \quad (24)$$

Ordinary solutions of second grade fluid in the presence of slippage if $\delta \to 1$ and $\chi \neq 0$

Letting$\delta \to 1$ and $\chi \neq 0$ in equations (18) and (22), we acquire

$$V(y,t) = \Omega H(t)e^{bt} + \Omega H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=1}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}{}_1\Psi_2\left[-\frac{\nu}{\alpha}t\middle|\begin{matrix}\left(\frac{\rho}{2},1\right)\\ \left(\frac{\rho}{2},0\right),(\varepsilon+1,1)\end{matrix}\right]t^{\varepsilon} + \Lambda\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho} \times\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}{}_1\Psi_2\left[-\frac{\nu}{\alpha}t\middle|\begin{matrix}\left(\frac{\vartheta+\rho}{2},1\right)\\ \left(\frac{\vartheta+\rho}{2},0\right),(\varepsilon+1,1)\end{matrix}\right]t^{\varepsilon}. \quad (25)$$

$$\tau(y,t) = -\Omega\sqrt{\alpha}\,\rho\,H(t)\sum_{\varepsilon=0}^{\infty}(b)^{\varepsilon}\sum_{\rho=0}^{\infty}\left(\frac{\chi}{\sqrt{\alpha}}\right)^{\rho}\sum_{\vartheta=0}^{\infty}\left(\frac{-y}{\sqrt{\alpha}}\right)^{\vartheta}{}_1\Psi_2\left[-\frac{\nu}{\alpha}t\middle|\begin{matrix}\left(\frac{\vartheta+\rho-1}{2},1\right)\\ \left(\frac{\vartheta+\rho-1}{2},0\right),(\varepsilon,1)\end{matrix}\right]t^{\varepsilon}. \quad (26)$$

Furthermore, one can investigate the few limiting solutions for instance, when$\delta \to 1$ and $\alpha \to 0$ solutions are termed into ordinary fluid and Newtonian fluid from general solutions as well.

6. RESULTS AND DISCUSSIONS

In this portion, numerical discussion regarding results and their effects are highlighted for the investigation of exponential flow over the slippage of fractionalized second order fluid under the influence of exponential plate. Fractionalized second order fluid is analyzed with help of graphical depiction under the existence and nonexistence of slip effects. The general solutions are plotted using distinct rheology of slippage, viscosity, fractional parameters, and material parameters. It is worth pointed out that while depiction of graphical illustrations, we have considered couple of graphs for velocity field and shear stress respectively. However, the major outcomes are:

- In Fig.1, by fixing all rheology except time parameter in presence and absence of slip assumption, the effects display the velocity is decreasing while shear stress is increasing at variation of time for the whole domain.
- The sequestrating and scattering behavior of fluid flow has been identified on the plate by increasing the fractional parameter at domain in Fig. 2 in presence and absence of slip assumption. This phenomenon happens when we consider the order of fractionalization as $0.2 \leq \delta \leq 0.8$.

- Fig. 3 is prepared to display effects of viscosity in presence and absence of slip assumption in which velocity field and shear stress has contradictory behavior of fluid as expected on the exponential plate with the no slip assumptions.
- Due to increment in exponential flow shown in Fig. 4, we observed that the range of fluid flow for coincident without slip effect and maximum with slip effect at the free surface.
- Fig. 5 indicates the comparisons made on fractionalized and ordinary fluid flows in which it is observed that both the velocity field as well as shear stress have reciprocal behavior in four models of fluid namely (i) fractionalized second grade fluid, (ii) ordinary second grade fluid, (iii) fractionalized Newtonian fluid and (iv) ordinary Newtonian fluid.

7. CONCLUSION

The conclusion is based on the rheological and pertinent parameters, the effects of such parameters have key notes similarities and differences which are:

- The velocity is decreasing and shear stress is increasing at variation of time either slip strength is considered or not.
- Fractional parameter is considered for the order of fractionalization as $0.2 \leq \delta \leq 0.8$. which represent sequestrating and scattering behavior of fluid flows.
- Effects of viscosity in presence and absence of slip assumption has reversal behavior of fluid flows.
- The analysis for the comparisons on fractionalized and ordinary fluid flows suggested opposite effects on different models.

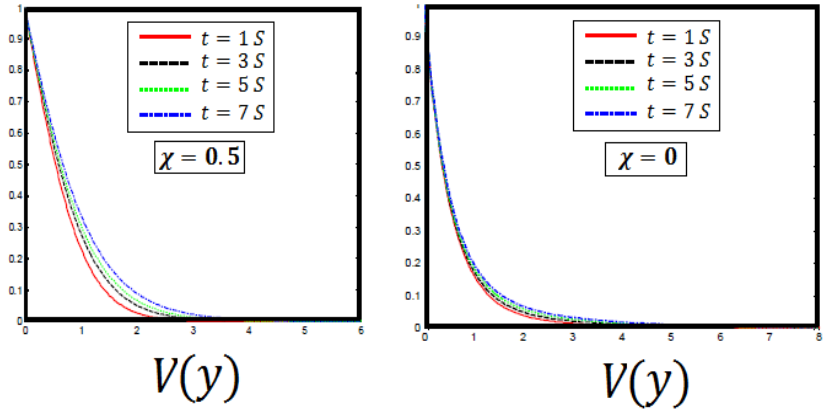


Fig. 1: Effects of time parameter on the velocity field with and without slip assumptions.

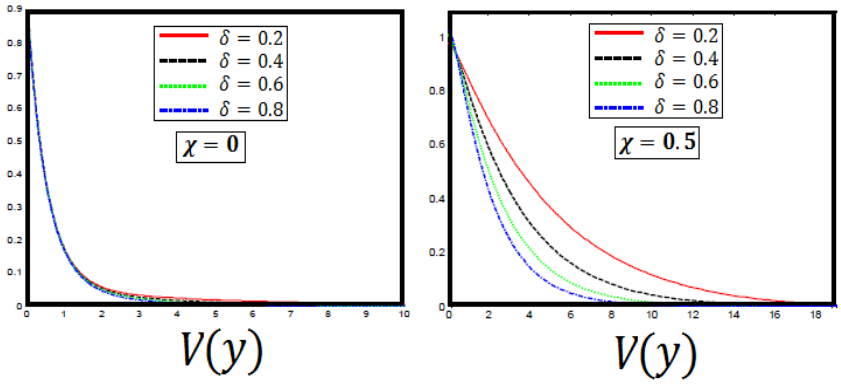


Fig. 2: Effects of fractional parameter on the velocity field with and without slip assumptions.

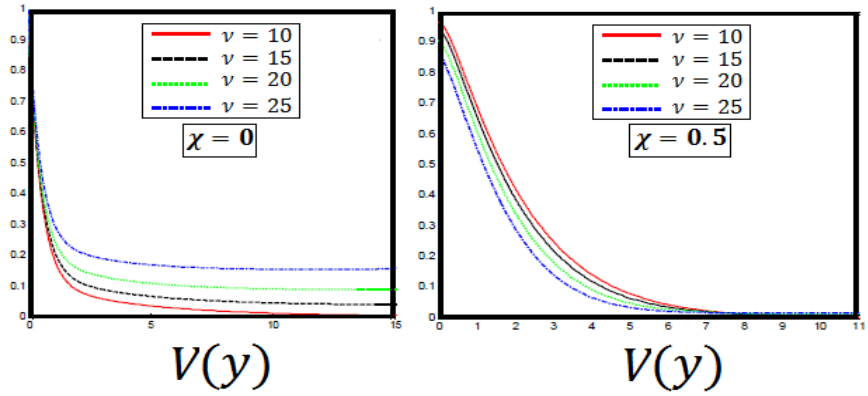


Fig. 3: Effects of viscosity on the velocity field with and without slip assumptions.

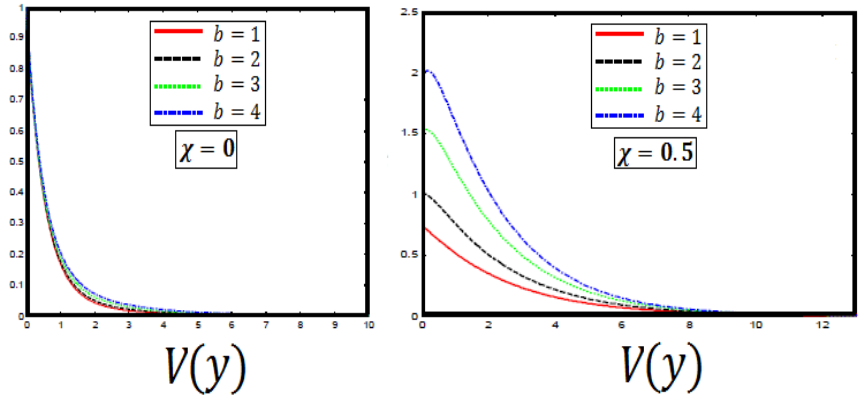


Fig. 4: Effects of exponential flow on the velocity field with and without slip assumptions.

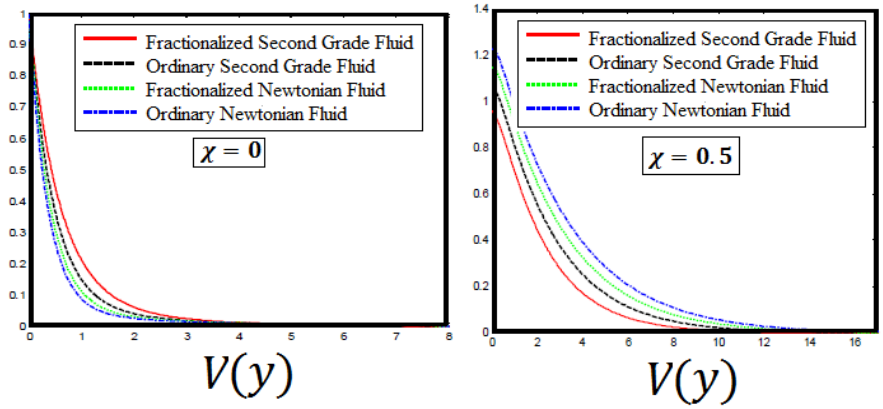


Fig. 5: Comparison of four rheological models on the velocity field with and without slip assumptions.

ACKNOWLEDGEMENT

The author Kashif Ali Abro and Imran Qasim Memonare highly thankful and grateful to Mehran university of Engineering and Technology, Jamshoro, Pakistan for generous support.

REFERENCES

[1] Rajagopal K.R., (1982), A note on unsteady unidirectional flows of a non-Newtonian fluid, *International Journal of Non-Linear Mechanics*, 17, 369-373.

[2] Kashif Ali Abro, Mukarrum Hussain, Mirza Mahmood Baig, Khalil-ur-Rehman Channa, Analysis of Generalized Burger's Fluid in Rayleigh Stokes Problem, Journal of Applied Environmental and Biological Sciences (JAEBS),7(5) 55-63 (2017).

[3] Kashif Ali Abro, Mukarrum Hussain, Mirza Mahmood Baig, Impacts of Magnetic Field on Fractionalized Viscoelastic Fluid, Journal of Applied Environmental and Biological Sciences (JAEBS), 6(9) 84-93 (2016).

[4] Fetecau C., Corina F., (2005), Starting solutions for some unsteady unidirectional flows of a second grade fluid, *International Journal of Engineering and Science*, 43, 781-789.

[5] Hayat T., Khan M., Ayub M., (2006), Some analytical solutions for second grade fluid flows of cylindrical geometries, *Mathematics and Computer Modeling*, 43,16-29.

[6] Tan W.C., Masuoka T., (2005), Stokes' first problem for second grade fluid in a porous half-space with heated boundary, *International Journal of Non-Linear Mechanics,* 40,515-522.

[7] Kashif A.A., (2016), Porous effects on second grade fluid in oscillating plate, *Journal of Applied Environmental and Biological Sciences*, 6, 71-82.

[8] Farhad A., Ilyas K., Shafie S., (2014), Closed form solutions for unsteady free convection flow of a second grade fluid over an oscillating vertical plate, *PLoS ONE,*9(2):e85099.

[9] Athar M., Kamran M., Imran M., (2011), On the unsteady rotational flow of a fractional second grade fluid through a circular cylinder, *Meccanica*, 81(11), 1659-1666.

[10] Tan W., Mingyu X., (2004), Unsteady flows of a generalized second grade fluid with the fractional derivative model between two parallel plates, *Acta Mechanica Sinica*, 20(5), 471-476.

[11] A. Mohamed, A. Rubayyi, Shifted Jacobi collocation method for solving multi-dimensional fractional Stokes' first problem for a heated generalized second grade fluid, Advances in Difference Equations, 2016:114, DOI 10.1186/s13662-016-0845-z.

[12] Samiulhaq, A. Rahman, I. Khan, A. Farhad, S. S. A Inayat, The impact of side walls on the MHD flow of a second-grade fluid through a porous medium, Neural Comput & Applic (2016), DOI 10.1007/s00521-016-2733-6

[13] Khan M., Hyder A.S., Haitao Q., (2009), Exact solutions for some oscillating flows of a second grade fluid with a fractional derivative model, *Mathematics and Computer Modeling,* 49 (7-8) 1519-1530.

[14] Shah N.A., Ilyas K., (2016), Heat transfer analysis in a second grade fluid over and oscillating vertical plate using fractional Caputo-Fabrizio derivatives, *Eur Phys J C*, 76(7) 1–11.

[15] Vieru D., Fetecau C., Corina F., (2015), Time fractional free convection flow near a vertical plate with Newtonian heating and mass discussion, Thermal Sciences,19 S85-598.

[16] Hussanan A., Ilyas K., Shafie S., (2013), An exact analysis of heat and mass transfer past a vertical plate with Newtonian heating, *Journal of Applied Mathematics,* Article ID: 434571.

[17] Hussanan A., Salleh M.Z., Tahar R.M., Ilyas. K, (2014), Unsteady boundary layer flow and heat transfer of a Casson fluid past an oscillating vertical plate with Newtonian heating, *PloS One*, 9 (10) (2014) e108763.

[18] Samiulhaq, K. Ilyas, F. Ali, S. Shafie, (2014), Free convection flow of a second-grade fluid with ramped wall temperature, *Heat Transfer Research*, 45(7) 579–588.

[19] Podlubny, I, (1999), Fractional Differential Equations. Academic Press, San Diego.

[20] Muzaffar Hussain Laghari, Kashif Ali Abro, Asif Ali Shaikh, Helical flows of fractional viscoelastic fluid in a circular pipe, International Journal of Advanced and Applied Sciences, 4(10) 97-105 (2017).

[21] Arshad Khan, Kashif Ali Abro, Asifa Tassaddiq, Ilyas Khan, Atangana-Baleanu and Caputo Fabrizio Analysis of Fractional Derivatives for Heat and Mass Transfer of Second Grade Fluids over a Vertical Plate: A Comparative study, Entropy, 19(8) 1-12, (2017).

J. Appl. Environ. Biol. Sci., 8(2)96-99, 2018
© 2018, TextRoad Publication

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Water Losses Management in Water Supply Company of Tabalong Regency

Aditya Noor Rakhmad* and Ali Masduqi

Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia

Received: October 31, 2017
Accepted: January 1, 2018

ABSTRACT

Water supply system becomes particular concern to every urban area in Indonesia including Tanjung and Murung Pudak Subdistrict as the Capital Regency of Tabalong, South Kalimantan Province. In water distribution system, water losses is one of serious problem to be overcome. The first step in reducing water losses is by developing an understanding of the big concept about water system including the preparation of a water balance. This process helps to understand the quantity, source and charge of water losses. The water balance calculation in this study uses the WB-Easy Calc program *version* 4.05. Based on the analysis, the percentage of water losses is 28.24% with the composition of real losses 23.86% and apparent losses of 4.38%. Distribution data components of water losses used in determining the effort leakage control in water supply company of Tabalong Regency. The effort is Establishment of Water Losses Team, commitment support, build a district meter area (DMA), routinely water balance with monitoring and evaluation of activities that have been done.

KEYWORDS: Water Losses, distribution, *WB-EasyCalc version* 4.05, Water Supply Company

1. INTRODUCTION

Drinking water is a basic need that can't be separated from human life. Drinking water services are a very important component of public services. The provision of drinking water is of particular concern to every urban area in Indonesia is no exception in Tabalong Regency, South Kalimantan Province. In 2016, water supply company of Tabalong Regency has been serving 10,771 costumers and 210 public hydrants equivalent to 55,684 or 67.78% of the total population in the Capital Regency of Tabalong [1]. In water distribution system, water losses is one of serious problem to be overcome. This results is significant losses for company income [2]. Non revenue water is the difference between the amount of water supplied with the water consumed [3]. In fact, the water losses in a drinking water distribution system will always be present. This water loss can be technical, such as water losses on the pipe itself, while non-technical for example illegal consumer [4]. Based on the data water supply company of Tabalong Regency, from 107.44 l/s water distribution, 29.1% is lost from the distribution system but the company doesn't know components cause of water losses [5]. Ministry of public work has set maximum limits of water losses as 20%, water supply company of Tabalong Regency not meet the standards [6]. To reduce water losses in distribution system is must be aware the cause of the water losses, one of them by using the water balance. International Water Association (IWA) has developed a structure and standard terminology for international water balance which has been adopted by national associations in many countries [7]. Water balance calculation in this study using the program *WB-EasyCalc version* 4.05. This software is very helpful in preparing the water balance and can show the level of accuracy of non revenue water calculation. Water balance is very important to know components causing water losses in order to determine future efforts to reduce water losses in water supply company of Tabalong Regency.

2. METHODS

The location of this research is urban water distribution network in water supply company of Tabalong Regency. In this research, Research methods will be done by quantitative research method through survey and interview. Technical analysis in this study using descriptive analysis techniques to identify the distribution of the causes of water losses in water supply company of Tabalong Regency. Required data to identify the components of the cause of water losses is annual system input volume, billed meters consumption, billed unmetered consumption, unbilled metered consumption, unbilled unmetered consumption, unauthorized consumption, costumer meter inaccuracies and data handling errors, length of distribution and transmission pipe, service pipe, average pressure, intermittent supply data and financial data. The data is inputted to the *WB-Easy Calc version* 4.05 program and analyzed the component of the cause of water losses in the water

***Correspondent Authors:** Aditya Noor Rakhmad, Department of Environmental Engineering, Faculty of Civil, Environmental and Geo Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia. E-mail: adityanoorrakhmad@gmail.com

distribution system of water supply company of Tabalong Regency [7]. After that determined efforts to reduce water losses based on the water balance.

3. RESULTS AND DISCUSSION

In 2016 water supply company of Tabalong Regency has distributed water as 3,388,419 m^3, with water losses in distribution system as 956,916 m^3 or 28.24%. With the composition of real losses 808,445 m^3 and apparent losses of 148,472 m^3. Water balance calculation results in urban areas water supply company of Tabalong Regency are shown in figure 1.

Water balance in water supply company of Tabalong Regency can be described as:

1. Non revenue water as annual system input volume which is reduced by revenue water. So the calculation for non revenue water in 2016 is 3,388,419 – 2,425,228 = 963,191 m^3/year.
2. Unbilled metered consumption is water for customers with installed meters but the company don't charge for water usage. Compensation given by water supply company of Tabalong Regency in 2016 is 4,766 m^3/year
3. Unbilled unmetered consumption is all official consumption which is not billed or not metered. This component is generally used for water supply company operations such as washing pipe, pipe test, road cleaning, etc. Calculation of unbilled unmetered consumption in 2016 as 1,509 m^3/year.
4. Unauthorized consumption is an illegal water use, caused by illegal connection, bypass on the meter, unauthorized use of hydrants, etc. Unauthorized consumption in 2016 water supply company of Tabalong Regency is 2,767 m^3/year.

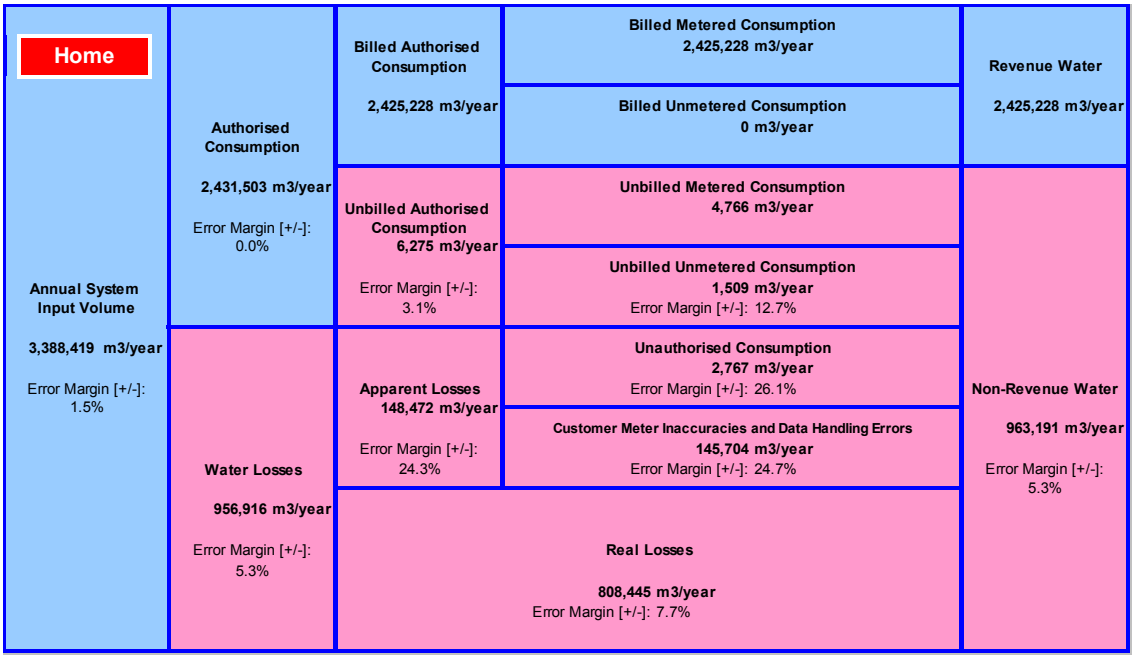


Figure 1. Water Balance Water Supply Company of Tabalong Regency

5. Customer metering inaccuracies and data handling errors is an apparent losses effect of costumer metering innacuracies and error in meter reading. In 2016 its value is 145,704 m^3/year.
6. Commersial losses as unauthorised consumption plus costumer meter inaccuracies and data handling errors. So the calculation for commercial losses in 2016 as 2,767 + 145,704 = 148,472 m^3/year. When changed in percentage is 4.38%.
7. Physical losses is the volume of water losses through all types of leakage, pipeline explosion, overflow on pipes, reservoir, etc. So in 2016, the calculation for physical losses water supply company of Tabalong Regency as 808,445 m^3/year or 12.8%.

Based on data from the water balance analysis, percentage of water losses is 28.24% with the composition of real losses 23.86% and apparent losses of 4.38%. The results of this water balance analysis are used to determine effort to be performed for the control of water losses.

Efforts to Control Water Losses

Water losses in distribution system effect a significant loss in the company. Like the illustrated in the water balance, on outline water losses can happen due two factors, that is real losses and apparent losses. Control of water losses in water supply company of Tabalong Regency not enough just to research how much is the value of water losses and the causes, but there is a real effort to implement the control of water losses [8]. So the strategy needs to be formulated to reduce water losses, is as follows:

a. Establishment of Water Losses Team
   The first step in the effort to lower Non Revenue Water/NRW is to establish a team for NRW. Team building if possible through volunteerism, then set with a decision of the Board of Directors and has the support of all directors. Preferably the team composition consists of the members of each operational section, including production, distribution, and customer service. The team can also be made up of members from the finance department, procurement and human resources. Job description of this team is to formulate goals and risk NRW reduce, formulate action plan to implementation NRW reduce (including site handling priorities), monitoring and evaluation of planned activities.
b. Commitment Support
   Resolve NRW effectively requires a joint effort of all water supply company employees and public/customer. Commitment of top decision makers, including the board of directors, the mayor or political figures is very important. Which means to change the old paradigm about water losses.
c. Establishment of service zone
   Active NRW management only possible using service zones, where the system overall divided into smaller subsystems to be able to calculate each NRW subsystem separately. These smaller subsystems often referred as District Meter Area (DMA). DMA must be hydraulically isolated so the company can to calculate the volume of water lost in the DMA. When one supply system is divided into smaller area and manageable, companies can set better NRW reduction activity.
d. Routinely Water Balance
   In reducing NRW, the company should develop an understanding about "big concept" including the preparation of a water balance. This process helps managers to understand the component, source and cost of NRW. The preparation of this water balance should be routine every month, and every will do DMA testing. Update data piping network, accessories attached should always do in order to get the closest water balance results to reality.
e. Monitoring and Evaluation
   Handling the reduction of water losses is a long-term job, even as long as the company still exists. The losses of water can't be eliminated at all, but can be lowered to the lowest possible level. This long-term work need handling such as monitoring and evaluation, consists of planning stage, implementation stage, monitoring and evaluation, and corrective action. All these stages are a continuous cycle until the target of water losses is achieved, as shown in Figure 2.

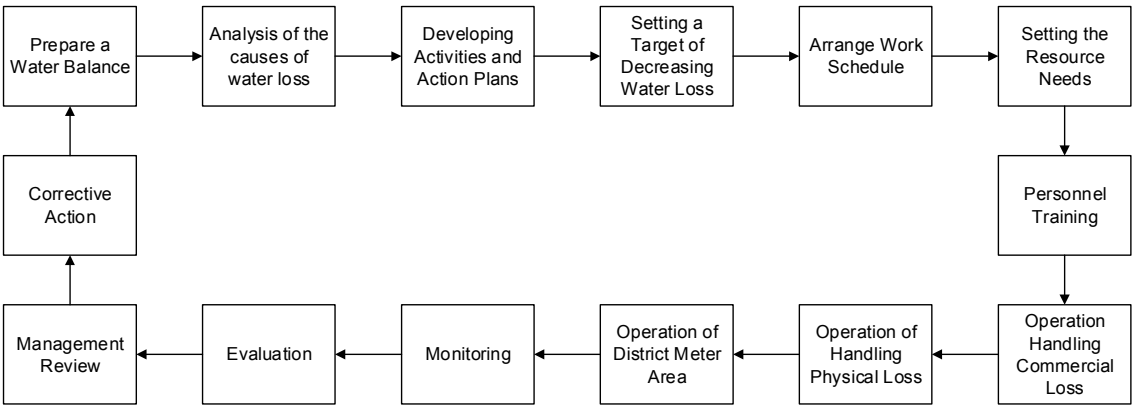


Figure 2. Reduced Water Losses Handling Cycle

4. CONCLUSION

High water losses rate 28.24% is above the water losses level set by the government is 20%. This resulted in significant losses of water supply company income. From water balance calculations, composition of real losses as 23.86% and apparent losses of 4.38%. Leakage control planned by management is establishment

of water losses team, commitment support, establishment of service zone, preparation of a routine water balance and monitoring and evaluation for the activities that have been done.

REFERENCES

[1]. Badan Pusat Statistik Kabupaten Tabalong (BPSKT). 2017. *Kabupaten Tabalong Dalam Angka Tahun 2016*. Tanjung Tabalong.

[2]. Peraturan Pemerintah Republik Indonesia Nomor 122 Tahun 2015 Tentang Sistem Penyediaan Air Minum.

[3]. Frauendorfer, R., & Liemberger, R. 2010. *The Issues and Challenges of Reducing Non-Revenue Water*. Philippines. Asian Development Bank.

[4]. Thornton, J., Sturm, R., Kunkel, G. 2008. *Water Loss Control 2nd Edition. United States of America*. McGraw-Hill Companies.

[5]. Badan Pengawasan Keuangan dan Pembangunan (BPKP). 2016. *Laporan Evaluasi Kinerja Perusahaan Daerah Air Minum Kabupaten Tabalong*. Banjarbaru.

[6]. Ditjen Cipta Karya. 2009. *Pedoman Pengelolaan Program Pamsimas*. Jakarta: Departemen PU.

[7]. International Water Association (IWA). 2012. *Water Audit Method*. American Water Works Assosiation. America.

[8]. Samudro, G. and S. Mangkoedihardjo. 2010. Indicators for leakage in water distribution system. Journal of Mathematics and Technology, 1(5): 15-19.

J. Appl. Environ. Biol. Sci., 8(2)100-104, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Impacts of Training and Orientation on Police about Juvenile Justice System Ordinance – 2000
A Study of Khyber Pakhtunkhwa Police Regarding Knowledge of JJSO-2000

Anas Baryal*[1], Kiran Seeneen[2], Muhammad Babar Akram[3], Zıa Ur Rahman[4]

Department of Sociology and Gender Studies, Bacha Khan University, Charsadda, KP, Pakistan[1]
Pakhtunkhwa Study Center, Bacha Khan University, Charsadda, KP, Pakistan[2]
Department of Sociology, Faculty of Social Sciences International Islamic University Islamabad[3]
Department of Computer Science, Bacha Khan University, Charsadda, KP, Pakistan[4]

Received: September 13, 2017
Accepted: December 19, 2017

ABSTRACT

The contact of juveniles with police within juvenile justice system is considered to be the most important one. Sensitization of police regarding juveniles and relevant justice is possible only with appropriate training & orientation and capacity building from time to time. The study was an endeavor to know the impacts of training & orientation of police on juvenile justice system ordinance – 2000. Three districts namely Peshawar, Charsadda and Mardan of Khyber Pakhtunkhwa province were selected whereas 420 police working in all police stations of these three districts were selected as respondents for the study. It was noted that only 20% of the respondents got training on JJSO-2000 and these 20% have a greater impact of knowledge regarding JJSO-2000. It was recommended that JJSO-2000 (Juvenile Justice System Ordinance) must the part of curriculum for police during their academic training. NGOs intervention is also an endower for further capacity building of police department.

KEYWORDS: Juvenile Justice System, Police Officers and officials, Training & Orientation, Khyber Pakhtunkhwa, Peshawar, Mardan, Charsadda.

1. INTRODUCTION

A "Juvenile" means a person who has not completed eighteen years of age at the time of commission of an offence. Any person who is committing any crime while his/her age is less than 18 years may be considered as Juvenile. According to International Law, a 'Child' means every human being below the age of 18 years. These children are also called the children in conflict with law. Today this is a universally accepted definition of a child which comes from the United Nations Convention on the Rights of the Child (UNCRC, 1990).

In the past, juveniles were brought back to home to be restricted by their parents or guardians. In 1824, the first ever juvenile detention center, also called the House of Refuge, established in New York State of USA, a place where young offenders as well as children from poor family and orphans were located there. The main goal of the House of Refuge was to further prevent juveniles from becoming adult criminals and providing facilities to those children who has not yet committed any crime (Ando, 2014). During the 19th century, juveniles were essentially considered as the property in the eyes of the law and society. These children could be bought, sold, and treated like any other property with the owner being the person in total control of the child. So many common social practices of the time treated children, by today's standards, dreadfully. Not given a separate status in the eyes of the criminal court, a juvenile was treated same as an adult under the criminal justice system procedures and subjected to the same penalties, including death also. (Brantingham, 1979).

Explaining the situation of South Asian countries, Lotse (2006) added that with the exception of Afghanistan, the minimum age of criminal responsibility in all the South Asian countries is below international standards, ranging from seven (Pakistan, India, Maldives) to 12 (Afghanistan). Bangladesh has in recent times raised the age from seven years to nine years, while in Nepal and Bhutan it is 10 years. India, Pakistan, Afghanistan, Bhutan, and Maldives had extended juvenile justice protections measures to all the children under the age of 18 years.

Pakistan initiated the Juvenile Justice System in the form of Juvenile Justice System Ordinance (JJSO) in the year 2000. The main impulsion behind this law is Pakistan's status of international obligation under the Convention on the Rights of Child (CRC), implemented by the United Nations (UN) in the year 1989. The Reformatory Schools Act, 1897 states to be the first example of a law relating to the rehabilitation of children in conflict with state law. This law, which was propagated during the British colonial time, authorized courts to direct young offenders sentenced to transportation or imprisonment, to reformatory schools (Act VIII of 1897).

Corresponding author: Anas Baryal, Department of Sociology and Gender Studies, Bacha Khan University, Charsadda, KP, Pakistan. Email: paindakhel@gmail.com

Before the JJSO, there were no specific central rules & regulations leading criminal trials of juvenile offenders. However, the provinces of Sindh and Punjab each have had one such type of law: the Sindh Children Act, 1955 & the Punjab Youthful Offenders Act, 1983.The key features of the JJSO-2000 consist of the provision of legal assistance to the juvenile offenders (Section 3(1) of JJSO-2000) and establishment of separate juvenile courts (Section 4(1) of JJSO-2000). The law requires that juvenile offenders must be separately treated. It avoids the publication of criminal proceedings in print or electronic media against juvenile offenders (Section 8(1) of JJSO-2000) and bars award of death penalty for and handcuffing of juvenile offenders. In safeguarding the freedom and liberty of children in conflict with law, the JJSO-2000 provides that keeping in view his/her welfare and safety, a child accused of an offence that is bail able, shall be immediately released on bail with or without sureties (Section 10(3) of JJSO-2000).

Fasihuddin, (2012) described that the KP (Khyber Pakhtunkhwa) police jointly with Pakistan Society of Criminology &Save the Children Sweden, during the year 2010, took some progressive steps towards sensitization of police regarding juvenile justice system, human rights and child rights. Arranging training sessions for the police of entire province and achieving almost 5000 target of police officers/officials of different ranks from constable (BPS-05) to ASPs/DSPs (Assistant Superintendent of Police)/Deputy Superintendent of Police) (BPS-17) were considered a great milestone. In the same time period, different juvenile justice training manuals for both the trainers as well as for the participants were printed and juvenile justice system ordinance has been incorporated as a subject in training course for police recruits. The same model was then replicated by other provinces in the country.

The role of police can't be neglected in practical implementation of JJSO-2000. The KP Police department signed a Memorandum of Understanding (MOU) with regional directorate of human rights and Save the Children, Sweden for the establishment of Police Child Protection Center (PCPC) in 2009 (Pakistan Society of Criminology, 2010). But the authorization of center was very much limited including only counseling, rehabilitation, a day-to-day shelter & food and only awareness about child's legal rights. Due to non-availability of funds and some other issues, the center has been closed by the end of 2012 (Khan et al, 2013).

2. OBJECTIVES OF THE STUDY

- To analyze the police capacity building regarding Juvenile Justice System – 2000
- To study the impacts of NGOs intervention in Police department.
- To present appropriate suggestions and policy recommendations for further implementation of Juvenile Justice System – 2000

3. MATERIALS AND METHODS

The most important element of the entire research process is to ensure the data reliability and appropriate analyses of research findings. Inappropriate statistical &mathematical analyses faked the original findings, misguide ordinary readers, and may badly manipulate the general public perception of the performed research (Shepard, 2002). In the existing study, data is being collected from all the relevant police stations through purposive sampling (Neuman, 2013) from three districts i.e. Peshawar, Charsadda and Mardan and further examined and tabulated analytically. The data was inspected with the help of both the univariate and bivariate analyses.

4. RESULTS AND DISCUSSIONS

Table No. 1: Distribution of respondents by district and Current Rank.

District of the respondents			
S. No	**Statement**	**Frequency**	**Percent**
I	Peshawar	206	49.05
Ii	Charsadda	93	22.14
Iii	Mardan	121	28.81
	Total	420	100.0
Current Rank of the Respondents			
I	Head Constable (BPS-07)	169	40.2
Ii	Assistant Sub Inspector (ASI_BPS-09)	114	27.1
Iii	Sub Inspector (SI_BPS-14)	94	22.4
Iv	Inspector (BPS-16)	43	10.2
	Total	420	100.0

The table no. 1 reveals the district wise distribution of respondents. There were total 420 respondents selected from three different most populated districts of Khyber Pakhtunkhwa in which around half i.e. 49.1% of the respondents were selected from district Peshawar, respondents from district Mardan was 28.8% and remaining 22.1% respondents were selected from district Charsadda.

The table also shows that 40.2% of the respondents are Head Constables (BPS-07), around 27.1% are Assistant Sub Inspectors (ASIs_BPS-09), about 22.4% are Sub Inspectors (SIs_BPS-11) and remaining 10.2% of the respondents are Inspectors (BPS-16). It has been observed that in urban areas the Inspector (BPS-16) are considered as the SHO (Station House Officer), while in some rural areas the Sub Inspectors (SIs_BPS-11) are appointed as SHOs at police station. Fasihuddin, (2012) described that the KP police jointly with Pakistan Society of Criminology & Save the Children Sweden, during the year 2010, took some progressive steps towards sensitization of police regarding juvenile justice system, human rights and child rights. Arranging training sessions for the police of entire province and achieving almost 5000 target of police officers/officials of different ranks from constable (BPS-05) to ASPs/DSPs (BPS-17) were considered a great milestone.

Table No. 2: Distribution of the respondents by Training Participation and Source of Knowledge of JJSO-2000

Participation in Training on JJSO-2000			
I	Yes	90	21.4
ii	No	330	78.6
	Total	420	100.0
Source of Knowledge of JJSO-2000			
i	Part of the Course	201	47.9
ii	NGO Training	18	4.3
iii	From Senior Police Officers	179	42.6
iv	Government Training	22	5.2
	Total	420	100.0

Training & Orientation of Police on JJSO-2000

Training and orientation is an essential element in getting knowledge and awareness about anything. The table reveals that almost more than a half of the respondents i.e. 78.6% didn't ever participate in any sorts of training about JJSO-2000 and remaining less than a quarter (21.4%) of the respondents participated in training. Source of knowledge of JJSO-2000 is an important factor in terms of awareness of police personals. In the table under discussion, less than half of the respondents (47.9%) stated that it is the part of their training course, around 42.6% acquired it from their senior police officers, and remaining 9.5% of the respondents stated that they got the said concept through trainings arranged by the government and NGOs.

Table No. 3: Distribution of the respondents by their opinion about training & orientation about JJSO-2000

Training & Orientation of Police about Juvenile Justice System: Frequency (Percent)							
S. No	Statement	S.A	A	N.O	D.A	S.D	Mean
I	Police can gain knowledge about JJSO-2000 through training	16.9(71)	78.8 (331)	1.7 (7)	2.1 (9)	0.5 (2)	4.10
Ii	Implementation of JJSO-2000 is possible through training	15.0(63)	81.9 (344)	2.6 (11)	0.5 (2)	0.0 (0)	4.11
Iii	Police department is regularly arranging trainings on JJSO-2000	6.2 (26)	20.2 (128)	20.2 (85)	41.0 (172)	2.1 (9)	2.98
Iv	JJSO-2000 is the part of training course for police under training	13.6(57)	83.1 (349)	0.2 (1)	2.6 (11)	0.5 (2)	4.07
V	NGOs activities are fruitful for police	22.4(94)	69.5 (292)	1.2 (5)	6.9 (29)	0.0 (0)	4.07
S.A = Strongly Agree(5), A = Agree(4), N.O = No Opinion(3), D.A = Disagree(2), S.D = Strongly Disagree(1)							

Training & Orientation:

Training and orientation conducted by police department for police officers/officials about JJSO-2000 is an indispensable element in terms of knowledge and awareness. The above table concentrates on the importance of training and orientation particularly delivered by police department itself. About 16.9% of the respondents strongly agreed and 78.8% agreed that police can gain much knowledge about JJSO-2000 through training. Only 1.7% kept salient, while 2.9% of the respondents disagreed and remaining 0.5% strongly disagreed about importance of training on JJSO-2000. The data highlighted that majority of the respondents agreed that police can achieve much of their knowledge about JJSO-2000 through training. The calculated mean value for police gaining knowledge about JJSO-2000 through training is 4.10.

JJSO-2000 is comparatively new concept and practical implementation is not possible without proper training. The above table states that implementation of JJSO-2000 is possible only through training and orientation. Fifteen percent of the respondents strongly agreed and 81.9% agreed that execution of JJSO-2000 is possible only after arranging training for police, only 2.6% of the respondents didn't express any opinion and 0.5% of the respondents were disagreed with proper training. The data demonstrated that majority of the respondents were of the opinion

that practical implementation of JJSO-2000 is possible only through training and orientation. The calculated mean value for implementation of JJSO-2000 is possible only through training and orientation is 4.11.

The basic theme of the above table is to know that police department is arranging training sessions on JJSO-2000 for police or not. About 6.2% of the respondents strongly agreed and show their favor for police department, while 20.2% of the total selected sample agreed that police department is regularly arranging training sessions on JJSO-2000 for police capacity building. While 20.2% of the respondents didn't disclose their opinion, 41% of the respondents disagreed and 2.1% strongly disagreed with the statement that police department is regularly arranging training sessions for police about JJSO-2000. The data shows that majority of the respondents have their opinion that police department is not regularly arranging training sessions on JJSO-2000 for police capacity building and improving knowledge and awareness. The calculated mean value for police department and other government organizations are regularly arranging trainings on JJSO-2000 is2.98.

Training courses for recruits comprise physical fitness and law related knowledge include education about criminal justice system. The above table shows the response from the selected sample about JJSO-2000 is the part of training course for police. Responses show that 13.6% of the respondents strongly agreed that JJSO-2000 is now the part of training curriculum for new and existing police officers/officials. While 83.1% of the respondents agreed that JJSO-2000 is the part of training course for police at different training centers. About 0.2% showed no opinion, 2.6% of the respondents disagreed with the inclusion of JJSO-2000 in course curriculum and remaining only 0.5% of the respondents strongly disagreed about the inclusion JJSO-2000 in training course of police. The data demonstrates that majority of the people have their opinion about the inclusion of JJSO-2000 as a part of training course for newly and existing police officers/officials. The calculated mean value for JJSO-2000 as a part of police training course is 4.07. NGOs activities particularly trainings and orientations about JJSO-2000 play a vital role in providing knowledge and awareness. The table describes the opinion of target group about NGOs activities being helpful and fruitful for police. About 22.4% of the respondents strongly agreed and 69.5% of the respondents agreed that NGOs activities are helpful and fruitful for police, while 1.2% showed no opinion and remaining 6.9% of the respondents disagreed about the NGOs activities being helpful in police department. The data proved that majority of the respondents have the opinion that NGOs activities are fruitful and helpful for police. The calculated mean value for importance and productivity of NGOs activities for police is 4.07.

Table No. 4 Participation in training on JJSO-2000 with relationship of Cr. PC & PPC and JJSO-2000

Participation in Training on JJSO-2000	**PPC & Cr. PC are enough for Juvenile Offenders**			Total
	Agree	**No Opinion**	**Disagree**	
Yes	53.3% (48)	2.22% (2)	44.4% (40)	21.4% (90)
No	38.5% (127)	3.0% (10)	58.5% (193)	78.6% (330)
Total	41.6% (175)	2.9% (12)	55.5% (233)	100% (420)
Mean Value = 1.79	Mean Value = 2.88			
St. Dev. = 0.411	St. Dev. = 1.169			
Pearson's Chi Square Value = 8.315	df = 4	Level of Significance = 0.081		
Gamma Value = 0.225		Level of Significance = 0.026		
Spearman Correlation Value = 0.115		Level of Significance = 0.019		
Pearson's Correlation Value = 0.119*		Level of Significance = 0.015		

Participation in training & relationship of JJSO-2000 with other laws:

The table no. 4 highlights receiving training have a major and great effect on relationship of Cr. PC & PPC and JJSO-2000. Cr. PC & PPC are constructed for criminal justice system, dealing the adult criminals and JJSO-2000 has been recently developed for dealing the juveniles. The table shows that majority of the respondents i.e. 78.6 percent didn't participate in any training programs on JJSO-2000 and remaining less than a quarter (21.4 percent) of the total respondents received training on JJSO-2000.PPC & Cr. PC and JJSO-2000 are two different laws dealing for two different groups. More than half of the respondents i.e. 55.5 percent disagreed and strongly disagreed with the statement that PPC & Cr. PC and JJSO-2000 are enough for juveniles. Around 41.6 percent of the total respondents agreed and strongly agreed that PPC & Cr. PC are enough for juveniles, and remaining only 2.9 percent of the respondents didn't express their interest.

The table presents that there is an adverse relationship between the participation in training as independent variable and knowledge about relationship between PPC & Cr. PC and JJSO-2000 as dependent variable. The table illustrates that 53.3 percent of the respondents who got training on JJSO-2000 have the opinion that Cr. PC & PPC are enough for juveniles and 38.5 percent of the respondents who didn't participate in any training or orientation on JJSO-2000 have the opinion that Cr. PC & PPC are enough for juveniles. There is a decrease in values (from 53.3 percent to 38.5 percent) for those who didn't participate in training yet they understand the facts. The table further explains that 44.4 percent of the respondents have the opinion that Cr. PC & PPC are not enough for juveniles as juveniles need a separate law, whereas 55.5% of those respondents who didn't acquire any training on JJSO-2000 were of the opinion that PPC & Cr. PC are not enough for juveniles. The values in

the table show an increase (from 44.4 percent to 55.5 percent) in favor of those who didn't receive any training yet have bit knowledge about differentiation in Cr. PC & PPC and JJSO-2000. It shows that those police officers/officials who got training have low knowledge as compared to those who didn't receive training on JJSO-2000.

The mean value for participation in training on JJSO-2000 is 1.79 with a Standard deviation of 0.411. The mean value for the statement 'PPC & Cr. PC are enough for juveniles and there is no need for a separate law' is 2.88 with a Standard deviation of 1.169. The Pearson's Chi Square test statistics value is 8.315 with 4 degree of freedom and level of significance is 0.081, which shows a strong relationship between these two variables. Gamma test statistics value for showing relationship of these variables 0.225 with level of significance is 0.026. The Spearman Correlation test statistics value 0.115 with level of significance is 0.019. The Pearson's Correlation value is 0.119 and 0.015 level of significance. The table shows that correlation between the two variables is significant at 95% with two tailed test.

5. CONCLUSIONS

Trainings and orientations play a vital role in all aspects of human professional life generally and particularly in police department. Considering a special and unique law, the importance of JJSO-2000 can't be ignored for police particularly those who are working in police stations. The collected data incorporates that participation in trainings and orientations have a great effect on knowledge of police officers & officials regarding JJSO-2000. Those police staff who participated in any training arranged and organized by police department itself or conducted by an NGO, have a diverse idea about JJSO-2000. Although only 20 percent of the respondents got trainings on JJSO-2000, yet they have a changed and progressive knowledge and idea about JJSO-2000.

6. RECOMENDATIONS

- Trainings and orientations should be arranged on district and regional levels for police regarding CRC-1990 and JJSO-2000 so that it will be very much fruitful for police knowledge and awareness as well as in capacity building and further easier in handling the juveniles.
- It is very much clear from the collected data that NGOs intervention is much needed in terms of training and orientation for police department. NGOs intervention is appreciated also by the police department as there is no problem for NGOs while working in police department.
- Trainings and orientations should be arranged particularly for lower rank of police personnel and their participation must be ensured as the lower rank police personals have the most difficult and important task in the whole criminal justice and juvenile justice systems in terms of arresting and registering different kinds of FIRs (First Information Reports) against adult criminals as well as against the juveniles. If this particular group of police is practically trained, hopefully the whole police department will get awareness about JJSO-2000 and other related and co-related laws.

REFERENCES

[1] Ando, R. (2014, March 13). *Components of the Juvenile Justice System.*Retrieved from eHow: http://www.ehow.com/list_6739518_components-juvenile-justice-system.html.

[2] Brantingham, F. L. (1979). *Juvenile Justice Philosophy: Readings, Cases and Comments.* Eagan, Minnesota: St, Paul, MN: West Publishing United States.

[3] Fasihuddin. (2012, August 9). *Role of Police in Developing. Juvenile Justice System in Pakistan.*Retrieved from International Juvenile Justice Observatory: http://www.oijj.org/en/docs/general/role-of-police-in-developing-juvenile-justice-system-in-pakistan.

[4] Juvenile Justice System Ordinance, 2000 (XXII of 2000).

[5] Khan, A., Sayeed, A., Haider, F., & Kamran, S. (2013). *Child Protection System Mapping and Assessment Khyber Pakhtunkhwa.* Karachi: Collective for Social Science Research.

[6] Lotse, C. (2006). *JUVENILE JUSTICE IN SOUTH ASIA: Improving Protection for Children in Conflict with the Law.* Kathmandu, Nepal: The United Nations Children's Fund (UNICEF), Regional Office for South Asia.

[7] Neuman, W. L. (2013). *Social Research Methods: Qualitative and Quantitative Approaches.*New Dehli: Pearson Education, Limited, 2013.

[8] Shepard, R.J. (2002). *Ethics In Exercise Science Research*. Sports Med, 32 (3): 169-183.

[9] The Reformatory Schools Act, 1897, (Act VIII of 1897).

[10] United Nations Convention on the Rights of the Child, (1990) G.A. Res. 25, U.N. GAOR, 44th Sess., Supp. No. 49, at 167, U.N. Doc.A/44/736.an Agency.MA. Thesis. Pakistan Study Centre University of Peshawar

J. Appl. Environ. Biol. Sci., 8(2)105-110, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Technical and Financial Assessments of Depo 3R Palasari, Denpasar

Agung Stiawan* and Yulinah Trihadiningrum

Postgraduate Program, Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Received: October 23, 2017
Accepted: January 2, 2018

ABSTRACT

Municipal solid waste (SW) has become a serious problem in Denpasar City. Due to the space limitation for landfill, it is necessary to intensify the SW reduction activity. Operation of Material Recovery Facility (MRF) from the SW is one of the solutions to overcome the problem. Depo 3R Palasari is an MRF, which is located in Sanur Kauh Sub-district, South Denpasar District. The SW management in this Depo has not worked satisfactorily. This Depo could only reduce 1.71% of the treated SW, and 98.29% of the SW should be disposed to the landfill. This Depo also faced financial problem, in which the revenue income could not cover the operational costs. Therefore, this study aimed to assess the technical and financial performances of the Depo. The SW amount, which was received by the Depo, was measured using load count analysis method for 8 consecutive days. This research also determined the SW composition, density, and recovery factor. Mass balance analysis was performed for estimating revenue and facility needs. Financial assessment was done using Net Present Value(NPV) and Benefit Cost Ratio (BCR) methods. The results showed the Depo received 3,478.82 kg of SW/day. With average SW density of 160.98 kg/m^3, the received SW amount was 21.61 m^3. The SW was composed of 80.48% biodegradable component, 9.06% plastic, 2.08% paper, cardboard and carton, and the remaining components were tetra pack, glass, metal, rubber, and others. Estimated SW amount which will be received by the Depo in 2027 was 4,054.15 tons/day. The SW reduction potential was 25.54%. This reduction level can be achieved if the Depo is expanded from 546.88 to990.89 m^2in 2027.The current NPV value was negative (IDR-102,062,182.52). This NPV value could be increased by improving the current 3R capacity from 1.71% to 16.90%, and increasing the number of labors from 2 to 10 staff. The Depo is financially feasible (NPV = IDR. 26,193,368.50, BCR = 1.01) in 2027 if provided with financial support from the local government.

KEYWORDS: optimization, 3R facility, solid waste, South Denpasar

INTRODUCTION

Municipal solid waste (SW) has become a serious problem in big cities with high population density [1] in Indonesia, including in Denpasar City, Bali. Pollution due to the unmanaged SW can cause adverse effects to the environment. These impacts not only pollute the environment, but also can directly affect the economy of Bali, which is dependent on tourism [2].

Based on Act No. 18 Year 2008 concerning Solid Waste Management, municipal SW management activities include reduction and handling activities [3]. The reduction activities not only aimed to reduce the amount of SW, but also to reduce the toxicity [4]. The reduction activities include limiting the SW generation, recycling and reuse. These activities are known as 3R (reduce, reuse, recycle) principles [5]. These 3Rprinciples can reduce the amount of MSW, which should be disposed to the landfill [6]. This can solve land limitation for landfill in big cities in Indonesia, and minimize public health and environmental risks. One of the manifestations of MSW reduction with the 3R principles is the provision of a solid waste treatment facility, or known as material recovery facility (MRF).

Depo 3R Palasari is an MRF in South Denpasar District [7]. It was built in 2005 and managed by a community organization (KSM). This Depo has 546.88 m^2area, which is used for sorting, composting, storage, placement for residual matter containers, collection vehicles parking area and office [8]. The Depo currently served 952 families or 3,771 people. The facilities include 5 collection vehicles, a shredder, and a compost sieve machine. However, at present both composting facilities are not working. The SW management in this Depo has not worked sat is factory. This Depo could only reduce 1.71%of the SW, including 0.34% of the biodegradable waste. The 98.29% of the SW should be disposed to the landfill. The SW collection fee isIDR.20.000 for each house holder. The payment participation rate is 78.15%. The Depo serves 23.32% of the total population in Sanur Kauh Sub-district. The rest of the SW (76.68%) of the SW is managed by private sector. Trucks for transporting the SW to landfill are provided by Head of the Sub-district.

***Corresponding author:** Agung Stiawan, Postgraduate Program, Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. email: agungstiawan23@gmail.com

Depo 3R Palasari conducts composting activities, but in limited quantity. Revenue from sale ofthe products and collection fee from the community could not cover the operational costs [9]. Therefore, this study aimed to assess the technical and financial aspects of Depo 3R Palasari.

MATERIALS AND METHODS

The amount of SW, which was processed in Depo 3R Palasari, was determined by load count analysis method [4] for 8 consecutive days. The SW composition and recycling potential were determined based on the weight percentage of each SW component. The measurement was done for 3 days by sorting the SW components of at least 100 kg [10]. Three SW samples were collected randomly from3 collection vehicles. This research also used mass balance analysis to determine the facility and financial needs. Development of the Depo was designed for 10 years from 2018 to 2027. Population projection to year 2027, which was calculated from 2008 to 2015 data, was used for SW generation projection. Financial assessment was done by using Net Present Value(NPV) and Benefit Cost Ratio(BCR) methods. If NPV value is higher than 0, and BCR value is higher than 1, the Deposit feasible to operate[11].

RESULTS AND DISCUSSION

Technical assessment

The SW quantity which was received in Depo 3R Palasari was 3,478.82 kg/day. With an average density of 160.98 kg/m^3, the SW volume was 21.61m^3/day. Biodegradable organic waste, which comprised food waste and yard waste, was the main fraction (80.48%), with a recovery factor of 41.17% for compost raw material. The second highest SW component was plastic waste (9.06%), of which recovery factor was 87.34%. Composition and recovery factor values of the SW are shown at Table 1.

Table 1. Composition and recovery factors (RF) in Depo 3R Palasari

No	Components	Percentage (%)	RF (%)	Recovered SW (kg/day)	Residue (kg/day)
1	Biodegradable organic waste	80,48	41,17	1.152,60	1.647,27
2	Plastics	9,06	87,34	275,39	39,92
3	Tetra pack	0,74	-	-	25,66
4	Papers, cardboards, cartons	2,08	90,17	65,34	7,13
5	Rubber	0,19	-	-	6,60
6	Textiles, leathers	0,23	-	-	8,13
7	Glass	1,12	73,16	28,61	10,49
8	Wood	1,68	-	-	58,56
9	Metal	0,62	100	27,10	-
10	Other	3,62	-	-	126,03
	Total	100,0	-	1.549,03	1.929,79
	Total solid waste received by the Depo			3.478,82	

The mass balance analysis resulted in 32.00% biodegradable organic waste could be composted (Figure 1). Volume of the composted material would be decreased due to composting process from 35.3% without bioactivator addition to 66.7% with bio activator addition [12]. If 40% of compostable SW is assumed to be composted, the compost product could only achieved12.80% of the total SW amount. Recovery factor of non-biodegradable waste was 11.40%. This amount could be sold to SW agent as recyclables.

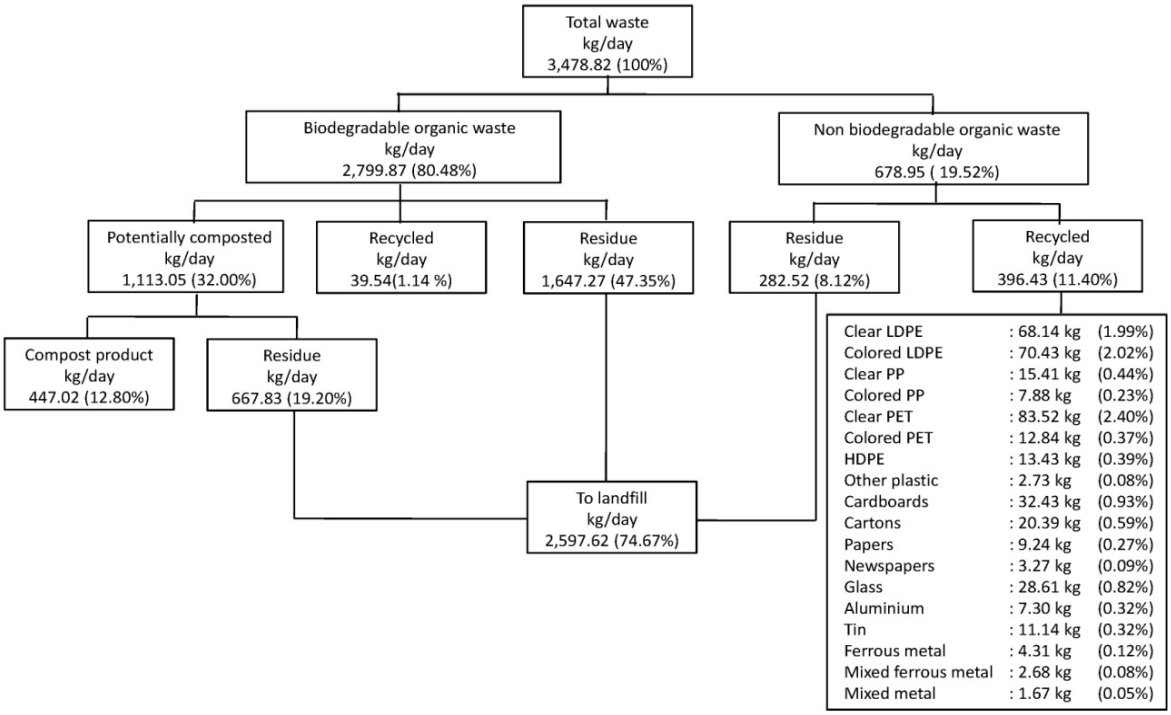


Figure 1. Results of mass balance analysis

Using population projection data until 2027, the estimated SW amount which will be received by the Depo is 4,054.15 kg/day. The Depo would require990.89 $m^2$to treat this amount of SW in 2027, compared to the current546.88 m^2. Composting requires the largest area (642.66 m^2).The current area and the needs for 2027 are shown in Table 2 and Figure 2.

The Depo did not need additional facility in 2027, except residual container. However, in year 2025a new collection vehicle should be provided for replacing an old one. Four new vehicles should be provided in 2026 for replacing the old ones. The number of collection vehicles toward 2027 was determined by optimizing the number collection frequency from 3 to 4 trips per day. An extra container of 8 m^3 capacity was needed for placing residual matter in 2027.The current facility need and in 2027are shown in Table 3.

Table 2. Estimation of area needs of Depo 3R Palasari in 2027

No	Area (m^2)	Existing area (m^2)	Area needs in 2027 (m^2)		Expansion needs (m^2)
1	Unloading and sorting	33.37		38.41	12.01
2	Storage for recyclables	20.82		20.82	-
3	Shredding machine for composting	207.03	642.66	2.75	435.63
4	Composting			622.13	
5	Compost maturation area			10.99	
6	Sieving machine for composting			5.22	
7	Packaging and storage of compost product	11.40		11.40	-
8	Container for residual matter	24.08		24.08	-
9	Parking for collection vehicles	57.83		49.16	8.68
10	Leachate pond	0.00		2.15	2.15
11	Office	34.20		34.20	-
12	Worship room	9.00		9.00	-
13	Rest room	2.60		2.60	-
14	Vehicle maneuver	157.95		157.95	-
	Total	546.88		990.89	443.98

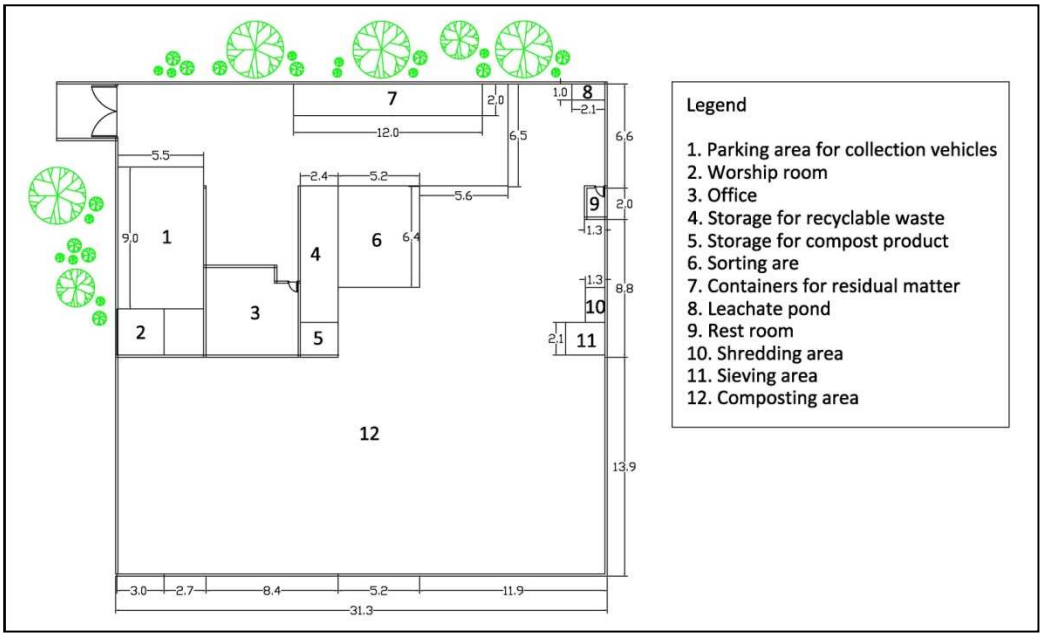


Figure 2. Layout of Depo 3R Palasari in 2027

Table 3. Estimatedn eeds of facilities at Depo 3R Palasari

Year	Amount of solid waste	Collection vehicles	Shredding machine for composting	Sieving machine for composting	Residual matter container
	(kg/day)	(unit)	(unit)	(unit)	(unit)
2018	3.531,36	5	1	1	1
2019	3.583,89	5	1	1	1
2020	3.636,42	5	1	1	1
2021	3.688,96	5	1	1	1
2022	3.741,49	5	1	1	1
2023	3.794,02	5	1	1	2
2024	3.846,55	5	1	1	2
2025	3.899,09	5*	1	1	2
2026	3.951,62	5**	1	1	2
2027	4.004,15	5	1	1	2

Note: * one new vehicle replaces old one
** 4 new vehicles replace old ones

Based on the spatial plan of Denpasar City of 2011-2031, which limits the land use of the surrounding area, it is impossible to expand the depo. Therefore, it is necessary to optimize the 3R activities in the existing area. Optimization can be done by prioritizing the 3R activities of the recyclable waste and limiting the composting biodegradable SW from 32% to 10%. The maximum capacity for composting was 379.73 kg/day. At this recycling capacity, the potential SW reduction that can be achieved by the Depo was 16.90%.

Financial assessment

Revenue of the depo came from the SW collection fee and the sale of recyclable SW materials. The collection fee was IDR 20.000 per householder. Community participation in paying the collection fee was 78.15% in 2017. This needs efforts to increase community participation in collection fee payment. If assumed that community participation

for collection fee was 10% per year, the estimated revenue would be in 204,578,520.00 in 2018 and IDR 263,040,000.00 in 2027 (Table 4).

Estimated revenue from sales of the of the recyclable materials, such as plastic, paper, glass and metal waste in 2027 was IDR 433.598.450,98. The total income in 2027 was IDR 772,010,292.54 while the operational cost in 2027 was IDR 738,459,566.85.The investment cost was required for providing the collection vehicles rejuvenation, the purchase of compost machines, and the supporting equipment such as packaging tools and scales; whereas the operational cost was for staff salaries, gasoline and vehicle and machinery maintenance.

Data in Table 4 show that the financial cash flow of the Depo in 2018 is deficit. This is due to the high investment cost and the collection fee which is still 78.15%. From 2020 to 2027, the cash flow is positive. With an interest rate of 12%, the estimated NPV value from 2018 to 2027 is IDR -102.062.182,57 and the BCR value is 0.97. Since the NPV and BCR values are negative, the Depo needs financial support from the local government for investment. This will make the NPV and BCR values become IDR 26,193,368.50 and 1,01 respectively.

Table 4. Financial cash flow in Depo 3R Palasari

Description	2018	2020	2023	2025	2027
Income					
Collection fee	204,578,520.00	239,040,000.00	249,360,000.00	256,320,000.00	263,040,000.00
Sale of recyclables	154,126,282.42	306,798,299.00	356,233,576.13	393,159,717.43	433,598,450.98
Compost	54,681,402.26	58,723,325.20	65,353,241.59	70,184,002.25	75,371,841.57
Expenditure					
Investment					
Collection vehicles	-	-	-	39,902,971.68	-
Shredded machine	-	-	-	-	-
Sieving machine	13,212,825.00	-	15,791,492.33	-	-
Packaging tool	800.000.00	-	990,838.73	-	-
Scale	2,750,000.00	-	3,406,008.15	-	-
Operational cost					
Salaries	392,532,000.00	554,757,340.80	606,198,324.74	643,115,802.72	716,304,820.64
Gasoline	29,784,442.12	29,791,606.35	29,802,352.69	29,809,516.92	29,816,681.15
Maintenance of collection vehicles	4,663,350.00	5,008,054.06	5,573,467.88	5,985,445.75	6,427,876.08
Machine maintenance	590,691.00	634,353.51	705,972.60	758,156.46	814,197.64
Water and electricity	1,865,340.00	2,003,221.62	2,229,387.15	2,394,178.30	2,571,150.43
Supporting cost for composting	8,953,632.00	9,615,463.79	10,701,058.33	11,492,055.84	12,341,522.07
Total income	413,386,204.68	604,561,624.20	670,946,817.72	719,663,719.68	772,010,292.54
Total expenses	455,152,280.12	601,810,040.14	675,398,902.61	733,458,127.68	768,276,248.00
Cash flow	-41,766,075.44	2,751,584.06	-4.452.084,89	-13,794,408.00	3,734,044.54

CONCLUSION

Depo 3R Palasari has a potential SW reduction of 25.54%, if expanded from 546.88 m^2 to 990.89 m^2. Due to the land in avail ability for expansion, the Depo should maximize the SW 3R treatment at its current area. With this option, the Depo can only reduce the SW by 16.90%. From 2018 to 2027 the Depo has an NPV value of IDR -102,062,182.57 (<0) and BCR value of 0.97 (<1). This means that the Depo is not financially to operate. With financial support from the local government for investment, the Depo can feasibly work (NPV value = IDR26,193,368.50 and BCR value = 1.01).

ACKNOWLEDGEMENT

The authors would like to acknowledge to the various parties who have participated in this research. They are the Ministry of Public Works and Housing, who provided research grant, the community organization (KSM)of Palasari who provided data and information, and the Government of Denpasar City, who gave recommendation and permission for conducting this research.

REFERENCES

1. Dhokhikah, Y., Trihadiningrum, Y. & Sunaryo, S. 2015. Community Participation in Household solid Waste Reduction in Surabaya, Indonesia. Science Direct, pp.153-62.
2. Zurbrugg, C., Gfrerer, M., Ashadi, H., Brenner, W. & Kuper, D. 2012. Determinants of Sustainability in Solid Waste Management - The Gianyar Waste Recovery Project in Indonesia. Science Direct, pp.2162-33.
3. Government of Republic of Indonesia. 2008. Undang-Undang Nomor 18 Tahun 2008 on Pengelolaan Sampah. Jakarta.
4. Tchobanoglous, G., Theisen, H. & Vigil, S. (1993). Integrated Solid Waste Management. Singapore: McGraw-Hill.
5. Government of Republic of Indonesia. 2012. Peraturan Pemerintah Nomor 81 Tahun 2012 on Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga. Jakarta.
6. Memon, M.A. 2010. Integrated Solid Waste Management Based On The 3R Approach. Springer, pp.30-40.
7. Ministry of Public Work and Housing. 2015. Masterplan Persampahan Sarbagita. Laporan Akhir. Denpasar.
8. Sudiana, I.K. 2014. Rencana Kerja Masyarakat TPS 3R Sanur Kauh. Desa Sanur Kauh.
9. Dwipayanti, N.M.U., Purnama, I.G.H., Kusuma Jaya, I.M., Mahardika, P.Y.A. & Prahesti, R.Y.R. 2011. The Sustainability of Community Based Solid Waste Management/MRF in Denpasar. Denpasar.
10. National Standardization Agency. 2002. SNI 19-2454-2002 on Tata Cara Pengelolaan Sampah Perkotaan. Jakarta.
11. Honesti, L. & Djali, N. 2012. Analisis Ekonomi dan Finansial Pengembangan Bandar Udara Internasional Minangkabau (BIM) di Sumatera Barat. Momentum, 13(2), pp.50-59.

12 Dewilda, Y. & Apris, I. 2016. Studi Optimasi Kematangan Kompos dari Sampah Organik dengan Penambahan Bioaktivator Limbah Rumen dan Air Lindi. In Seminar Nasional Sains dan Teknologi Lingkungan. Padang, 2016. Andalas University.

J. Appl. Environ. Biol. Sci., 8(2)111-119, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Socıal Exclusıon of Transgenders from Pakhtun Socıety (A Case Study of Dıstrıct Charsadda)

Muhammad Nisar*[1], Dilkash Sapna[1], Asadullah[2], Mussawar Shah[2], Anas Baryal[1], Zia Ur Rahman[3]

Department of Sociology and Gender Studies, Bacha Khan University, Charsadda, KP, Pakistan[1]
Department of Rural Sociology, The University of Agriculture Peshawar, KP, Pakistan[2]
Department of Computer Science, Bacha Khan University, Charsadda, KP, Pakistan[3]

Received: September 19, 2017
Accepted: December 13, 2017

ABSTRACT

The study was conducted in District Charsadda. Interview was used as method of data collection. Interview was used as method of data collection.. The convenience sampling was used to select the respondents. Findings of the study show that most of the transgenders were confused about their own identity that what kind of people they were, but presented themselves as females. The roles that these people played were dancing in wedding ceremonies and at the birth of male child. The problems they faced in society include mobility, sexual harassment, physical violence and adjustment problem. They have many rights, almost the same as the other people have, but it is difficult for them to get access to those rights. People's perception towards transgenders was negative and discouraging and they were treated negatively. Social stigma was associated with them because of their confused identity. People consider transgenders homosexual prostitutes and source of entertainment which creates social evils. In a society like Pakistan, where normal people are deprived of their rights, it seems impossible for such people to achieve their rights. Based on these findings it is recommended that through training and education, transgenders should be make capable to earn their livelihood through better and respectable ways.
KEYWORDS: Social exclusion, Transgender, Perception, Pakhtun society..

1. INTRODUCTION

Human beings are divided into two biological sexes male and female. Generally, people emphasize upon two categories of human beings' male and female in all spheres of life. These two categories are not having equal status in the society. Usually women are dependent on men and live marginalize life.
There is a third category of human beings who are between women and men and they are ignored by the society. People, who are called transgender, are marginalized in one way are another way. The societal perceptions towards these people are negative and not very encouraging; and in fact, full of mortification because people do not even consider them human being. They are tolerant and peace loving people because of their innocence they give no harm to the society.
It is known fact that Pakhtun Society is patriarchal. Male section of the society has full command over other sections, like women and transgender people that is why transgender are subjugated by the discriminatory structure of the society. This area was selected for the study because transgender are passing through very critical situation and having too much problems in existing structure. The Pakhtuns enjoy singing, but hate their musicians: due to this fact or this ill treatment towards this group has really aroused the researcher sympathy towards them and accepts the same sympathy and treatment from society.
That is why the researcher want to sensitize the people about their problems and to place them in society as the other human beings are; and to urge the people to have respect for these transgender because this group is the part of our society. They should not be denied. Due to this fact, there is a need to study the lives of these people. The study would be helpful to bring about the issues and problems of these people to limelight.

2. OBJECTIVES OF THE STUDY

1. To explore the perception of transgender people regarding the society and social attitude towards them.
2. To highlight the problem of transgender community.
3. To find out the reason of transgender social exclusion from the society.
4. To highlight the attitude of public towards transgender

.

***Corresponding Author:** Muhammad Nisar, Department of Sociology and Gender Studies, Bacha Khan University, Charsadda, KP, Pakistan. Email:muhdnisar74@gmail.com

3. LITERATURE REVIEW

Transgenders people experience a mismatch between their gender identity or gender expression and their assigned sex. Transgenders is also an umbrella term because; in addition to including Trans men and Trans women whose binary gender identity is the opposite of their assigned sex.
Bhasin (2013) defines gender as social cultural definition of man and woman, the way societies distinguish men and women and assign them social role.

The terms 'trans people' and 'transgenders people' are mostly used for those people whose gender appearance and/or gender identity differs from their sex at birth. It included transsexual people (those who intend to undergo, are undergoing or have undergone a course of gender reassignment to live permanently in their attained gender), transvestite/cross-dressing people (who wear clothing traditionally associated with the other gender either regularly or occasionally), androgyne/polygender people (those people who have non-binary gender identities and do not identify as male or female), and others who are defined as gender variant (Mitchell & Howarth, 2009).
Sabar (2002) said the society conducts a negative attitude towards transgenders. They are not treated as human beings by the society. These transgenders suffer shameful jokes and sexual harassment. The most tragic aspect of a transgenders life is that they are not rewarded with in term of respect and dignity in Pakistani society. The traditional role of the transgenders is to sing and dance at wedding and other auspicious ceremonies. Hence, they are not accepted by the societies, as most of them are not compatible with the prevailing norms in the present society. Due to this discriminated behavior, transgenders community has become isolated from the rest of the society and has developed a separate subculture.

JAN (2002) stated that transgenders has become a part and parcel of Pakistani society. Even in this modern era, many still do not know what they are; male or female? Or why God has created them in the first place, interestingly we use these unfortunate people for pleasure and entertainment, never thinking of them as normal human beings. We as Muslims believe in Allah and the most important message of Islam is that He has created nothing without purpose. Then the question is that why we consider them inferior?
Andersen (2006) said that sometimes transgenders are respected in India during the time of a newly couple give birth to a male child. Although at the time they are not accepted in society and they are treated as social out casted. Voices of Hijras (2001) narrated that society is having some prejudice about Hijras and these prejudices have become straightly negative due to lack of information. Society does not go and ask that why they are treated negatively. Hijras, in India are treated worse that even untouchables.
Nanda (1999) said that in Hindus society, attitude towards the transgenders is ambivalent. Although Hijra have an auspicious presence, they also have inauspicious potential. The sexual ambiguity of Hijra as impotent men eunuchs represents a loss of virility, and this undoubtedly is the major cause of the fear that type inspire. Thus, the stout, middle class matrons who are so amused by the Hijras performances and who may even pity them as tragic hermaphroditic figures also have underlying anxiety about them. This is translated into a taboo of orthodox Hindus that the Hijras should not touch or even see, a new bride, so that their importance will not contaminate her reproductive potential.
Harvey (2008) asserts that more than 4,000 years of recorded history, Hijras have a supposedly sanctioned place in Indian life, but they have faced severe harassment, if you are an Indian in need of some luck on your wedding day, you could do no better than seek the blessing of one of the country's estimated 200,000 male to female transsexuals or "Hijras". Ancient myths bestowed them with special power to bring luck and fertility. Yet despite this supposedly sanctioned place in Indian culture, Hijras face severe harassment and discrimination from every direction

4. METHODOLOGY

The present study was conducted in district Charsadda Khyber Pakhtunkhwa. The universe was purposively selected because in this area the transgenders were living and no study was conducted to highlight their problem. It was an attempt to through light upon the problems faced by transgenders and to know why they are socially excluded from the society. Two BalaKhana were selected through convenience sampling for the study. Every BalaKhana comprised of 25-30 transgenders. Among them 30 transgenders were selected randomly. Along with them 20 common people were also studied by the researcher because the study was two sided to know the public opinion about transgenders. Qualitative approach was adopted to conduct this study. In-depth interviews were used as tool of data collection. The researcher conducted qualitative study because a problem or issue needs to be explored.

5. RESULTS AND DISCUSSIONS

Data was collected from 40 respondents. Small sample size was selected to have an in-depth and detailed analysis of the concerned topic. There were two types of respondents i.e. the transgenders and the community people. The Sample size comprised of 20 transgenders and 20 common people. One among the respondents from the common people was a primary school teacher, 2 were qualified English lecturers, 2 were medical technicians, 5 were farmers, 4 were shopkeepers, 3 were police personals and the remaining 3 were drivers. The Researcher wanted to explore the parallel opinion from both sides that's why he selected transgenders as well as common people for the study.

6. DATA ANALYSIS

The data was divided in two portions, one portion presents the collected information from the transgenders group, and the second portion comprised of the perception and point of view of the common people regarding transgenders. For the easy accessibility, the collected data and in formations are further subdivided in major themes which present the objectives of the study.

6.1. TRANSGENDERS AND THEIR IDENTITY

Most of the respondents were confused about transgenders identity that what kind of people they were, but some of them were of the view that they were of third sex, thus, neither male nor female.

Mung pa khpala heran u chi monga sa u

We ourselves are confused that what we are.

Some of the respondents replied that they were not transgenders. They consider themselves normal people. However, their profession was dancing to entertain people.

Mung khudey dasey paida kare U mung kho Hagha sara jagara na shokawaley

God has made us like this, we cannot fight with Him for this.

The above statement indicates that they considered themselves as third sex. It is not because they intended to be transgenders but that biologically they were shaped like that.

One of the respondents argued that:

Da hijira ba sa shanakhat we kho na nar we aw na khaza

What would be the identity of transgenders! He is neither male nor female.

That person wanted to say that transgenders with their complex identities could not claim to be a male or a female. They argued that due to confused identity they are having no acceptance and respect in society. Common people refused to accept them due to their identity. Public usually perceive them as deviant and thus do not respect them. Some of the respondents were of the view that it varied from person to person. The educated people usually respect and accept them as human beings and consider them innocent. However, uneducated and ignorant people have no respect for them because they always have negative attitude towards them. Few of the respondents were of the view that:

Da hijira pa muashera ke hes ezat neshta

Transgenders has no respect in the society.

Most of the respondents revealed that they did not belong to the area and either came from Punjab are far flung areas of Khyber Pakhtunkhwa which further added to their alienation in the society. Joining the community for the first time, the leader called 'Guru' received and guided them. An introductory party is held in their honour followed by the Guru giving them a ring. This ring validates their permanent membership in the community.

6.2. PROFESSION OF TRANSGENDERS

Regarding their profession, most of the respondents replied that they were dancers and used to attend weddings and other ceremonies for generating of their income.

Mung da kar pa khpala khwakha kao.da zamung pesha na da

We adopted this profession, this is not our permanent profession

They argued that this profession is not imposed upon them by the society. Responses showed that poverty was the major factor behind the adoption of this profession by these transgenders people. Their parents demanded money from them because of that they were compelled to do any kind of job.

One of the most important reasons was that being transgenders they had no other option except to join the dancing community.

6.3. TRANSGENDERS'S VIEWS ABOUT THEIR PROBLEMS

Findings related to this theme indicate that transgenders people were facing so many problems. One of the most important among them was poverty which pushed them toward insulting and indecent jobs. One of them argued that;

Dey ghareby zamung na haya waghesta

Poverty has deprived us of dignity.

They wanted to get free of their economic problems and difficulties that's why they get involved in dancing profession. They told the researcher that some of them left this job many times but financial problems pushed them back. One of the respondents said that he was not ready to dance in front of the people and show himself as a female but his poor economic conditions compelled him for that.

Second most important and great problem, from which they were suffering, was the insulting and harassing attitude of the lecherous people due to which they felt embarrassed. Some of them argue that:

Ghata masla zamunga badmashan de chi mung threy deer pareshana u

The main problem which we face is bullying due to which we feel unhappy.

They said that when they were invited to the functions or wedding ceremonies, they always were insulted by immoral people in the form of unwanted/ indecent comments and gestures of sexual nature. Few of the respondents argued that:

Ka da badmassan zamung na qalar sho no mung ba dera kha zendage terakro

If these immoral bullies leave us alone then we would live a peaceful life.

Some of the respondents were extremely sad and unhappy because of their problems. One can feel the pain in the statement:

Zamung jwand da masalo na dak day kuma kuma ba yadawo

Our life is filled with problems, which one should I tell?

Social adjustment was another issue for these transgenders people and they faced this issue in the form of social stigma everywhere due to which they were unable to get settled in one specific area. They told the researcher that due to their transgenders position they had no respect at home and in Balakhana (living place of transgenders) They were always vexed or sexually exploited by wicked people. Some of the respondents argued that:

Zamung na pa kor ke zay shta na pa balakhanake

We have no place at home or at balakhana.

Responses revealed that being perceived as abnormal and inferior people, the transgenders community tried to hide itself from the society. They informed the researcher that they were afraid of the stigma which was associated with them by the society.

Da gedar ao zamung yaw shan zendage da.

Jackal and we have similar life.

6.4. VIOLENCE FACED BY TRANSGENDERS

Regarding the theme of violence against them, they replied that they faced physical as well as verbal violence from the common masses. Whenever they resisted sexual advances from sexual perverts, they were subjugated to physical violence. Some of the respondents argued that when they tried to keep themselves safe/ away from physical violence they still were vulnerable to verbal violence. One of the respondents argued that:

Da khlko pa vaja bahar na sho tlay zaka che awazona rapasy kave

We cannot step out of our residence because of the ridiculing and degradingcomments of the people.

They were of the view that physical, verbal and sexual violence continued unchecked in the society, which have made their lives miserable. Most of the respondents were thankful to educated people because of their positive attitude. One of the respondents argued that:

Da ghalat kar da waje na ma Peshawar prekhodo aw dalta raghlam

Due to immoral and sexual nature of activities, I left Peshawar and came toCharsadda.

6.5. GENDER / STEREOTYPICAL ROLE

Most of the respondents informed the researcher that they were not satisfied with their role of dancing. Whenever they attended the weddings and other ceremonies, after their dancing party/ program even they were not provided the space to spend the night. Some of the respondents replied if they retire to bed for sleep they would certainly face forced sex. That is why they were not satisfied with their role. One of the respondents argued that if we compare Punjab with Charsadda, Punjab is better than Charsadda because in Punjab they did not face such sort of violence. They were not happy with this role but according to them they had no qualities of male and could do nothing like men that was one of the reasons of their inferiority. Few of the respondents were of the view that by birth they were transgenders and had souls of females which made them confined to this uncomfortable role.

6.6. TRANSGENDERS VIEWS ABOUT THEIR RIGHTS

Most of the respondents when they were asked about their rights, they replied that they have the same rights such as the other people had, but they could not get these rights easily because there were some hindrances due to which they could not approach their rights. Majority of the respondents replied that due to the rigidity of Pakhtun society, they could not get their rights. Likewise, one of the respondents argued that:

Mung baher na sho wataly no da khpal haq tapos ba sanga kao.

We cannot step out from balakhana then how we can ask about our rights.

From the above statement, the researcher observed that due to the social pressure, the transgenders could not even step out of their residence so it is impossible for them to ask about their rights. Majority of the respondents replied that they knew that they had the right to education, economic, political, religious and sexual rights but to get these rights was not an easy task because of the rude behavior of the people. Some of the respondents told that their parents always used to advise them to join school but they were not ready to join school because of social stigma and poverty. When the respondents were asked about their economic rights such as service and property rights they replied that in Pakistan even male could not get these rights then how could they (transgenders) imagine such a possibility? It is indicated from the statement that they have been so frustrated that they even cannot think about their rights. Most of the respondents told the researcher about their political rights that they have right to vote and right to contest election but the major problem to these transgenders is that they were not relevant to the constituency where they lived. They have come from far away therefore they do not know that where should they cast their vote. Likewise, one of the respondents replied that he was from Rawalpindi; therefore, he/she could not cast a vote in Charsadda. Majority of the respondents when asked about their sexual rights, they replied that they were confused about their sex. If some of them are male, they fulfill their sexual needs from their colleagues. Some of them believed they were of complex gender, which did not allow them to get married. One of the respondents told the researcher that he was married and had one daughter, it is indicated that he has taken this job as a profession to earn money.

6.7. PERCEPTION OF COMMON PEOPLE TOWARDS TRANSGENDERS

Most of the respondents when they were asked about the transgenders, they replied that they are inferior people, likewise one of the respondents replied that:

Hijira kho hes sez na day

Transgenders is nothing.

Majority of the respondents replied that it depends on the people's minds; some consider them normal and some inferior. Majority of the educated people have decent behavior and are sympathetic towards transgenders but un-educated people have negative attitude towards transgenders.

Da hijra na muashery ta sa faida neshta

Transgenders are not beneficial to society.

6.8. VIEWS OF COMMON PEOPLE REGARDING THE PROBLEMS OF TRANSGENDERS VS PROBLEM CREATED BY TRANSGENDERS

Most of the respondents when asked about the transgenders they replied that the major problem of these transgenders is social adjustments because they fit in no sex. Due to their complex biological make up they could not be adjusted in any sex category of male or female that is why they faced adjustment problems. Majority of the respondents when asked about transgenders economic problem they replied that these transgenders have some economic problems due to which they have adopted dancing profession. One of the respondent replied that transgenders do anything for the sake of money. The above statement indicates that poverty is the main problem due to which they get involved in this job. Most of the respondents believed many problems are created by these transgenders in this society because they are homosexual and are always busy in immoral activities which is hazardous for the society. Some of the respondents were of the opinion that a single transgender can create disturbance in a whole village. Few of the respondents believed these transgenders involve the young generation in immoral activities.

6.9. COMMON PEOPLE VIEWS ABOUT TRANSGENDERS'S ROLE

Most of the respondent replied that transgenders have no productive role in society. They replied that they were only the source of entertainment. They can play their role as dancers only. Through this dancing, they earn money that is why they have no specific role in the development of society. Some of the respondents replied that these transgenders have no active role in society. They joined wedding ceremonies only when invited by the people. Majority of the respondents replied that they like transgenders because they have close similarities to girls. Some men like transgenders due to their apparent sexual similarities to female sex.

6.10. COMMON PEOPLE VIEWS ABOUT TRANSGENDERS RIGHTS:

Most of the respondents believed transgenders have some rights but they cannot get these rights easily. One of the respondents said that:

Haquna mung la sok na rakawe da kho la hijiragan de

Even we are not given our rights then how the transgenders can get their rights

Majority of the respondents were of the view that God has assigned rights to every gender but these rights need to be accessed, which is out of transgenders reach. Some of the respondents replied that they are of normal gender and have no access to their rights. Few of the educated respondents replied that transgenders have no access to their rights because they have no such organization or leaders who can support and fight for their rights.

7. DISCUSSION

First objective of the study was about the social perception towards transgenders. Finding related to this objective indicate that common people think that these transgenders are inferior people and abnormal section of the society and they could not play their role in the development of society.

One of the respondents argued that;

Hijra kho hes sez na day

Transgenders is nothing,

They could not play their role in the development of society likewise one of the respondents argued that:

Da hijra na dy moaashery ta sa faeda neshta

Transgenders are not beneficial to society.

It shows the negative societal perception towards these transgenders. It is argued by Anderson (2006) that they are respected during the time when the newly married couples give birth to a male child. Although at that time they are treated as social outcasted. A taboo of orthodox Hindu that the hijra should not touch, or even see, a new bride, so that the impotence will not contaminate her reproductive potential.

But on the other hand, the responses of transgenders group showed that they were also confused about their identity that what kind of people they are, but majority of them was of the view that they are of third sex, neither male nor female. Some of them argue that:

Mung pa khapala heran u chi mung sa u.

We ourselves are confused that what we are

When they were asked about their acceptance and respect in society majority of the respondents replied that because their complex identify, they are having no acceptance and respect in society.

Jan (2002) said that transgenders has become a part and parcel of our society. Even in this modern era many still don't know what they are.

Researcher also observed that transgenders were in confusion because of their identity and they did not know that what they were.

Usmani (2009) argued that in Pakistan the PPP government has brought hijras into the public eyes. They hold their first protest outside the Lahore press club on June 26, 2009. Hundreds of Hijras came together from all over the Pakistan holding up placards with the verse who am I? The gathering was to land the colossal effort to make the Supreme Court acknowledge of their existence and to inform the public about the impoverished and desperate conditions that they live in.

Study show that transgenders were mostly deprived of their rights.

The common people were of the view that;

Haquna mung la soe no rakawe no da kho la hijragan de.

Even we do not get rights then how transgenders can get rights.

Common people argued that due to the unjust and discriminatory structure of the society most of the normal people were not capable to enjoy their rights.

Harvey (2008) said that Indian law recognized very few rights of Hijras and they are deprived of their right to vote, the right to own property, the right to marry and the right to claim formal identify through any official document such as a passport or driving license.

A news report of daily Pakistan (November, 1998) also highlights the views of transgenders that transgenders arranged a meeting and made appealed to chief executive Pervez Musshraf to announce privileges to their cults.

But on the other hand, the responses of transgenders group indicated that they had the same rights as the other people had, but they could not get these rights easily because there is some hindrance due to which they could not approach their rights. They told the researcher that they had no strong and stable organization or association to help them in satisfying their rights.

Majority of the respondents replied that due to the rigidity of this society in terms of strict classification human beings into masculine and feminine identities and gender division of labor, they could not get their rights likewise one of the respondent said that:

Munga bahe na sho watay no da khapal haq tapos ba sanga wako.

We cannot step out from Balakhana then how we can ask about our rights?

Some of the transgenders knew that they had educational, economic, political and sexual rights but to get these rights is not an easy task because of the rude behavior of normal people. Poverty is also an obstacle in their way of getting education.

Transgenders also agreed to the opinion of normal people that economic rights such as employment and property rights are not easy to get, because in Pakistan even some male as well as majority of female population is deprived of these rights. The study shows that these transgenders were holding National Identity cards and could cast their votes but the problem was that they came from different areas of Pakistan. They did not belong to that specific constituency that's why they did not cost their votes. Likewise, one of the respondent replied that he was from Rawalpindi then how he could cost his vote.

One of the objectives was related to the transgenders profession. Findings regarding to this theme indicate that due to the economic problems they had adopted dancing as profession which was an easy way for these transgenders to earn money and lead their life comfortable. One of the respondents argued that.

Hjiragan kho da peso da para her sa kawe

Hijra do anything for the sake of money.

Money is the only thing which helps them in this society. The most traditional roles through which they earn money are; performing at homes where a male child born, wedding ceremonies, the negative role of transgenders was that most of them often engage in homosexual activities.

Majority of the respondents were of the view that these people are not transgenders but professional because due to this way they want to get or earn money.

Some of the respondents told the researcher that they have seen many transgenders who had children in life that's why they were professional not transgenders. But Bong (2001) said that transgenders are generally accepted both within the community and among helping professional.

Mung pa da kar ke Khushhala u da zmongPesha na da.

We are here just for entertainment dancing is not our permanent profession.

This profession was not imposed upon them by the society but they had taken it by choice. In contrast the study also revealed that poverty is the major factor behind the adoption of this profession by transgenders,

The researcher observed that the gender division of labor affects this community in a very severe way because in our society everyone knows about his/her responsibilities and functions. So, transgenders who were having no identity and are not fit in any category, they were confined to that specific profession and being transgenders they were not having any other option. This dancing and entertainment is now considered a natural and permanent profession of these people and it is their identity in our society. Researcher observed that they were male but their physique or body structure is just like female and having no ability to join male's job. Findings regarding the problems of transgenders indicated that the major problems of transgenders were social adjustment, poverty, violence, sexual harassment and mobility. Due to their complex identify they were not adjusted either in category of male or female. Common opinions show that transgenders have no problem of their own, but they themselves creating problems and evils in the society due to their homosexuality and immoral activities which are against the religion. The below statement show the perception of people regarding transgenders;

Da Hijragan da moaashery da para tabahi da..

Meant that, these transgenderss are hazardous to the society.

According to the public opinion they me homosexual and this homosexuality is not the problem of transgenders but a problem for the society.

Nanda (1999) also supports this view by saying that most of the transgenders are homosexual.

On the other hand, the responses of transgenders group show that poverty is the major problem which pushed them to this job. One argued that;

Dey Ghariby zamunga haya wakhista

Poverty has deprived us of dignity.

Poverty compelled them to be involved in dancing profession as well as in homosexuality to earn the money through an easy way. They told the researcher that some of them left this job many times but financial problems pushed them back to this job. One of the respondent said that he was not ready to dance in front of people and show himself as a female but these financial constraints made him to be a dancer.

The greatest problems faced by this community were violence and sexual harassment at the time when they did not agree to the normal people. Most of the transgenders did not face violence because they voluntarily do homosexual activities to earn more. Findings regarding to this theme show that transgenders face too much violence because of these people at the time when these transgenderss did not obey the order of these common people which lead them to sexual, verbal and physical violence likewise one of the respondents argued that:

Da cha na pa lar na sho tlay, da masalo sara Zmong makh day.

We cannot go on road. We always face problems due to people.

They were of the view that physical, verbal and sexual violence are at large numbers which had made their lives miserable.

According to Khan (2004) the life of hijira is very tough and having much violence as compare to the common people. Researcher observed that transgenders have too much violence in their Bala Khana and wedding ceremony too. In both Bala Khana and at weeding ceremonies they are ordered by the normal people to fulfill their sexual desire, sometime these transgenders did not agree with these people due to which they face sexual and physical violence. The problem of sexual harassment is created by lecherous people to transgenders. Majority of the respondents argued that due to lecherous people we felt embarrassment. They always demand of that which is not suit to us. Few argued that:

Ka da badmashan zamung na qalar sho no mung ba dera kha zindagi terakro.

If these immoral bullies leave us alone then we would live a peaceful life.

Some of the respondents were extremely sad and unhappy from their situation. One can feel the pain in the statement:

Zamung jwand da masalo na dak dey kuma kuma ba yadawoo.

Our life is filled with problems which one should I tell.

This person wanted to say that the transgenders face so many problems which the normal human beings did not face. Researcher observed that there are many problems which are faced by transgenders in society. The major problem to these people is their social adjustment which cannot be denied. The second problem to these people is their poverty which made them homosexual.

8. CONCLUSIONS

It was concluded from the study that the entire problem which the transgenders faced in society was their identity. Because of their complex biological make up these people cannot be placed in either male or female category. Due to this complex identity, societal perception towards them was negative. The transgenders present themselves in the appearance of female to attract the people. The female attire was put on, the voice, gestures dress delicacy and timidity of women were adopted which functioned as providing alternative techniques of providing gratification. The dominant cultural role of the transgenders was that of rituals performance on occasion of wedding, birth day parties and at the birth of children. It is also true that transgenders often engaged in homosexual prostitution, indeed it was the major source of income for most of them. It can be said that transgenders were passing very tough and insulted life, because they always face sexual harassment and violence in society. The rigid behavior of the parents of the transgenders seemed more to be a deciding factor in leaving the family are joining the transgenders community. The study shows that majority of the transgenders belong to the lower and middle class socio-economic background due to which they were not enjoying basic facilities of life. In short, the lack of productive activity, lack of money and negative social perception lead to the exclusion of transgenders from the mainstream of society and confine them to that specific community.

9. RECOMMENDATIONS

Following are some of the recommendations if adopted can be helpful for the solution of transgenders problems.

1. The Media should highlight the problems of transgenders community and make the people aware regarding their problems to treat them properly.
2. The Government should establish institutions for the training and education of these people to enable them to live with dignity in society.
3. Government should come up with schemes to make transgenders community stable financially.
4. Transgenders needs to make their effective association or organizations which help them in resolving their problems.
5. There is a need that the public should encourage transgenders to participate in public life. This public participation will generate confidence in them and they will be made functional member of the society.

REFERENCES

[1] Andersen, L.M & Jailor, F.H. (2006). Sociology: Understanding a Diverse Society. Australia: Thomson.

[2] Bhasin, K. (2013). Understanding Gender, New Dehli: Paul's press.

[3] Harvey, N. (2008). India's Transgendersed-the Hijras. Retrieved Oct 13, 2014 from http://www.transgenderscare.com/guidance _what_is_gender.htm.

[4] Jan, A, I. (2002, February 3) Lahore: Struck between He and She. The Daily News, p.4.

[5] Mitchell, M., & Howarth, C. (2009). Trans research review.

[6] Nanda, S. (1999). The Hijras of India: Neither Male nor Women. (2nded.) New York; Wards worth publishing company.

[7] Sabar, S, M. (2002 November 22). Unemployment has a Clung: Save us for God sake. The Daily Pakistan.

[8] Usmani, B. (2009) Pakistan to register 'third sex' Hijras. Retrieved November 13, 2014 from http://www.blurti.com/relationship/sex/sexuality,transgennder.

J. Appl. Environ. Biol. Sci., 8(2)120-125, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Implications of Caste System on Social Development in Rural Areas of District Lodhran in Southern Punjab, Pakistan

[1]Dr. Muhammad Shabbir, [2]Paris Zaka Ullah, [3]Uzma Niaz

[1]Assistant Professor, Department of Sociology, Govt. College University, Faisalabad, Pakistan
[2]Lecturer, Department of Sociology, Govt. College University, Faisalabad, Pakistan
[3]Visiting Lecturer, Department of Sociology, Govt. College University, Faisalabad, Pakistan

Received: September 21, 2017
Accepted: December 11, 2017

ABSTRACT

Caste is a social group having two characteristics of hereditary membership and endogamy. The caste system is basically a way of dividing people into different social classes. In developing societies stratified along caste, clan, or ethnic lines, social hierarchies can be particularly salient, yet their consequences for durable inequalities in opportunity have been only lightly explored. Present study focused to identify on the implications of caste system on social development in rural areas of District Lodhran. Data were collected with the help of a well-designed interview schedule. Data were analyzed by using Statistical Package for Social Sciences (SPSS) software. Descriptive and inferential statistical techniques were used for data analysis. (59.2%) of the respondents were living in joint family system and out one-fourth i.e. (28.8%) favor the biradarism to a great extent while (39.2%) to some extent. About one-third (32.0%) of the respondents had thinking that the caste system is started from India, while about one-fourth (25.6%) of them told that caste system is started from Arabic Qabail. (48.0%) of the respondents had thinking that the group formation in their villages is the result of this caste system. As gender discrimination was probed, a majority (64.0%) of the respondents told that biradari had normal reaction if some females of their biradri/caste go to get higher education but they have different observation. More than a half (56.0%) of them had thinking 'to some extent' that rural educated people were against the biradrism. More than a half (55.2%) of them had thinking 'to some extent' that education and caste systems are the major components of social development. It was noted that all the respondents had thinking that caste system created the infrastructure for formation of social relations and interaction between peoples. A majority (64.0%) of the respondents had thinking 'to a great extent' that biradari system played an important role at local level politics.

KEY WORDS; Caste system, social development, social classes, social relations

INTRODUCTION

Hutton defined caste "a collection of families or groups of families bearing a common name, claiming a common descent from mythical ancestor, human or divine; professing to follow the same hereditary calling; and regarded by those who are competent to give an opinion as forming a single homogeneous community". Another definition of caste is, it's a status of inferior or superior rank of endogamous and hereditary subdivision of an ethnic unit of any social esteem in comparison with other such subdivision [1].

Biradri: It is the group of people belonging to same caste, intermarrying together. Two or more families related to each other are called biradri. People of biradri do not necessarily live at the same place. There may be different languages, styles, and customs in biradri. Old biradries having same caste are still strong in Pakistan. They have more rigid norms. Social violations in biradries are strictly condemned. Endogamy is a strict condition in some of the biradries[2].

Among Muslims as among Hindus, castes are organized locally on the basis of caste brotherhood (biradari). Those born into another caste, even though they may be on the same social level and practice the same occupation, are excluded from this brotherhood. Each brotherhood is normally governed by a committee of elders (panchayat) that has the power to settle disputes within the caste. It punishes members who break caste and dishonor the brotherhood, the worst punishment being expulsion, which traditionally entailed not only social ostracism but the loss of one's livelihood [3].

In developing societies stratified along caste, clan, or ethnic lines, social hierarchies can be particularly salient, yet their consequences for durable inequalities in opportunity have been only lightly explored. Caste identity

***Corresponding Author:** Uzma Niaz, Visiting Lecturer, Department of Sociology, Govt. College University, Faisalabad, Pakistan. Email:uzmaniaz@gmail.com

is embedded in occupational differences, which are associated with status and notions of purity and pollution. Various exclusionary norms follow from these hierarchies and are exercised in relationships of mutual assistance, in social networks, and in the establishment and maintenance of political power within and outside the village economy. To the extent that a high-caste group dominates a community, it may be able (and willing) to exclude or at least discourage the low-caste group from accessing local public services [4].

Pakistan can proudly boost of having one of the oldest and the most organized caste systems in the world. This system always drew interest from the ancients to the recent sociologists. Plutarch and Homer studied it and made it a part of their ancient doctrine. Chankiya and Machiavelli added its necessary components in their celebrated works. Recently the salient features have been added in studying the covert mind control technique program of the CIA. This system has developed over centuries. However, much fine-tuning has been done to it in the last 63 years making it the envy of the nations. Under this system, society has been organized under a system of unorganized chaos. All basic groups are circling around one major group reflecting the principle of oneness of god and the principle of circling around in spheres by this whole universe. Any group who dares to move outside their circle is dealt harshly. Systems of punitive measures are set up for behavior not compliant to the set norms. Separate belief systems are established for each cast. They have their own gods. The role of each caste is pre-defined and gets the entire society into one fine-tuned system [5].

The sociological significance of the study lies in the part where attitude plays an important role in determining human social behavior and social relations. Caste system is the products of group life. It is well known that the study of group life is the focal point of sociology. Caste system is an aspect of social stratification. Social stratification is the one of the important institutions of the human society and can be found in all human societies. The sociological significance of studies becomes more necessary in a society where the social stratification is of rigid kind, i.e. caste system. The present study found out the impact of caste system on social development in rural areas of District Lodhran and also study the implications of caste system on their social life with following objectives.

Objective of the Study

Following are major objectives of the present study are;

- To study the socio-economic characteristics of respondents.
- To explore value, history and attitudes of respondents regarding caste system.
- To find out the role of education between caste system and social development.
- To explore the effect of caste system regarding social development.
- To suggest measures and recommendations for policy making.

METHODOLOGY

The study was conducted in District Lodhran. The multistage sampling technique was used for data collection. At the first stage one tehsil (Tehsil Duniyapur)out of three tehsils was selected randomly, at the second stage two union councils i.e. UC-22 & UC-33 were selected randomly, at the third stage four villages (two from each UC) i.e. Chak No. 360/WB and 358/WB from UC-34, Chak No. 355/WB and 357/WB from UC-35 were selected randomly and at the last stage one hundred and twenty-five respondents (25 from each caste) of 5 different costs (Gujjar, Rajput, Arain, Jutt& others minor caste) were selected purposively from the selected rural areas of District Lodhran by using simple random sampling technique. The well-designed interview schedule was used for data collection. Descriptive and inferential statistical techniques were applied for data analysis.

RESULTS

Data analysis based on the information taken from the respondents gives the following results. A large majority (73.6%) of the respondents were male and about one-fourth (26.4%) of them were female to take gender wise instance. One-third (32.8%) of the respondents had up to 35 years of age, while a major proportion (44.0%) of the respondents belong to middle age group of (36-50), and remaining (23.2%) had above 50 years of age. Respondents were choosing through equal distribution regarding caste and five caste groups were selected i.e. Gujjar, Rajput, Arain, Jutt and the last one group belong to minor castes. Results also reveals that about one-fourth (25.6%) of the respondents were illiterate, while (20%) of them had primary-middle level education, about one-third (32.0%) of the respondents were matriculated and (22.4%) of them had above matric level education. (40.8%) of the respondents were living in nuclear family system and a majority (59.2%) of the respondents were living in joint family system. Further, about one-fourth (25.6%) of the respondents had up to Rs. 15000 monthly income from all sources, while a major proportion (45.6%) of the respondents had Rs. 15001-30000 monthly income from all sources and (28.8%) of them had above Rs.

30000 monthly income. (28.8%) of the respondents had greater favor towards biradrism and (39.2%) of them had favor of biradrism 'to some extent' while (32%) of them were against the biradrism. Majority (71.2%) of the respondents reported that marriages in their family strictly/always contracted with caste. Perception of the respondents about discriminations on the bases of caste was also probed and respondents told with the opinion "Caste is the sequential division of society" (17.6%) agreed 'to a great extent' and (52.8%) agreed 'to some extent', whereas only (17.6%) of them had denied to respond and while (12%) of them had no knowledge about this statement. So majority of the respondents had thinking that caste is the sequential division of society. About one-fifth (19.2%) of the respondents agreed 'to a great extent' and (39.2%) of them agreed 'to some extent' with the opinion "Caste is the hierarchy", whereas only (16%) of them gave no response about this opinion while (25.6%) of them had no knowledge about this statement. Only (9.6%) of the respondents had thinking 'to a great extent' and (15.2%) of them thinking 'to some extent' that "Caste had restriction on food, dress, speech and customs", whereas about a half (52.8%) of them had no response towards this opinion while (22.4%) of them had no knowledge about this statement. Just (11%) of the respondents had thinking 'to a great extent' and (17.6%) of them thinking 'to some extent' that "Caste is pollution", whereas a major proportion (47.2%) of them had no opinion about this statement and (24%) of them had no knowledge about this opinion. Only (8%) of the respondents had thinking 'to a great extent' and (10.4%) of them thinking 'to some extent' that "Lack of unrestricted choices of occupation", whereas a substantial proportion (48.8%) of them had no opinion about this statement and (32.8%) of them had no knowledge about this opinion. About (7%) of the respondents had thinking 'to a great extent' and (12.8%) of them thinking 'to some extent' that "endogamy", whereas (16.8%) of them had no opinion about this statement while (63.2%) of them had no knowledge about this opinion. A major proportion (48%) of the respondents was found in the favor of the statement that marriages are necessary inside the castes while (41.6%) were thinking that marriages within caste is necessary for marital adjustment and (24%) of the respondents had thinking that Islam is against the biradarism. More than one-fourth (28%) of the respondents had thinking that every party in Pakistan is strongly backed by a caste while (22.4%) shared that in our society different residential localities are establishing with strong customs and well defined norms of interaction, and all these based on biradarism. About one-fourth (24.8%) of the respondents were sharing that education and caste system are the major components of social development, (35.2%) told caste system created the infrastructure for formation of social relations between peoples, (38.4%) shared caste system created the infrastructure for formation of social interactions between peoples, (8.4%) responded that caste system is still perpetuating in Pakistani society, majority i.e. (64.0%) of the respondents told biradari system played an important role at local level politics, one-third (34.4%) of the total respondents that baradari is a stronger determinant of voting behavior than party allegiance and only (18.4%) told that marriages are successful which are preceded within the biradri. (50.4%) of the respondents had thinking that caste is effective to resolve local disputes, one-fifth (20.8%) of the total respondents told that communities easily accept Panchayat (biradari) decisions, (24.8%) shares that caste system maintains law and order, (28.0%) said that casre support lower class, (30.4%) told that people had 'participation in development' due to caste system, (16.%) shared that people highlighted the problems at upper level' due to caste system and majority i.e. (72.0%) of the respondents told that biradari system plays an important role at local level politics' due to caste system. Only (16%) of the respondents told that caste system is reason of conflicts, (41.6%) told that caste system is a cause of superior thinking, only (19.2%) told that there are 'discrimination of lower caste' due to caste system, while majority (60.0%) of the respondents shared that caste system is used as a power of politics in Pakistan.

TESTING OF HYPOTHESES

Hypothesis 1: Higher the educations of the respondents, lower will the impact of caste system on social development

Table 1: Association between education of the respondents and the impact of caste system on social development

Education	Impact of Caste System on Social Development			Total
	Low	Medium	High	
Illiterate	8	7	17	32
	25.0%	21.9%	53.1%	100.0%
Primary-Middle	5	10	10	25
	20.0%	40.0%	40.0%	100.0%
Matric	8	23	9	40
	20.0%	57.5%	22.5%	100.0%
Above Matric	12	10	6	28
	42.9%	35.7%	21.4%	100.0%
Total	33	50	42	125
	26.4%	40.0%	33.6%	100.0%

Chi-square = 13.69 d.f. = 6 P-value = .047* Gamma = -.250* = Significant

Table 1 represents the association between education of the respondents and their opinion about the impact of caste system on social development. Chi-square value (13.69) shows a significant association between education of the respondents and their opinion about the impact of caste system on social development. Gamma value shows a negative relationship between the variables. It means majority of the illiterate respondents had more thinking about positive impact of caste system on social development as compared to educated respondents. Above table also shows that majority (53.1%) illiterate respondents had high level thinking positive impact of caste system on social development, on the other hand only (21.4%) qualified (above matric) had thinking about positive impact of caste system on social development. So the hypothesis "Higher the education of the respondents, lower will the opinion about the impact of caste system on social development" is accepted.

[6] Caste system is a burning issue in Pakistan and every person feel proud to have believed on it. Above hypothesis is constructed to explain the relationship between the education status of the respondents and their emphasis on caste system. Because, in Pakistan, over 70% population is residing in rural areas and educational facilities in these areas are not sufficient. Therefore, less educated people have more focus on caste as compared to the educated people. As the majority people kept strong believes on caste system and this believe remained them away from the main stream of social activities, which directly impacts the social development negatively.

Hypothesis 2: Higher the incomes of the respondents, lower will the impact of caste system on social development

Table 2: ***Association between income of the respondents and their opinion about the impact of caste system on social development***

Income (Rs.)	Impact of Caste System on Social Development			Total
	Low	Medium	High	
Up to 15000	6	12	14	32
	18.8%	37.5%	43.8%	100.0%
15001-30000	9	28	20	57
	15.8%	49.1%	35.1%	100.0%
Above 30000	18	10	8	36
	50.0%	27.8%	22.2%	100.0%
Total	33	50	42	125
	26.4%	40.0%	33.6%	100.0%
Chi-square = 15.72	***d.f. = 4***	***P-value = .003*****	***Gamma = -.345** = Highly-Significant***	

Table 2 above represents the association between income of the respondents and their opinion about the impact of caste system on social development. Chi-square value (15.72) shows a highly significant association between income of the respondents and their opinion about the impact of caste system on social development. Gamma value shows a negative relationship between the variables. It means majority of the low income respondents had more thinking about positive impact of caste system on social development as compared to high income respondents. Above table also shows that a major proportion (43.8%) low income respondents had high level thinking about positive impact of caste system on social development, on the other hand only (22.2%) high income (above 30000) had thinking about positive impact of caste system on social development. So the hypothesis "Higher the income of the respondents, lower will the opinion about the impact of caste system on social development" is accepted.

Income status of people or family is the key bone of every country or state because people take part to boost the economy directly by paying taxes. In response of this, state has the responsibility to provide the basic necessities to the people. When any state is providing all the basic facilities like health, shelter, education etc. it means common man is participating at every level. Above hypothesis is reflecting that how income level of respondents show the impact of caste system on social development. [7] Also described in his study that people having the high level of income level participating more as compared to those who have low income level. As per the analysis of data, every less number respondents said, they have high level income level while majority have lower status, so very small number of people are participating in social activities, which directly impacting the social development negatively.

DISCUSSIONS

Respondents have strong believes on caste system and they want to marry their children within caste and families because they have very strong opinions towards caste like caste is the sequential division of society or it's a hierarchy. Very small respondents are thinking that caste is pollution and it's directly destroying the social development of the society. Although Islam is against the biradarism but event that people focused on caste system

due to their ignorance and rigid cultural traditions and community is strongly backed by a caste in Pakistan. Like education, caste system is the major component of social development which created the infrastructure for formation of social relations between peoples and social interactions between peoples. Caste system is still perpetuating in Pakistani society which played an important role at local level politics to determine the voting behavior of people. Caste system is effective to resolve local disputes because people easily accept Panchayat (biradari) decisions and they also believe that that caste system maintains law and order more effectively than other decision making bodies. Believe on case system give birth of large number of social diseases like discrimination, conflict orientation among lower and upper class people, thinking of superiority and inferiority and unlawful use of power of politics in Pakistan. Educated people said that caste is pollution for the social development of the country due to lack of unrestricted choices of occupation and marriages are necessary inside the castes for marital adjustment to reduce the rate of divorce. When caste system is discussed under the window of Islamic educations, Islamic educations found against biradiarism. Moreover, it was observed that system created the infrastructure for formation of social relations between peoples, playing an important role at local level politics, it is stronger determinant of voting behavior, marriages are successful which are preceded within the biradri, caste is effective to resolve local disputes because communities easily accept Panchayat (biradari) decisions, it is maintain law and order and it promote the social development. Some criticism also observed regarding the caste system that caste system is reason of conflicts among the people at large scale because of superior thinking and discrimination towards lower caste. Illiterate respondents had high level thinking about positive impact of caste system on social development and the people having low income had high level thinking positive impact of caste system on social development.

CONCLUSIONS

Conclusion has been drawn on the basis of results and discussions. It was concluded that about one-third of the respondents were matriculated and a majority of the respondents were living in joint family system. It was noticed that a majority of the respondents had favor of biradrism. About one-third of the respondents had thinking that the caste system is started from India, while about one-fourth of them told that caste system is started from Arabic Qabail. A major proportion of the respondents had thinking that there is grouping in their village on caste base. A large majority of the respondents told that biradari had normal reaction if some females of their biradri/caste go to get higher education. More than a half of them had thinking 'to some extent' that rural educated people were against the biradrism. More than a half of them had thinking 'to some extent' that education and caste system is the major components of social development. It was noted that a large majority of the respondents had thinking that caste system created the infrastructure for formation of social relations and interaction between peoples. A substantial proportion of the respondents had thinking 'to a great extent' that biradari system played an important role at local level politics. Sample respondents believed that caste is effective to resolve local disputes and biradari system played an important role at local level politics. While a major proportion of the respondents had thinking that caste system is a cause of superior thinking. A significant association was found between age, education and income with their opinion about the impact of caste system on social development.

SUGGESTIONS

In the light of the findings of the present study, the research considers it his duty to give some suggestions to follow by the forth-coming researchers for achieving good and true results.

1. Education should be promoted at root level to reduce the impact of caste system.
2. Rigid thinking of the rigid people can be replaced by raising awareness among the community.
3. Law implementation and enforcing authorities should take steps regarding honor killing.
4. Awareness at community level should be necessary by using different moods.
5. Formal education and religious teachings should be provided to each one in all the areas.
6. Bad old and new customs should be replaced or rooted out from the society.
7. Justice should be assured at each level socially and legally, and within the families by the heads of different well known caste.
8. Destroying the Caste System in Pakistan is not as easy as it sounds. While a rational and educated person would assume that general population would also be rational and aware of the virulent vermin that this caste system is, it is not quite so. It has become a part of their lives and their mindset. And to destroy a mindset and create a new one is not an easy task, for it changes the definition of the world that they have grown up in.
9. As far as the Govt. is concerned, there are some things that a Democratic country like Pakistan can promote, but not force onto its people. Destroying Caste System is one of them.

10. A mere introduction of policies or new ideology does not help in changing the mindset of people. One need to Preach, Practice & Believe in the idea one is trying to spread.

REFERENCES

1. Velassery, S. 2005.*Casteism and Human Rights: Toward Ontology of the Social Order.* Singapore: Marshall Cavendish Academic.
2. Khan, I. 2012.*Class, Caste and Biradri System in Pakistan's Society.* Monthly World Times, Friday, June 01.
3. Risley, H.H. 1908. Crooke, William, ed. *The People of India (Memorial edition).* Calcutta: Thacker, Spink.
4. Kumar, S. 2006.*Is India Rising*?, World Press blog of March 2, 2006; available at: http://indiarising.wordpress.com/2006/03/02/common-problem-in-india/
5. Abdal, A. 2010. *A Historical perspective of the Caste system of Pakistan.* Word Press, Ayazabdal's Blog. Online available at: https://ayazabdal.wordpress.com/2010/02/12/a-historical-perspective-of-the-caste-system-of-pakistan/
6. Hutton, J.H. 1963. *Caste in India: Its Nature, Function and Origin*, Bombay, Indian Branch, Oxford.
7. Jonker, J. and B. Pennink2010. *The Essence of Research Methodology: A Consice Guide for Master and Ph.D. Students in Management Science*. Springer, Heidelberg.

J. Appl. Environ. Biol. Sci., 8(2)126-135, 2018
© 2018, TextRoad Publication

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Discrimination of Normal and Abnormal Grapes' Leaves Using Image Processing and Artificial Intelligence Approach

[a*]Fazli Wahid, [b]Rabia Afzal, [b]Muhammad Hamayun, [c]Zahid Ali But, [a,d]Rozaida Ghazali

[a]Faculty of Computer Science and Information Technology, UniversitiTun Hussein Onn Malaysia, BatuPahat, Parit Raja, 86400, Johor, Malaysia
[b]Department of Botany, Abdul Wali Khan University, Garden Campus, KPK, Pakistan
[c]Govt College Women University Sialkot, Pakistan
[d]Soft Computing Data Mining Research Centre (SCDM)

Received: October 11, 2017
Accepted: December 16, 2017

ABSTRACT

The vital role of the agriculture draws the attention of the researchers to introduce different types of techniques and approaches to improve the agricultural products both qualitatively and quantitatively. One of the most focused issues is the detection, diagnosis and treatment of different types of plant diseases that degrades the quality and quantity of agricultural products e.g. fruits, vegetables and other crops. Traditionally, these diseases are detected, diagnosed and treated manually which requires a continuous monitoring of crops' farms which may lead to wastage of time and human physical hard work involvement. The human inspection also fails in providing accurate results as different human beings follow different procedure to resolve a specific issue. Therefore, to overcome all the deficiencies, an automatic plants' diseases detection process is required. This automatic system will provide accurate results as well as will be universally acceptable and applicable. The first step towards the automatic plants' disease detection is the classification of plants' normal and abnormal parts. In this work, an easy approach is presented for the classification of grapes' leaves into normal and abnormal using artificial neural network and image processing technique. The proposed approach consists of five stages namely image acquisition, pre-processing, feature extraction, classification and performance evaluation. Total of 120 grapes' leaves images were used in the experiments. Out of these 120 images, 60 were normal and 60 were abnormal images. Different performance parameters have been used to evaluate the performance of the proposed approach and the comparison of the proposed approach has been made with many state of the art techniques used for automatic detection of plants' diseases.

KEYWORDS: Plants diseases detection, Image processing, Machine learning, Filtering, Color features, Multi-layer perceptron

1 INTRODUCTION

There are many plant diseases that degrade the quality and quantity of fruits and vegetables which are addressed by various researchers for bringing considerable amount of improvements in overall capacity building. The major sources of these diseases are mainly bacterial, viral, and fungal infections in addition to the unacceptable climate and environmental conditions. The main target of these diseases may be one of the stem, leaves, fruits, vegetables or all these parts of the plants. For the production of more fruits and vegetables with the least possible effects of the dangerous diseases, a high quality agricultural production control system is required. The major component of this system will be the detection system for different diseases causing damaging effects to both fruits and vegetables [1].
For the detection of different diseases in plants, different parts of plants can be kept under consideration but the leaves' diagnosis is the main target of experts due to the fact that leaves are the primary part affected by different abnormalities. The conventional method of disease detection using plants' leaves has been the manual inspection by experts which is suffered from two major drawbacks; firstly, a continuous monitoring of plants by experts is required which is very expensive in terms of time and cost: secondly, the accuracy of the detection may not be too enough to completely recover the disease.
Therefore, this process needs to be automatic to overcome both of these drawbacks. In the automatic detection and diagnosis of diseases, a computer aided application is required that takes assistance from different other software and hardware applications. In this regard, the importance of applications of image processing and artificial intelligence techniques cannot be under estimated. The image processing technique is required for taking images of different parts of plants depending on the case under observation for finding the disease affected areas of plants and

***Corresponding author:** Fazli Wahid, Universiti Tun Hussein Onn Malaysia.
Email: wahid_uomian@hotmail.com,

finding the intensities of disease. After taking the images of the targeted plants, machine learning or artificial intelligence techniques are applied for the classification of leaves into normal and abnormal, or detection of the affected areas.

For discrimination of normal and abnormal leaves, or finding abnormality in the leaves' images, different authors have performed the image processing procedure in different stages but the main stages are: leave image acquisition, pre-processing of leave images, extraction of valuable features, segmentation of leave images into different parts. A brief introduction of all these stages is given as follow [2].

Image acquisition: In the image acquisition stage, the leave images are captured using some high resolution image capturing device e.g. digital camera or high resolution camera of high quality mobile.

Pre-Processing: In pre-processing stage, the quality of data representing the image is improved by applying some image pre-processing technique e.g. different types of filters. The quality of image is improved by eliminating undesired signals and enhancing the image contrast. During this stage, the images may also be converted to other format for better description of features representing the image e.g. to Hue Saturation Value (HSV) format. The reason behind the image conversion is to give proper representation to images for their full description. Using this phenomenon, the extra components are dropped from the images which facilitate further processing.

Image Segmentation: For easier and meaningful analysis of images, the images are divided into different regions e.g. normal and affected part of diseased image. This process is called image segmentation. There are different image segmentation techniques which are applied in image processing e.g. region based segmentation, edge based segmentation, threshold based segmentation, model based segmentation and feature based clustering.

Feature Extraction: In the feature extraction stage, the important features are extracted from the image which in turn reduces computation cost and time for further processing of images. Different types of features can be extracted from the images e.g. texture features, color features and shape features.

Image Classification: After the image processing mechanism has been carried out, some artificial intelligence technique is applied for the discrimination of normal and abnormal leaves or the affected areas of leaves. For the discrimination of normal and abnormal leaves, different types of classifiers are used with each classifier having its own advantages and disadvantages. The major classifiers applied for the diseases identification are K-nearest neighbor, radial basis function, and artificial neural network and support vector machine. For the measurement of performance of classifiers, different parameters can be applied e.g. simplicity, robustness, speed, input specification, problem specification and classification accuracy.

There are many approaches in the literature proposed for automatic detection of different types of diseases in plants. The authors [3] applied image processing technique and support vector machine (SVM) for the automatic detection of plants' diseases. The authors[4] presented a comprehensive discussion on different data mining techniques that could be applied for automatic detection of diseases in various fruit plants. The authors [5] applied support vector machine (SVM) for the classification of normal and diseased soybean leaves. The authors [6] applied K-Nearest neighbors, local binary pattern, and artificial neural network and support vector machines for identification of different types of fungal diseases in various plants.

For the identification of diseases in sugar beet leaves, the authors [7] applied support vector machine. The authors [8] presented a comprehensive survey on different machine learning techniques applied for automatic classification of various diseases affecting the plants' leaves. The authors [9] proposed a four steps procedure for automatic detection of different types of diseases in plants. The authors [10] presented a technique for automatic classification and detection of different diseases affecting plants. A machine learning based identification and disease detection system was developed for saving money, efforts and time. The diseases detection procedure was carried out in four steps by the authors [11]. The authors [12] applied image processing techniques and artificial neural network for classification of plants diseases detection. The authors [13] applied k means clustering technique for classification and recognition of different diseases of plants. For identification of plants' diseases the authors [14] used the histogram matching. The authors [15] applied simple and triangle threshold based approaches for detection of diseases in plants. For the detection of diseases in plants' leaves, the authors [16] applied image processing techniques in combination with statistical methods.

2 PROPOSED METHODOLOGY

The proposed technique consists of four simple stages namely image acquisition, pre-processing, feature extraction and classification. The proposed approach is shown in Figure 2 and all these steps are explained in the following section.

3.1 Image acquisition

In the image acquisition stage, the images of the leaves are captured using high quality digital camera or other image capturing device. In our system, images have been collected from different standard databases available online.

3.2 Pre-processing

Normally, the pre-processing stage is applied for improving the quality of images or to convert the images from one format to another format suitable for further processing according to the application being used. In the proposed approach, following two activities have been performed during pre-processing

- **a.** Filtering
- **b.** Channelization

3.2.1 Filtering

During filtering stage, the images have been smoothened by applying 5x5 linear filters. After applying this filter, the peaks have been removed from the images and the changes in the values of pixels have been smoothly adjusted. The images before and after applying filtering have been shown in Figure 1.

3.2.2 Channelization

Every color images consists of three main channels namely red, green and blue channels. In the physical appearance, these channels are not in red, green or blue channels, respectively but these channels are based on the values of pixels. The pixels values within specific ranges are considered as red, green or blue channels. During the channelization stage, these channels are extracted from the leaves' images. These three channels of leave images are shown in Figure 1.

3.3 Feature extraction

In the feature extraction stage, useful features are extracted from each of the channels extracted during the channelization stage. Total of nine features have been extracted from each image for its full description [17], [18], [19], [20]. In the proposed algorithm, color moments of red, green and blue channels have been used as main features for the description of grapes' leaves images.

3.3. 1 Mean

Mean is the first color moment, representing the average of all pixels' intensities of each color channel.

3.3.2 Variance

Variance is the second color moment, representing variations in distributions of intensities in each color channel

3.3.3 Skewness

Skewness is the third color channel representing the asymmetry of color distribution in each channel.

3.3.4 Mathematical representation of Color Moments

So, a total of nine features (three from each color channel) have been extracted as main features. All these features are represented by following mathematical equations.

$$M_{1,1} = \frac{1}{N}\sum_{J=1}^{N} I_j \quad (1)$$

$$M_{1,2} = \frac{1}{N}\sum_{j=1}^{N}\left(I_j - M_{1,1}\right)^2 \quad (2)$$

$$M_{1,3} = \frac{1}{N}\sum_{1}^{N}\left(I_j - M_{1,1}\right)^3 \quad (3)$$

$$M_{2,1} = \frac{1}{N}\sum_{J=1}^{N} I_j \quad (4)$$

$$M_{2,2} = \frac{1}{N}\sum_{j=1}^{N}\left(I_j - M_{2,1}\right)^2 \quad (5)$$

$$M_{2,3} = \frac{1}{N}\sum_{1}^{N}\left(I_j - M_{2,1}\right)^3 \quad (6)$$

$$M_{3,1} = \frac{1}{N}\sum_{J=1}^{N} I_j \quad (7)$$

$$M_{3,2} = \frac{1}{N}\sum_{j=1}^{N}\left(I_j - M_{3,1}\right)^2 \quad (8)$$

$$M_{3,3} = \frac{1}{N}\sum_{1}^{N}\left(I_j - M_{3,1}\right)^3 \quad (9)$$

Where $M_{1,1}$, $M_{1,2}$, $M_{1,3}$ represents mean, variance and skewness of the red color channel, respectively. $M_{2,1}$, $M_{2,2}$, $M_{2,3}$ represents mean, variance and skewness of the green color channel, respectively. $M_{3,1}$, $M_{3,2}$, $M_{3,3}$ represents mean, variance and skewness of the blue color channel, respectively. I represent the intensity of each pixel in the red, green and blue channel and N represent the total number of pixels in the channels.

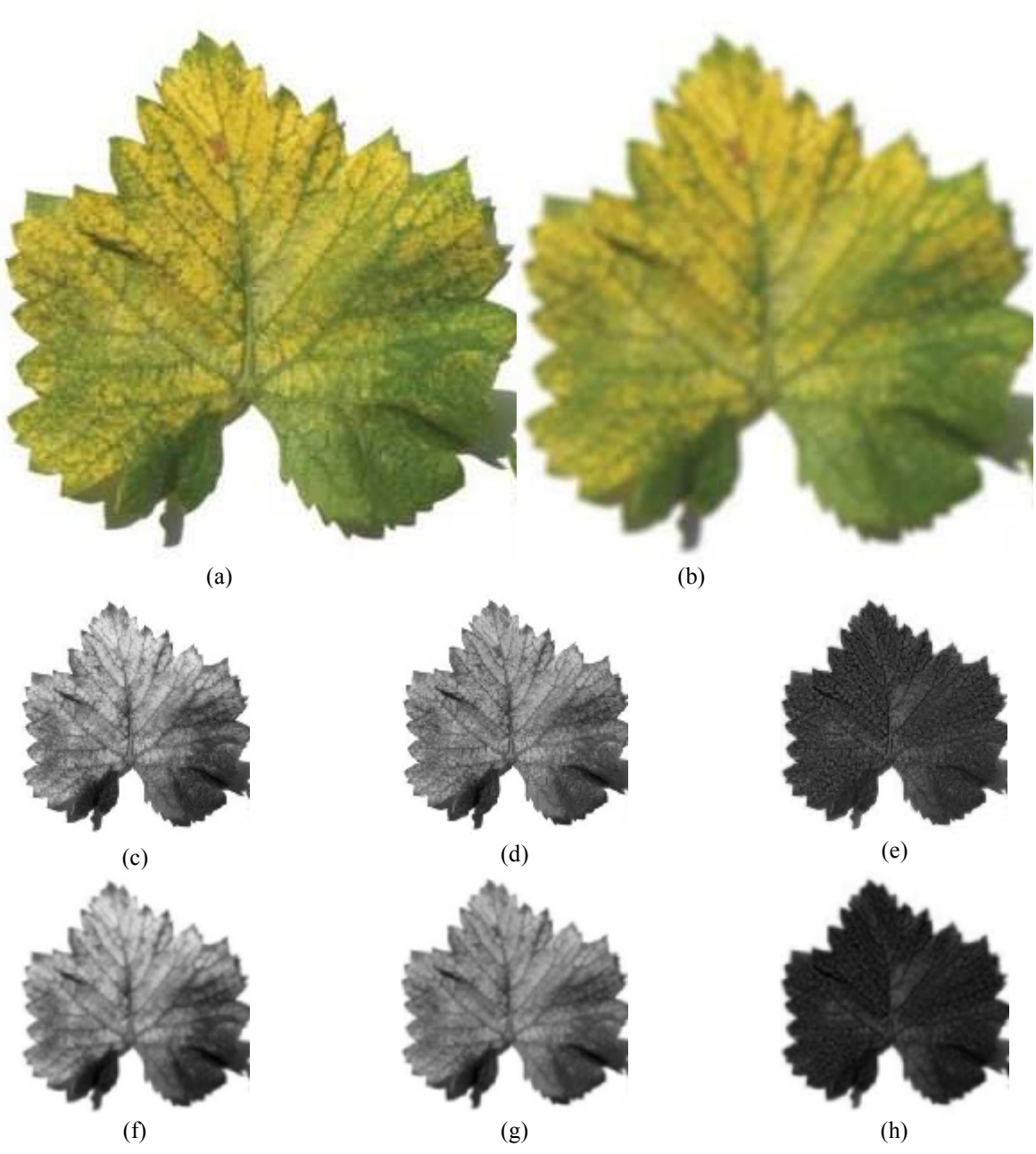


Figure 1:a. Brfore Filtering **b.** After Filtering **c. d. e. f. g. h**. Channels

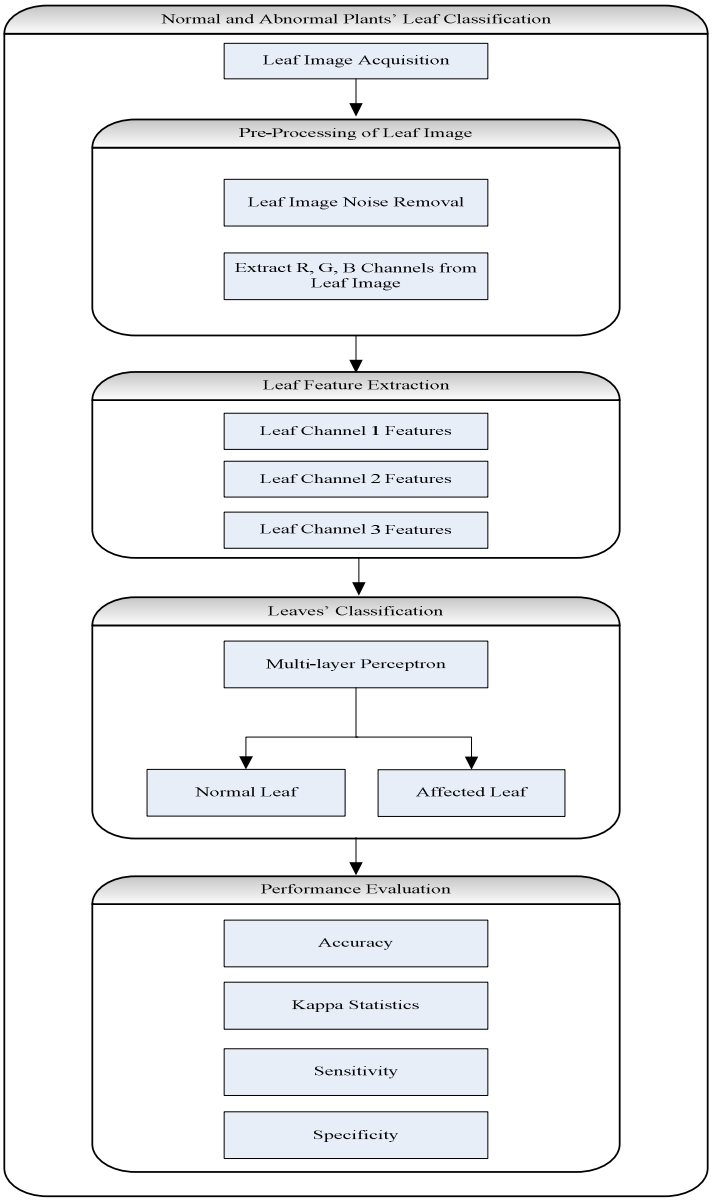


Figure 2: Proposed Methodology

3.4 Classification

In the classification stage, the features extracted during the feature extraction stage are given to machine learning technique to classify them into either normal or abnormal images. In our proposed approach, we have used multi-layer perceptron with different types of architectures for this purpose. The complete descriptions of all the architectures of multi-layer perceptron are shown in results and discussion section.

3.5 Performance Evaluation

The performance of the classifier has been evaluated using Classification Accuracy, Kappa Statistics, Sensitivity (SE), Specificity (SP) and ROC for different training and testing ratios [21], [22]. The formulation of these parameters is shown in Table 1.

Table 1. Performance Measurements

Evaluation Parameter	Equation
Accuracy	(TP+TN)/(TP+TN+FP+FN)
Sensitivity (TPR)	TP/(TP+FN)
Specificity	TN/(TN+FP)
False Positive Rate (FPR)	FP/(FP+TN)
ROC	TPR, FPR required to draw the curve
KS	(P0-PC/(1-PC))

Where
TP = True Positive: Normal leaves identified as normal leaves.
TN = True Negative: Abnormal leaves identified as normal leaves.
FP = False Positive: Abnormal leaves identified as abnormal leaves.
FN = False Negative: Normal leaves identified as abnormal leaves.
P0 represents total agreement probability; PC represents hypothetical probability of chance agreement.

3 EXPERIMENTAL RESULTS

All the experiments have been performed on Intel Core i5 with 4.00 GB of memory with the windows 7 operating system installed on it. For feature, extraction and pre-processing, MATLAB 7.6.0 (R2008a) was used whereas for classification purpose, Weka 3.7.10 was used. The proposed approach was tested on total of 120 grapes' leaves images. Out of these 120 images, 60 images were normal images whereas the remaining 60 images were images affected by different types of diseases.

3.1 Algorithm Accuracy

The total data set was divided into 70% training and 30% testing data set. The algorithm gave 97.50% accuracy for training data set whereas 95.00% for testing data set. The experimental results are shown in the following tables. For making the algorithm more generalized, cross validation was applied, which gave 94.57% accurate results. The experimental results are shown in the following tables.

Table 2. Training Data Set Accuracy

Identification Accuracy of Normal Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
40	39	1	97.50%
Identification Accuracy of Diseased Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
40	39	1	97.50%
Overall Identification Accuracy			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
80	78	2	97.50%

Table 3. Testing Data Set Accuracy

Identification Accuracy of Normal Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
20	20	0	100.00%
Identification Accuracy of Diseased Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
20	18	2	90.00%
Overall Identification Accuracy			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
40	38	2	95.00%

Table 4. 10 Fold Cross Validation Accuracy

Identification Accuracy of Normal Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
60	56	4	93.33%
Identification Accuracy of Diseased Leaves			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
60	55	5	91.66%
Overall Identification Accuracy			
Total Leaves	Correctly Identified Leaves	Incorrectly Identified Leaves	Identification Accuracy
120	111	9	92.50%

For further evaluation of the proposed approach, the data was divided into different training and testing ratios and various performance evaluation parameters were applied e.g. Kapp statistics, sensitivity, specificity and ROC. The values obtained for all of these performance evaluation parameters are shown in Table 5.

Table 5. Performance parameters of MLP

Training/Testing Ratios	**Identification Accuracy**	**KS (Kappa Statistics)**	**Sensitivity**	**Specificity**	**ROC Area**
25-75%	87.8269	0.7876	0.8780	0.8783	0.9384
34-66%	90.9231	0.8131	0.9094	0.9092	0.9690
50-50%	93.3077	0.8291	0.9332	0.9333	0.9882
66-34%	97.5000	0.8806	0.9761	0.9763	0.9903
75-25%	92.5897	0.8238	0.9257	0.9254	0.9626
10-Fold Cross Validation	94.5769	0.8394	0.9456	0.9457	0.9791

3.2 Comparative Analysis

Table 6 shows the comparison of the proposed technique with other techniques along with the disease type affecting the plant different parts, the targeted crop, the image processing and machine learning procedure and the accuracies of these approaches [6], [23].

Table 6. Comparison of proposed approach with other approaches

Target Crop	**Disease Type**	**Affected Area**	**AI and Image processing approach adapted**	**Identification Accuracy (%)**
1. Fruit Crops • **Grapes** • **Mangoes** • **Pomegranate**	• Anthracnose • Powdery mildew • Downy mildew	• Stem • Fruit • Leaf	• Region growing method • Edge detection method • K-means clustering • Neural Network • Canny edge detection • Filtering • GCCM • K-Nearest neighbors	• 84.65 • 76.60 • 91.37 • 86.71 • 94.08
2. Vegetables • **Bengal gram** • **Beans** • **Soybean** • **Tomato** • **Sunflower**	• Late blight • Early blight • Powdery and downy mildew • Anthracnose	• Leaf • Stem • Fruit	• Local binary pattern • Chan-vase • KNN • KNN+ANN	• 84.11 • 91.54
3. Commercial Crops • **Cotton** • **Chili** • **Sugarcane**	• Fruit rot • Gray mildew • Powdery and downy mildew • Red rot etc	• Leaf	• Wavelet based • Grab-cut • Principal component analysis	• 83.17 • 86.48
4. Cereal Crops • **Wheat** • **Jowar** • **Maize**	• Leaf spot • Leaf blight • Leaf rust • Powdery mildew	• Leaf • Stem • Fruit	• Filtering • K-means clustering • Shape features • Support vector machine	• 80.83 • 85.00 • 90.83
5. Grapes Disease Detection	• Powdery Mildew • Down Mildew • Black rot	• Leaf	• Pre-processing • Segmentation • Statistical Analysis	• 91.00 • 93.00 • 94.00

			• Feature extraction • Classification using SVM • Back propagation neural network • Fuzzy logic	• 84.00
6. Proposed Approach **Grapes**	• Powdery Mildew • Down Mildew • Black Rot	• Leaf	• Image Acquisition • Pre-processing • Filtering • Channelization • Feature extraction • Classification Using MLP • Performance Evaluation	• 97.50

4 DISCUSSION

After comparison of the proposed technique with the techniques presented in Table 6, a conclusion can be drawn that the proposed algorithm performs better than all these techniques in terms of complexity and accuracy. The architecture of the proposed algorithm is simpler than all these techniques and provides better results as well. Almost all techniques shown in the tables use more features than the proposed architecture due to the fact the color features are more informative features than other features and therefore provide better description of the images. All algorithms have used some feature reduction algorithm to reduce the features whereas in our algorithm; this step has been eliminated, which reduces computational complexity to a large extent. The classifier used in our proposed architecture is also simpler and efficient than classifiers used by authors of above algorithms. The major advantages associated with this new approach is that it can be extended to other types of classification problems e.g. gender classification and different types of classification of normal and abnormal human parts with keeping in considerations the facts explored in this proposed work.

5 CONCLUSION AND FUTURE WORK

In this work, the automatic detection of grapes' diseases has been carried out using image processing and machine learning technique called multi-layer perceptron. The process consists of simple five stages namely image acquisition, pre-processing, feature extraction, classification and performance evaluation. The experimental results of multi-layer perceptron have been compared with many other state of the art classifiers pointed out by other researchers for different types of plant diseases detection as shown in Table 10. It is evident from the above table that the proposed approach gives better results than many other techniques suggested by researchers for detection of diseases affecting different parts of plants.

The proposed approach is simple in terms of total number of features used and the computation complexity due to simple pre-processing and feature extraction stages. Extensive experimentation has been carried out for different types of multi-layer perceptron training function, hidden layer function and output layer function in addition to different number of neurons in the hidden layer and number of epochs. Keeping in consideration, different accuracies obtained from different combination, this approach can be applied in other classification mechanisms as well as its extension can be applied for identification of various types of other diseases in other plants which is left as future work.

ACKNOWLEDGEMENT

The authors would like to thank Department of Botany, Abdul Wali Khan University, Garden Campus, Mardan, KPK, Pakistan; Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia (UTHM); Govt College Women University Sialkot, Pakistan for their strong coordination in carrying out this research activity by providing the required working environment.

REFERENCES

1. Kulkarni, A.H. and R.A. Patil, 2012. Applying image processing technique to detect plant diseases. Intl. J. Modn. Eng. Rsrch., 2: 3661-3664.

2. Gavhale, K.R. and U. Gawande, 2014. An Overview of the Research on Plant Leaves Disease detection using Image Processing Techniques. IOSR Journal of Computer Engineering (IOSR-JCE), 16: 10-16.
3. Kaur, R. and S.S. Kang, 2015. An enhancement in classifier support vector machine to improve plant disease detection. In MOOCs, Innovation and Technology in Education (MITE), 2015 IEEE 3rd International Conference, 135-140.
4. Ilic, M., P. Spalevic, M. Veinovic, and A.A.M. Ennaas, 2015. November. Data mining model for early fruit diseases detection. In Telecommunications Forum Telfor (TELFOR), 2015 23rd, 910-913.
5. Dandawate, Y. and R. Kokare, 2015. An automated approach for classification of plant diseases towards development of futuristic Decision Support System in Indian perspective. In Advances in Computing, Communications and Informatics (ICACCI), 2015 International Conference on, 794-799.
6. Pujari, J.D., R. Yakkundimath, and A.S. Byadgi, 2014. Identification and classification of fungal disease affected on agriculture/horticulture crops using image processing techniques. In Computational Intelligence and Computing Research (ICCIC), 2014 IEEE International Conference on: pp. 1-4.
7. Rumpf, T., A.K. Mahlein, U. Steiner, E.C. Oerke, H.W. Dehne, and L. Plümer, 2010. Early detection and classification of plant diseases with support vector machines based on hyperspectral reflectance. Computers and Electronics in Agriculture, 74: 91-99.
8. Ghaiwat, S.N. and P. Arora, 2014. Detection and classification of plant leaf diseases using image processing techniques: A review. International Journal of Recent Advances in Engineering and Technology (IJRAET), 2347-2812.
9. Dhaygude, S.B. and N.P. Kumbhar, 2013. Agricultural plant leaf disease detection using image processing. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, 2: 599-602.
10. Badnakhe, M.R. and P.R. Deshmukh, 2011. An Application of K-Means Clustering and Artificial Intelligence in Pattern Recognition for Crop Diseases. In International Conference on Advancements in Information Technology with workshop of ICBMG, 134-8.
11. Velmurugan, P. and M. Renukadevi, 2017. Detection of Unhealthy Region of Plant Leaves and Classification of Plant Leaf Diseases using Texture Based Clustering Features. Artificial Intelligent Systems and Machine Learning, 9: 8-10.
12. Kulkarni, A.H. and R.A. Patil, 2012. Applying image processing technique to detect plant diseases. International Journal of Modern Engineering Research (IJMER), 2: 3661-3664.
13. Bashir, S. and N. Sharma, 2012. Remote Area Plant disease detection using image processing. IOSR Journal of Electronics and Communication Engineering, 2: 31-34.
14. Kumar, S.R. and K.R. Kumar, 2015. ADVANCES IN IMAGE PROCESSING FOR DETECTION OF PLANT DISEASES. Asian Journal of Computer Science and Technology (AJCST), 3: 75-83.
15. Patil, S.B. and S.K. Bodhe, 2011. Leaf disease severity measurement using image processing. International Journal of Engineering and Technology, 3: 297-301.
16. Chaudhary, P., A.K. Chaudhari, A.N. Cheeran, and S. Godara, 2012. Color transform based approach for disease spot detection on plant leaf. International Journal of Computer Science and Telecommunications, 3: 65-70.
17. Wahid, F., Ghazali, R., Fayaz, M., & Shah, A. S. (2016). Using Probabilistic Classification Technique and Statistical Features for Brain Magnetic Resonance Imaging (MRI) Classification: An Application of AI Technique in Bio-Science. International Journal of Bio-Science and Bio-Technology, 8(6), 93-106.
18. Wahid, F., R. Ghazali, M.Fayaz, and A.S. Shah, 2017. Discrimination of Normal and Pathological Brain MRI Using Color Moments and Random Subspace Ensemble Classifier, Journal of Applied Environmental and Biological Sciences, 7: 2017.
19. Nazir, M., F. Wahid, and S.A. Khan, 2015. A simple and intelligent approach for brain MRI classification. Journal of Intelligent & Fuzzy Systems, 28: 1127-1135.

20. Wahid, F., Fayaz, M., & Shah, A. S. (2016). An Evaluation of Automated Tumor Detection Techniques of Brain Magnetic Resonance Imaging (MRI). International Journal of Bio-Science and Bio-Technology, 8(2), 265-278.
21. Wahid, F., and D.H. Kim, 2015. Prediction Methodology of Energy Consumption Based on Random Forest Classifier in Korean Residential Apartments. Advanced Science and Technology Letters, 120 (GST 2015): 684-687.
22. Wahid, F., R. Ghazali, M. Fayaz, A.S. Shah, 2017. A simple and Easy Approach for Home Appliances Energy Consumption Prediction in Residential Buildings Using Machine Learning Techniques, Journal of Applied Environmental and Biological Sciences, 7 (3), 2017.
23. Wahid, F. and D.H. Kim, 2017. Short-term energy consumption prediction in Korean residential buildings using optimized multi-layer perceptron. Kuwait Journal of Science, 44(2).
24. Waghmare, H., R. Kokare, and Y. Dandawate, 2016. Detection and classification of diseases of Grape plant using opposite colour Local Binary Pattern feature and machine learning for automated Decision Support System. In Signal Processing and Integrated Networks (SPIN), 2016 3rd International Conference on, 513-518, IEEE.

J. Appl. Environ. Biol. Sci., 8(2)136-143, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Effect of Systematic Training on Teachers' Performance: An Experimental Study

Iftikhar Ahmad[1], Dr. N.B. Jumani[2], Dr. Shamsa Aziz[3]

[1]PhD scholar, Department of Education, International Islamic University Islamabad, Pakistan.
[2]Professor of Education, International Islamic University Islamabad, Pakistan.
[3]Chairmen Education Department (Ladies), International Islamic University Islamabad, Pakistan.

Received: October 5, 2017
Accepted: December 17, 2017

ABSTRACT

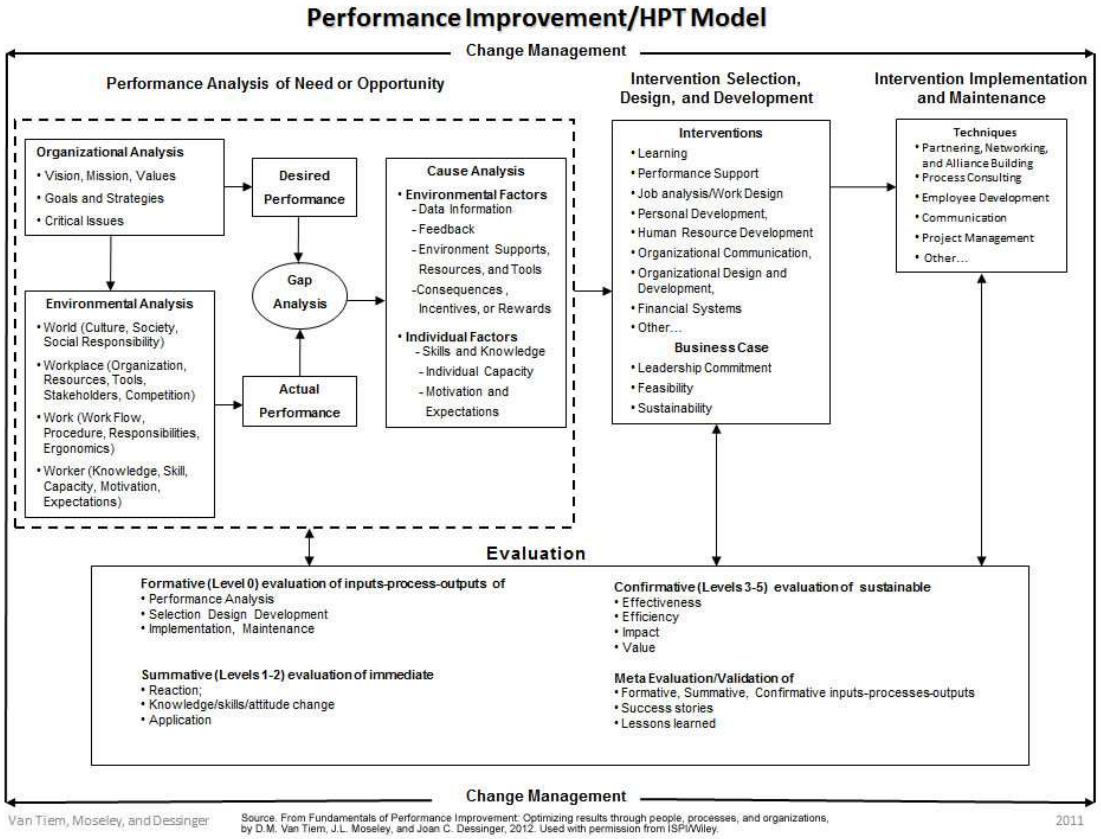
Experimental effect of training on school teachers' learning performance was determined. The 60 male Secondary School Teachers (Science/Arts) were selected through simple random method in the year 2016-17. There were one hundred and eighty teachers the then working whose list was obtained from their Executive District Officer (Education). A self made test was prepared. After pretest trainees' list was arranged in descending order. Then both experimental and control groups were equally divided and equated with the single trait of pretest scores by selecting them one by one for both groups. The researcher also took the test and got the highest marks and was identified as the exemplary performer among the trainees to deliver training to the experimental group. The training was delivered by lectures and discussions up to six weeks. The aim of the training was to enhance the knowledge and skills of trainees up to the trainers' level. 01 null hypothesis was tested to check the effectiveness of training. After training the posttest was conducted and data were analyzed through independent t test for the difference between experimental and control group which was found statistically significant. A medium large magnitude (.626) of effect size was determined by Cohen's d. Together; the findings suggest that the systematic training can be used in the government schools education department at district Rajanpur. Such type of training can improve the performance of teachers by enhancing their knowledge, comprehension, and skills. As per the findings and conclusions of this study, it is recommended that the systematic training may be adopted more frequently in educational institutions. It may increase the performance of teachers.
KEYWORDS: Experimental Research, Performance, Systematic Training, Exemplary Performer, Performance Gap.

1. INTRODUCTION

Systematic training of teachers after their long term development of university education is very economical tool to enhance their performance at their workplaces. A great concern for almost all government schools in Pakistan is to enhance the performance of their teachers and other employees. "Thus, conducting a systematic needs assessment is a crucial initial step to training design and development, and can substantially influence the overall effectiveness of training programs [3]". Systematic training is a well planed intervention to improve the performance of employees. International Society for performance improvement, Canadian Society for training and development and American Society for training and development has done a lot of work on such type of training. Specific knowledge, skill and comprehension are necessary for the performance of a teacher [2]. A gap is measured between required level of performance and existing level of performance as it was created in human performance technology model by International Society for Performance Improvement [4]. It uses systematic and systemic approach focusing on performance measurement. A system is more than the simple sum of its elements (13). Almost all schools are human systems where low learning is usually due to their teachers and other employees. Training may be a good solution if low performance is due to the lack of knowledge and skills of the teachers.

***Corresponding Author:** Iftikhar Ahmad, PhD scholar, Department of Education, International Islamic University Islamabad, Pakistan.

International society for performance improvement has created the following model.



[4]

Figure 1: Human Performance Model

This human performance model by International Society for performance improvement was partially used to create the gap between exemplary performer (trainer) and trainees. These cyclic processes systematically focus on measuring human performance at almost all levels. Human performance model helps to address the primary causes by identifying and analyzing it systematically at an organizational level. It provides foundation to identify, analyze and create performance gap. It helps to design and develop cost-effective and workable solution to fill the gap. It measures results continuously in a cyclic process and each cycle decreases the identified performance gap.

Cause analysis model by [9] helped the researcher to find out the reasons behind the low performance of teachers in the government schools at district Rajanpur[9].

Table 1 Cause Analysis Model

	Information	Instrumentation	Motivation	
Environmental Supports	1. data	2. Instruments	3. Incentives	Rooted in environment
Person's Repertory of Behavior	4. Knowledge	5. Capacity	6. Motives	Rooted in individual performance

All teachers were from the same department and district so it was presumed that they had almost same kind of instruments provided and motivation level to do work. Their performance was different due to their individual differences of knowledge and skills. "HPT is a measurable way of solving problems or realizing opportunities related to work performance and human capital improvement. Human performance is results-driven and focuses on achievements that are valued by individual performers and the organization as a whole, but the approach also emphasized the need for analysis to determine root causes and assess or evaluate [10]". Performance is a measurable outcome of an activity which has always some worth. "Academic achievement is the performance level of a student

which focuses on attaining learning objectives, desired knowledge, skills and competencies in the learning process" [12]. For example in general when a painter paints something as per given standards, or a driver covers some distance with required safety; they accomplish something which is the necessary condition of performance. Thomas F. Gilbert had given us a good comprehensive theorem about performance. "Human competence is a function of worthy performance (W), which is a function of the ratio of valuable accomplishments (A) to the costly behavior (B) [9]".

"Training refers to a systematic approach to learning and development to improve individual, team and organizational effectiveness [1]". All schools consist of systems and subsystems having dense interaction between them. By changing the way of interaction among trainers and trainees, the learning outcome can be changed. "A system is more than the sum of its parts [12]". Training changes not only knowledge and skills of employees, but also their motivation level. "Systematic approaches are analogous to the act of touching a spider web: touching a single strand of a spider web makes the whole web vibrate [7]".

"Results of the meta-analysis revealed training effectiveness sample-weighted mean ds of 0.60 (k=15,N=936 for reaction criteria, 0.63 (k=234, N=15014) for learning criteria, 0.62 (k=122, N=15627) for behavioral criteria and 0.62 (k=26, N=1.748) for result criteria [3]".

But a little attention has been paid towards systematic training especially in Pakistan so far. Therefore, the researcher took interest to find out the effect of systemic training on teachers' performance.

1.1 Research Questions

Do the Secondary School Teachers (SSTs) trained through systematic training and the untrained tend to score differently on posttest?

1.2 Hypotheses

Research hypothesis: H_a: $\mu_i > \mu_j$ (The trained teachers' mean score is more than the teachers' who do not receive training).

Null hypothesis: H_0: $\mu_i \leq \mu_j$ (The trained teachers' mean score is equal to or less than the teachers' who do not receive training).

2. MATERIALS AND METHODS

2.1 Research Design

Pretest posttest control group design was used for this study. "The strongest comparisons come from true experimental designs in which subjects (students, teachers, classrooms, schools, etc.) are randomly assigned to program and comparison groups. It is only through random assignment that evaluators can be assured that groups are truly comparable and that the observed differences in outcomes are not the result of extraneous factors or pre-existing differences [6]".

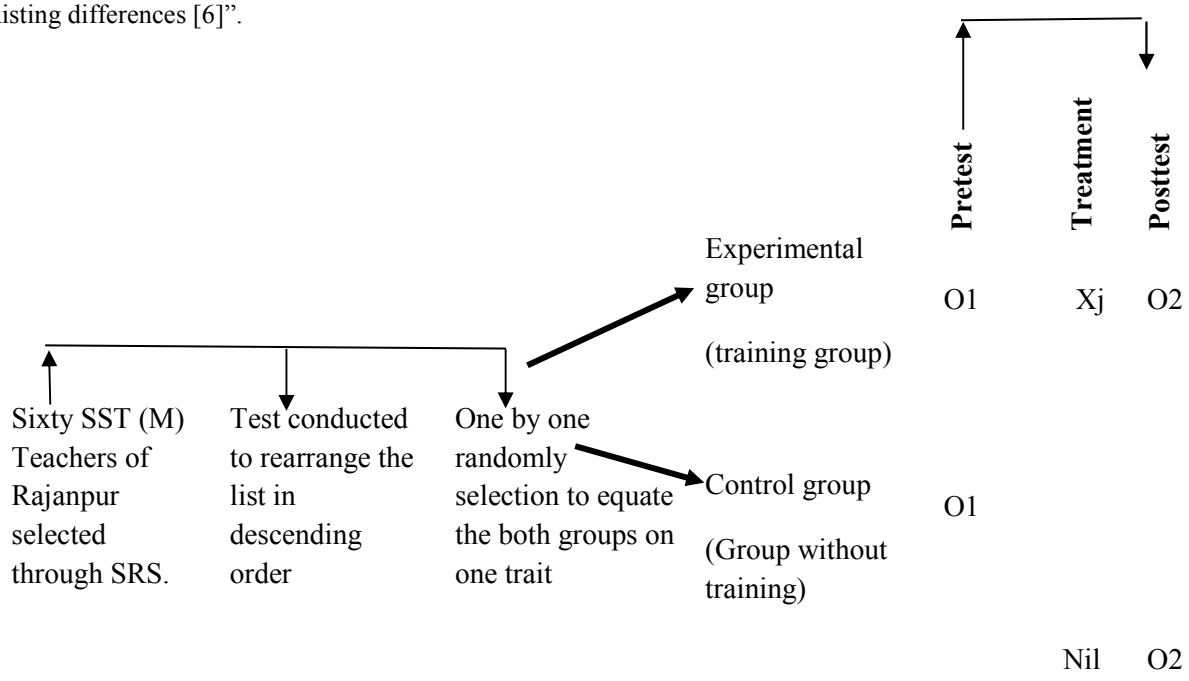


Figure 2 Pretest Posttest Control Group Design

This design was considered fit to control for internal threats to validity.

2.2 Population

The participants of this study were government sector Secondary School Teachers (male) in the district Rajanpur, so all one hundred and eighty the SST's (male) working in the year 2015-2016 were the target population of the study.

2.3 Sample

The list of Secondary School Teachers (SSTs) of science and arts was obtained from the office of Executive District Officer (Education) Rajanpur. Sixty SSTs were selected through simple random method.

2.4 Research Procedure

In this study first of all, a gap was measured in exemplary performer and other performers as indicated in human performance technology model between existing level of performance and required/desired level of performance. The researcher being exemplary performer tried to transfer his knowledge and skills to others performers in 6 weeks. In this way the exemplary performer tried to minimize the performance gap between him and the other trainees. Academic achievement (marks obtained in the test) was taken as dependent variable and the delivery of training was taken as independent variable.

2.4.1 Training Material Compilation

Standard text given by [9] in his book "Human competence: engineering worthy performance", and the text given by the International Society for Performance Improvement on training, information, instruction, and incentives were selected for this training. The text typically explains how teachers can improve their performance.

2.4.2 Pretest Setting

Pretest of all the participants selected (including the researcher) in the sample was given. There were 50 multiple choice questions, each question carried 2 marks. Pretest was marked and a descending list of participants on the base of marks obtained was prepared.

2.4.3 Instrument

A self developed standardized M.C.Qs' test comprising 50 questions was prepared for trainees. Candidates had to select the best answer from given options and fill in the blanks. There were no differences in pretest and posttest except the order of questions.

2.4.4 Table of Specification

The multiple choice questions of self-made test in the context of Bloom's Taxonomy were designed in the following composition.

Table 2 Table of Specification

Content/Topics	Domain of Bloom's Taxonomy	Percentage
Human Performance Technology, Systematic Training, Incentive, Instruction and Information	Knowledge	20%
	Comprehension	48%
	Application	32%

2.4.5 Reliability of the Test

"Reliability is defined as a measure of the internal consistency and stability of a measuring device" [8]. Cronboch's alpha was used to find out the reliability which was 0.80. The high coefficient is the indication of high Reliability so the test was considered reliable.

2.5 Data Analysis

The posttest scores for control group and experimental group were summarized by finding out their means, standard deviations, minimum, maximum and total number of participants analyzed through descriptive statistics. The scores of both groups were displayed through histograms. The difference between posttest by control group and experimental group was determined by using independent t test.

2.6 Internal and External Validity of Experiment

Pretest posttest control group design was used in this research which is capable to control extraneous variables. Sources of variation were controlled by making conditions as similar as possible for both groups. Unknown sources of variation were minimized by doing randomization of participants.

So the results of this experiment can only be considered for the SSTs (Male) of District Rajanpur.

3. RESULTS

The display and numerical description for pretest and posttest scores are as under:

Posttest Scores for Control Group

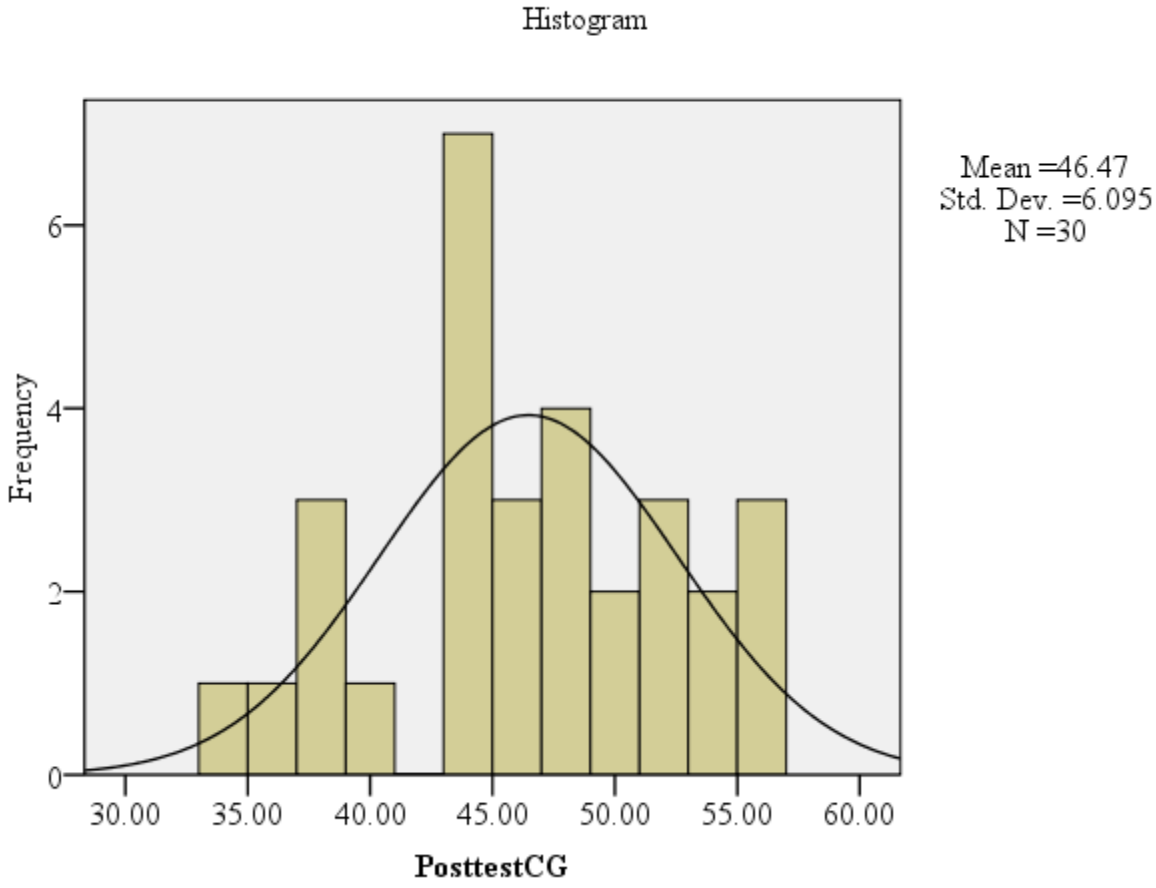


Figure 3: Display of Posttest Scores for Control Group

The histogram shows that posttest scores were normally distributed. There were not any out of pattern scores present in the display of posttest scores for control group.

Table 3: Description of Posttest Scores for Control Group

	N	Minimum	Maximum	Mean	Std. Deviation
Posttest CG Score	30	34.00	56.00	46.47	**6.10**
Valid N (list wise)	**30**				

Table 3 described the posttest scores of control group.

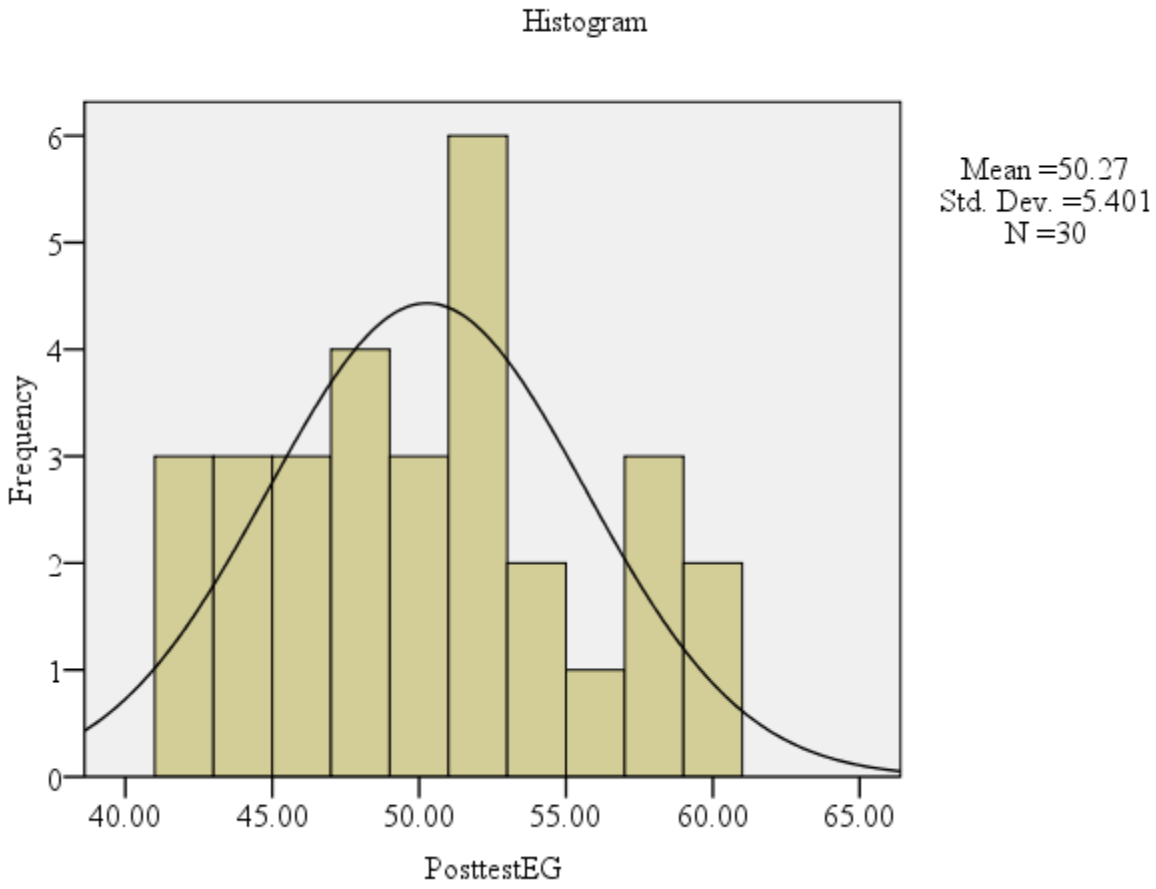


Figure 5: Display of Posttest Sores for Experimental Group

The histogram shows that posttest scores are normally distributed. There were not any out of pattern scores in the display of posttest scores for experimental group.

Table 4: Description of Posttest Scores for Experimental Group

	N	Minimum	Maximum	Mean	Std. Deviation
Posttest EG Score	30	42.00	60.00	50.27	5.40
Valid N (listwise)	30				

The mean score of the experimental group is greater than the mean score of the control group. Table 4 described the posttest scores of experimental group. The mean score of the experimental group is higher and standard deviation is lower than that of the control group. It indicated the positive effect of training. Dispersion in scores of the experimental group decreased after treatment which also favoured the positive influence of training. It also decreased the possibility of any lurking variables.

Hypotheses Testing

Research hypothesis: H_a: $\mu_i > \mu_j$ (The trained teachers' mean score is more than the teachers' who do not receive training).

Null hypothesis: H_0: $\mu_i \leq \mu_j$ (The trained teachers' mean score is no more than the teachers' who do not receive training).

Table 5: Results of t-test and Descriptive Statistics for Academic Achievement by Training

Group	Mean	SD	t	*df*	ES	p-value
Experimental group	50.27	5.40	2.56	58	.62	.01
Control group	46.47	6.10				

p<.05

The results of table 5 showed that the mean scores of the experimental group and the control group were 50.27, 46.47 and SD 5.40, 6.10 respectively with a p-value .01 and t value 2.56, p<.05. The degree of freedom was 58. The effect size (ES) was .621.

Table 5 rejected null hypothesis and showed that the group who received training was statistically different from the one who did not. As the relevant hypothesis was directional based on the review of related literature, therefore, the difference was in favour of the experimental group.

4. DISCUSSION

Size effect .626 found in this study is consistent with the past results of the effectiveness of training programs in different organizations evaluated by Donald L. Kirkpatrick's training evaluation model. Reassuringly, [2] conducted a meta-analysis of 1152 studies from 165 sources and ascertained that training in comparison with no-training had an overall positive effect size of 0.62 in job-related behaviors or performance (mean effect size or ES= 0.62).

This systematic training was different from classroom learning for a few reasons. Firstly, it was conducted after university education (long term development) of teachers. Secondly, in classroom learning, the focus is on open learning and understanding. But in a systematic training, focus shifted from open learning to the specific learning which the exemplary performer had had as his ability. Lastly, the main focus of this training was on trainer's knowledge, skill and ability.

"As technology continues to shape our global world, educational leaders are confronted with the daunting task of preparing students to navigate successfully in a technologically driven society [11]". Technology has been a catalyst for advancing the performance of teachers. The effect of technology can be felt in our industries and medical fields as well. Our schools are not yet taking full advantage of technology. [5] expressed that teachers seem to value the technology as an instructional tool. The training was focused on the measurement of performance. It emphasized only on necessary intervention. In this way it tried to minimize the use of time, effort and money.

This study was not conducted in purely performance based organization where teachers are supposed to perform as per their knowledge and capacity. Otherwise, teachers usually save their energies even being capable of performance. The gap creation and need analysis for training were adopted according to the Human Performance Model. But the whole cyclic process of this model was not adopted in this training. In this way the results of systematic training are likely to be improved if it is conducted in the purely performance based system.

5. CONCLUSION

This experimental study found out the effect of systematic training on teachers' performance. It highlights a number of techniques adopted by a systematic training to improve performance. Effect size determined by Cohen's ES was 0.626 which indicated a medium large magnitude of systematic training effect on male secondary school teachers of Rajanpur. Such type of training used only necessary time, effort, and money of participants. In Pakistan systematic training has full potential to improve the performance of teachers in an economical manner.

6. RECOMMENDATION

Systematic training may be adopted in Government Male Schools of District Rajanpur.

7. FUTURE STUDY SUGGESTIONS

The focus of the present study was on academic performance. The results can be improved by conducting such type of study at the workplace where performance can be measured more accurately.

REFERENCES

[1] Aguinis, H., & Kraiger, K. (2009). Benefits of training and development for individuals and teams,organizations, and society. *Annual review of psychology, 60*, 451-474.

[2] A.Nawaz, N.B. Jumani, Effectveness of Microteaching on Pedagogical Design Capacity of Prospective Teachers, Journal of Applied Environmental and Biological Sciences (JAEBS), 7(10) 86-91, (2017).

[3] Arthur, W., Bennett, W., Edens, P., & Bell, S. (2003.). Effectiveness Of Training In Organizations: A Meta-analysis of Design And Evaluation Features. *Journal of Applied Psychology,* 234-245.

[4] Aziz, D. M. (2013). What's in a Name? A Comparison of Instructional Systems Design, Organization Development, and Human Performance Technology/Improvement and Their Contributions to Performance Improvement. *Performance Improvement, 52*(6), 28-35.

[5] Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report. *European Schoolnet*.

[6] Barry, G., & Herman, J. (1997). True and quasi-experimental designs. Practical assessment. *Res Evaluation, 5*, 14.

[7] Chyung, S.Y. (2008). *Fundamentals of Instructional and Performance Technology*: U.S and Canada: HRD Press, Inch.

[8] Hale, J. (2011). Scientific measures: Reliability and validity. *Retrieved April, 23*, 2012.

[9] Gilbert, T. (1996). *Human competence engineering worthy performance, tribute edition* (Tribute ed.). Silver Spring, Md.: International Society for Performance Improvement.

[10] King Jr, C. L. (2013). An exploration on the use of Gilberts behavior engineering model to identify barriers to technology integration in a public school.

[11] Reich, J. (2011). Thoughts on Digital Equity. Harvard Graduate School of Education.

[12] Tariq Javed, Muhammad Aslam Asghar, Association of Motivation with the Academic Achievement at Secondary Level in Pakistan, Journal of Applied Environmental and Biological Sciences (JAEBS), 7(8) 52-57, (2017).

[13] Wittkuhn, K. (2004). Systems, nontrivial machines, circular causality, and other ghosts haunting performance improvement technology. *e Improvement,* 33-37.

J. Appl. Environ. Biol. Sci., 8(2)144-151, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Assessment of Water Quality Status in Rainy and Dry Seasons along the Brantas Upstream Watershed, Batu City

Bambang Rahadi[1*], Fajri Anugroho[1], Euis Elih Nurlaelih[2], Novia Lusiana[1], Akhmad Adi Sulianto[1]

[1]Department of Agricultural Engineering, Faculty of Agricultural Technology, University of Brawijaya, Jl. Veteran Malang, 65145
[2]Department of Agricultural Cultivation, Faculty of Agriculture, University of Brawijaya, Jl. Veteran Malang, 65145

Received: October 21, 2017
Accepted: January 3, 2018

ABSTRACT

The Brantas Upstream Watershed located in Batu City is one of the water resources that supporting for many purposes. However, the water quality of the upstream is deteriorating due to the human activities throughout land-use change and the effluents. The aims of the study were to determine characteristics of water, to assess the water quality and pollution indexes along the Brantas Stream. The pH values of the Year of 2015 was higher than that of 2017. Moreover, the BOD and COD in the Year 2015 (rainy season) were fluctuative and higher than that of 2017 (dry season), while the Nitrate levels in the Year 2015 was lower significantly than that of Year 2017. According to Class I, status of water quality became deterioriate from the Year 2015 to 2017, where the water pollution indexes in Year 2017 were dominantly extremely polluted, meanwhile the water quality indexes in the Year 2017 were bad status.
KEYWORDS: Brantas Stream, land use, water pollution index, water quality index

INTRODUCTION

The Brantas river is one of the longest river (320 km) and the strategic watershed with catchment area of 12,000 km^2 in East Java, Indonesia [1]. The Brantas watershed is on the high land with dominant land use as forest, so it is suitable area for water conservation [2]. Moreover, the arable soils that is supported by tropical climate is favorable lands for agriculture. The beautiful green lands is attractive places for tourisms. The human populations including permanently stay, work or visit increase every year in Batu City. Many peoples who live at surrounding sides of the watershed depend on the river water to support daily human activities for drinking, household, agriculture, industry and other purposes [3][4] [5]. Therefore, there was decreased in a number of ground water resources in 2005. Impact on the increase of human populations and their daily activities to use water together with a number of organic and harmfull substances, then discharge into water body cause the water quality deteriorating year by year [6][7].

Deterioration of the water quality in the Brantas Stream due to the landuse change has been reported by several researchers [8] [6] [7]. In 1999, the water quality of the Brantas downstream was classified as bad [9]. Meanwhile, the quality of river water was deteriorated by higher inorganic nitrogen (NO_3-N and NH_4-N) and sedimentation with high phosphours content in the upstream site due to the agroforestry activity increased [10].

According to Regulation of the Indonesia Republic Number 82 Year 2001, there are four classes in determining the status of water classes that reviewed based on water quality parameters namely Class I for drinking water, Class II for water recreation facilities, freshwater fish farming, farming, water to irrigate crops, Class III for freshwater fisheries, livestock, water to irrigate crops and Class IV to irrigate crops. Assessment methods to determine the river water quality have been carried out by previous researchers. Two common methods to assess water quality are water quality index [11] [12] and water pollution index [13] [14][15] [16]. The aims of the study were to determine physical, chemical and biological characteristics of water, and to assess their water quality and pollution index along the Brantas Stream.

MATERIALS AND METHODS

Study Area

This research was conducted in the upstream area of Brantas Watershed in East Java, Indonesia which flows in three districts of Batu City, covering Bumiaji District (12,798 Ha), Batu District (4,546 Ha) and Junrejo district (2,565 Ha). Geographically, the study area lies in Batu City which has a latitude of 7°52' S and a longitude of 112°32' E.

***Corresponding Author:** Bambang Rahadi, Department of Agricultural Engineering, Faculty of Agricultural Technology, University of Brawijaya, Jl. Veteran Malang, 65145 e-mail: jbrahadi@ub.ac.id

Water Sampling Location and Procedure

Water sampling was conducted in May 2015 (Wet Season) and in July 2017 (Dry Season). Establishment of water observation points was using GPS which was taken in 12 Points. After taking Points, the researcher conducted water quality testing using various parameters. Samples were taken from the left side, middle and right side of Brantas Stream from the half of river's depth in all sampling area. The samples taken from each Points were retained in 1.5 L bottles measured in three different locations (two riverbanks and one midstream) of the river. The samples taken were put in a cooler box and analyzed in a laboratory [17].

Water Samples Analysis

Water quality parameters tested include pH, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solid (TSS), total dissolved solid (TDS), total of nitrate (T-NO_3), phosphate (T-PO_4) and faecal coliform (FC). Based on East Java Governor Regulation No. 61/2010, it is explained that upstream water from Bumiaji District to Junrejo District according to water quality classification is classified as Class I. Water quality in Class I must be obtained interval value of pH 6.5-9.0, DO ≥ 6 mg/L, BOD ≤ 2 mg/L, COD ≤ 10 mg/L, TSS ≤ 50 mg/L, TDS ≤ 1000 mg/L, T-NO3 ≤ 10 mg/L, T-NO4 ≤ 0.2 mg/L and FC ≤100 MPN/100mL.

The pH was measured using pH meter, DO using Winkler titration method, BOD was determined by knowing the amount of oxygen consumed for 5 days by the DO way of reading on the first day and DO on the fifth day with the temperature of incubator 20^{o}C. COD was measured by using the Digital Conductivity Meter (LT-51), TSS was determined by measuring the sediment weight difference before and after heating with temperature of 105^{o}C for 1 hour [18]. The T-NO3 was measured by Spectrophotometric method, T-PO4 was determined by ammonium molybdate ascorbic acid reduction method, and Fecal coliform using MPN method [19].

Water Quality Index

Water Quality Index (WQI) is an index that can define water quality value from the considerably high value into a value which can be explained in simple way [12]. Water Pollution Index has been used by developing countries based on National Sanitation Foundation (NSF) of USA. WQI is utilized to determine water quality of a river [20]. WQI was determined by summing up the multiplication result of Q_i and W_i values ,where Q_i value is water quality parameter value, W_i value is a weight score of each parameter. W_i value in pH, DO, BOD, TSS, T-PO4, T-NO3 and FC parameters are 0.13, 0.20, 0.13, 0.1, 012, 0.11 and 0.19, respectively. Status qualification of water quality index can be seen in Table 1.

$$\mathrm{WQI} = \sum_{i=1}^{n} Q_i \, x \, W_i$$

Table 1. Classification of water quality status

Range	Status
90 ≤ WQI ≤ 100	Excellent
70 ≤ WQI ≤ 89	Good
50 ≤ WQI ≤ 69	Medium
25 ≤ WQI ≤ 49	Bad
WQI < 24	Very Bad

Water Pollution Index

The Water Pollution Index is a method for determining water quality simply [15]. Water Pollution Index in Indonesia has been implemented based on Ministerial Decree Number 115 Year 2013. The equation used to determine water pollution index, where Ci is the parameter concentration i, Li is the parameter concentration i permitted according to the water quality standard, the M value is the maximum value and the value of R is the average value. The determination of water pollution index criteria based on WPI values can be seen in Table 2.

$$WPI \quad = \sqrt{\frac{(\mathrm{C_i}/\mathrm{L_i})^2{}_{\mathrm{M}} + (\mathrm{C_i}/\mathrm{L_i})^2{}_{\mathrm{R}}}{2}}$$

Table 2. Classification of water pollution index

Score	Criteria
WPI > 10.0	Extremely polluted
5.0 ≤ WPI ≤ 10.0	Polluted
1.0 ≤ WPI ≤ 5.0	Moderately polluted
0.0 ≤ WPI ≤ 1.0	Good

RESULTS AND DISCUSSION

Sampling Site Description

Batu City is divided into 8 areas i.e., moor, forest, agro industrial, parks, grassland, residential, agricultural and shrubs. According to Agricultural and Forestry Office of Batu City (2014), agricultural area in Batu City is 2,480 Ha, area for agro industrialarea is 860.99 Ha, moor area is 3323.57 Ha, forest is 11,071.2 Ha, and the rests are 2,172.96 in sum. Even though the area for forest is more dominant compared to other land area in Batu City, however, Batu City earns astronomical increase in tourism field, so that it affects to how high land functional shift nowadays which causes degradation of river's water quality.

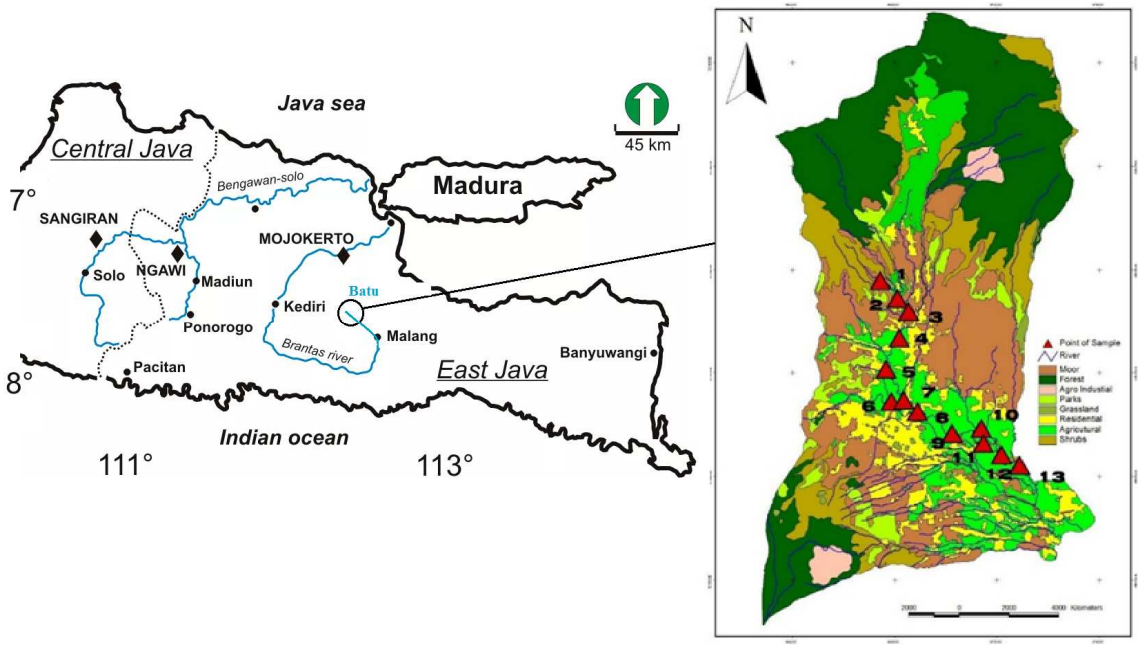


Figure 1. Sampling points along the Brantas Upstream river, in East Java, Indonesia

Determination of observation station used to determine water pollution value at Brantas Stream are taken from 12 points (Table 3). Such point determination is taken from the impact of land change due to land use for residential area, agricultural purpose, cemetery area, dam establishment, farming and due to stone quarry on the water quality of the river. In detail, positioning of observation station location can be seen in Figure 1.

Table 3. Observation Station Brantas's Upstream

River	Coordinate		Wide River	Description	Vegetation
	X	Y	(m)		
1	0667912	9134758	8.0	Agriculture Land	Bamboo, Vegetables, Pine Tree and Fern
2	0667890	9134719	4.7	Agriculture Land	Bush, Bananas and Vegetables
3	0668164	9133756	7.2	Settlement andGround Water Sources	Ornamental Plants and Elephant Grass
4	0668224	9133756	4.0	Settlement, Stone Mining and Goat Farm	Bamboo, Mango Tree and Bush
5	0667973	9133239	9.0	Settlement, Goat Farm and Funeral	Bamboo and Bush
6	0667539	9131941	7.8	Stone Mining andDam	Bamboo
7	0667464	9131914	8.7	Stone Mining and Funeral	Bamboo and Bush
8	0667614	9131659	8.1	Dam and Agricultural Land	Bamboo, Ornamental plants and Vegetables
9	0667971	9130328	7.1	Agricultural Land	Rice, Corn Bamboo, Banana tree and Cassava
10	0668693	9130313	6.4	Agricultural Land	Rice, Corn Bamboo, Banana tree and Cassava
11	0668746	9130265	8.3	Stone Mining	Bamboo and Bush
12	0668693	9130313	4.0	Stone Mining	Bamboo and Bush

Physical-Chemical-Biological Characteristics of the River Water

In this study, the water sampling was conducted on 12 observation points for testing of several parameters of the river water quality as pH, TSS, TDS, DO, BOD, T-NO3, T-PO4 and FC. In 2015 (Rainy Season), the pH values of the river water were in the range of 6.9 to 8.5, higher than that of pH in 2017 (Dry Season) shown fluctuative from 6.3 to 7.8. In the rainy season, pH of the water tended to be higher due to the materials from upper area was 6.30 and the largest value 7.83 with an average pH of 6.95. Compared to the Year of 2015, the pH value of 2017 was tends to be more acidic. When compared to the first class water quality standard, the pH is still categorized according to the standard.

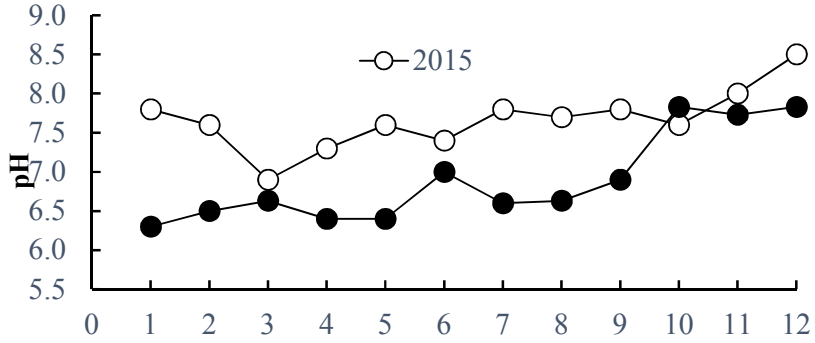


Figure 2. pH of the river water on 12 Locations in 2015 (Rainy Season) and 2017 (Dry Season)

Figure 3 shown that the lowest DO in 2017 was 5.47 mg / L and the largest value was 6.43 mg / L with an average of 6.03 mg / L. The average DO score of research in 2015 was 4.75 mg / L, so in this study it had a DO increase of 27%. The largest BOD value in 2017 was 9.97 mg/L and the lowest was 5, 63 mg/L, with an average grade of 7.28 mg/L. When compared with research in 2015, then there was a decrease of 23%. The largest COD value was 26.32 mg / L and the lowest was 17.52 mg / L with an average value of 20.59 mg / L. When compared to the research in 2015 then there is a decrease of 31%. The COD value graph on 2015 tends to be unstable, this is inversely proportional to 2015.

With the BOD / COD chart shows that water quality condition in dry season (year 2017) is better than rainy season (year 2015). This may be due to the non-mixing of pollutants carried by the rainwater, thus decreasing the value of BOD and COD.

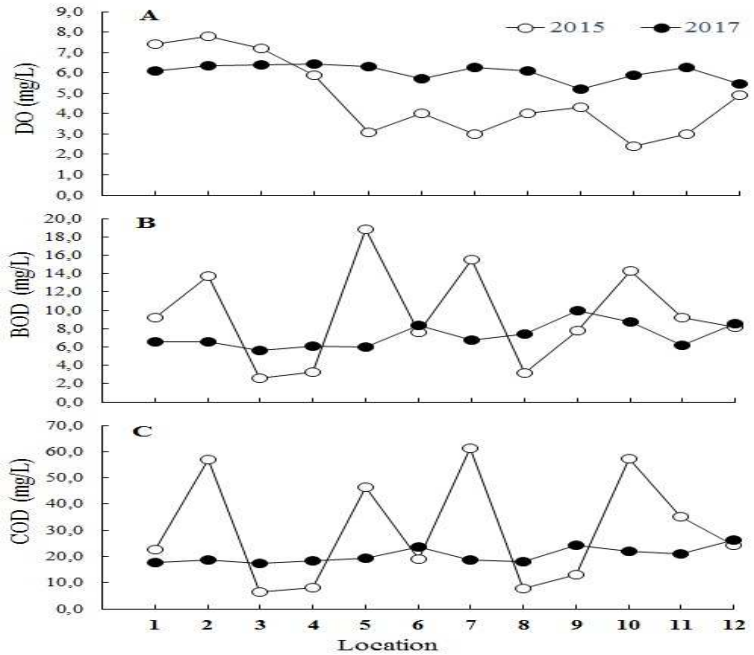


Figure 3. DO (A), BOD (B) and COD (C) of the water along the Brantas River

Figure 4 shown, the highest TSS value was 140.9 mg/L and the lowest value was 7.57 mg/L with an average 50.12 mg/L. In case it was compared to research conducted in 2015, there was an increase by 2%. The highest TDS value was 316.20 mg/L and the lowest value was 134.60 mg/L with anaverage 234.30 mg/L. In case it is compared to research conducted in 2015, there was an increase by 18%.

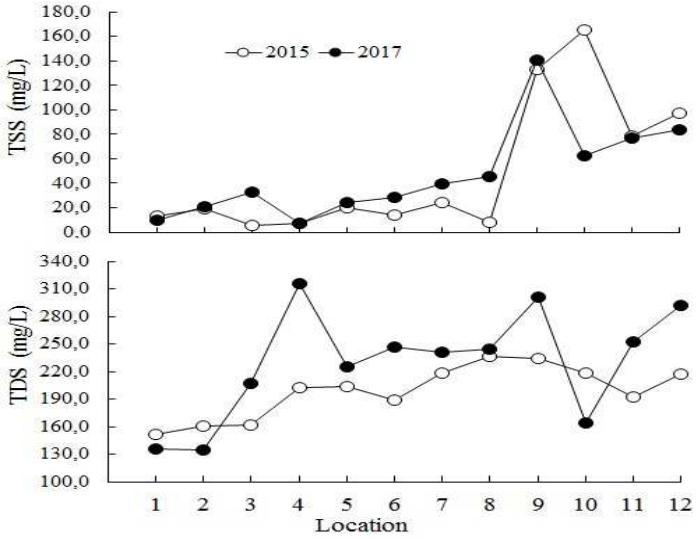


Figure 4. TSS (A) and TDS (B) of the water along the Brantas River

Figure 5 shown, the highest T-NO3 value in 2017 was 24.26 mg/L and the lowest value was 2.89 mg/L with an average 11.38 mg/L. In case it was compared to research conducted in 2015, there was a significant increase by 3.916%. The highest T-PO4 value was 0.79 mg/L and the lowest value was 0.12 mg/L with an average 0.12 mg/L. In case it was compared to research conducted in 2015, there was decrease by 26%. If we take a look at the chart, T-NO3 value in 2015 and 2017 has significant difference, which in 2017, the T-NO3 was far higher. The average value of FC was 2.00 MPN/100 mL. In case it is compared to research conducted in 2015, there was a decrease by 94%, thus, such value is classified into class I category where the water functions as drinking water.

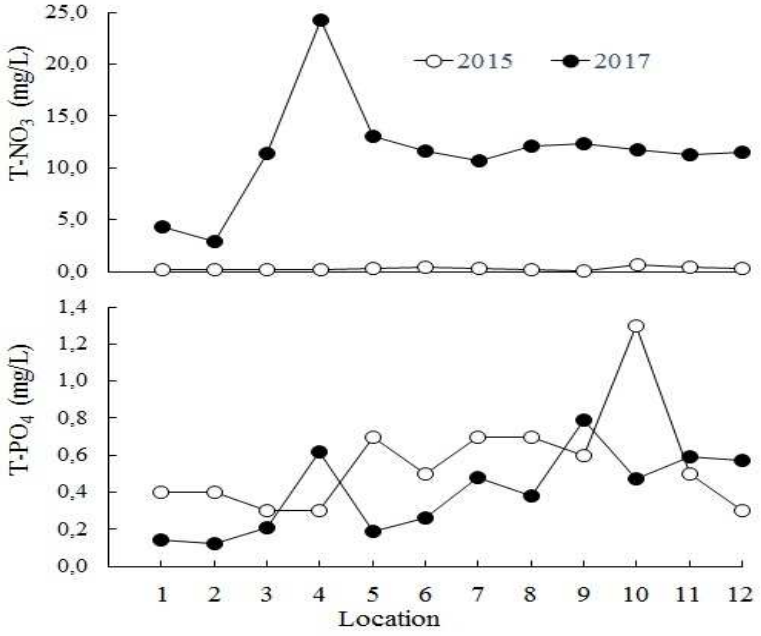


Figure 5. T-NO_3-N (A) and T-PO_4 (B) of the water along the Brantas River

The correlation of Pearson connecting the water quality parameters from the 12 sampling points has a positive and negative correlation (Table 4). Correlation between parameters with significant difference p <0.01 can be seen in the relationship between BOD and DO, COD and BOD, TSS and DO, TSS and BOD, TSS and COD, T-NO3 and TDS, T-PO4 and TSS, T-NO4 and TDS. When compared to the 2015 study, almost all parameters showed a markedly significant difference of p <0.01 except BOD and pH. Correlation between parameters with significant difference value p <0.05 can be seen in the relationship between TSS and pH, whereas in the 2015 study the correlation was success different p <0.05 seen in the BOD relationship and pH. This may result in uneven distribution of pollutants in various sampling locations, resulting in lower correlation values.

Table 4. Pearson Correlationfrom 12 Observation Points in Brantas Stream

		pH	DO	BOD	COD	TSS	TDS	T-NO3	T-PO4
pH	**2015**		-0.290	0.261	0.251	0.391	0.303	0.035	0.041
	2017		-0.492	0.505	0.737	0.612	0.245	0.011	0.511
DO	**2015**			-0.389	-0.313	-0.441	-0.591	-0.644	-0.634
	2017			-0.945	-0.860	-0.777	-0.369	0.052	-0.518
BOD	**2015**				0.878	0.212	0.031	0.431	0.412
	2017				0.794	0.741	0.297	-0.029	0.530
COD	**2015**					0.220	-0.040	0.448	0.429
	2017					0.710	0.462	0.060	0.536
TSS	**2015**						0.396	0.435	0.502
	2017						0.470	0.007	0.750
TDS	**2015**							0.213	0.622
	2017							0.735	0.780
T-NO3	**2015**								0.543
	2017								
T-PO4	**2015**								
	2017								

The highest correlation value lies in the relationship between BOD and DO parameters of 0.945 with a real difference value p <0.01. This is different in the research in BOD and COD of 0.878. This is due to the consistency of each observation station between the two parameters. While the lowest correlation value lies in the relation of T-NO3 and TSS parameters that is 0.007. In the 2015 study, the lowest correlation value lies in the relationship of TDS and BOD of 0.031. In the parameter with the same concept value, it will show a positive correlation. If there is a negative correlation relationship because the value in each relationship of the parameters is inconsistent or does not indicate the stability [21, 22].

Upstream Water Pollution and Quality Indices

Water Pollution Index (WPI) in 12 water quality observation points, it is obtained the data of water quality as presented in Table 5. Result of WPI shows the highest WPI value of 34.61 (Point 4), while the lowest WPI shows a number of 4.19 (Point 2), which are 16.36 in average. Should it be compared to research conducted in 2015, the average WPI of 3.17, then the WPI shall increase by 413.88%. As reviewed based on WPI status in 12 class I Points, it shows that status water quality of Brantas' upstream in location 1 is polluted, however, in point II, there is decrease in WPI by 47%. From location no.3 up to 12, there are increases in WPI, so that in class I, such WPI value shall be categorized as extremely polluted. In the research conducted in 2015, the rating of all observation points on WPI shows that the water is moderately polluted, so that it can be concluded that there is degradation of water quality within the last 2 years. It can be seen on the significant increase of T-NO3 compared to the research conducted in 2015, so that it affects water quality degradation. In Water Quality Index (WQI), it can also be seen that averagely, the statuses of water quality are classified in bad category under WQI value of 39.11, where in the research conducted in 2015, the value of water quality were still in 'medium' category.

Table 5. Water quality from 12 Observation Stations in Brantas's Upstream

Observation Station	WPI on the Quality of River Water in Indonesia in the Class I Classification				Acceptability WQ in NSF			
	2015		2017		2015		2017	
	WPI	Status	WPI	Status	WQI	Status	WQI	Status
1	3.16	Moderately polluted	6.16	Polluted	70.21	Good	57.61	Medium
2	3.76	Moderately polluted	4.19	Moderately polluted	71.16	Good	46.13	Bad
3	1.62	Moderately polluted	1.22	Extremely polluted	77.30	Good	40.85	Bad
4	1.63	Moderately polluted	34.61	Extremely polluted	71.34	Good	38.98	Bad
5	4.38	Moderately polluted	18.63	Extremely polluted	49.95	Bad	41.16	Bad
6	2.98	Moderately polluted	16.71	Extremely polluted	58.18	Medium	38.89	Bad
7	4.08	Moderately polluted	15.34	Extremely polluted	51.71	Medium	37.39	Bad
8	2.77	Moderately polluted	17.33	Extremely polluted	63.39	Medium	37.00	Bad
9	3.09	Moderately polluted	17.68	Extremely polluted	54.97	Medium	29.04	Bad
10	4.16	Moderately polluted	16.76	Extremely polluted	44.64	Bad	34.65	Bad
11	3.33	Moderately polluted	16.07	Extremely polluted	50.89	Medium	34.65	Bad
12	3.11	Moderately polluted	16.59	Extremely polluted	54.07	Medium	33.17	Bad

CONCLUSIONS

In this study was taken in 12 points in upstream of Brantas river which will be reviewed from 2 seasons namely wet season (2015) and dry season (2017). Sampling is taken based on changes in land use due to agricultural land, settlements, stone mining, goat farms, cemeteries and dams. Water quality parameters tested pH, DO, BOD, COD, TSS, TDS, T-NO3, T-PO4 and FC. The results show that pH in 2017 (dry season) is lower than in 2015 (rainy season) with a range of 6.3-7.8. The DO value in 2017 (dry season) was higher with an average of 27%, while the BOD, FC, COD values decreased by 23%, 31% and 94%. In contrast, TSS and TDS values increased 2% and 18%. At the value of T-NO3 in 2017 (dry season)increased by 3.9%, but T-PO4 decreased by 26%. According to the class I air class for drinking water, by 2017 (dry season) the status of WPI status increase from 'moderately polluted' becomes 'extremely polluted'. In WQI status spelled out the status of the 'medium' to 'bad'.

Acknowledgments

The authors would like to thank the environmental engineering and faculty of agriculture Universitas Brawijaya, Indonesia. The authors are also grateful to the water quality laboratory Perum Jasa Tirta 1 Malang City, Indonesia.

REFERENCES

[1] Utami, Sri, Soemarno, Surjono, Bisri, M. Disaster risk and adaptation of settlement along the River Brantas in the context of sustainable development, Malang, Indonesia. *Procedia Environmental Sciences*, 2014; 20:602-611.

[2] Rahadi, B., Nurlaeli, E.E., Lusiana, N. Evaluation of carrying capacity layout based on as endorsing human activities in Batu, Indonesia. Project report of Management Model of pengelolaan daerah aliran sungai berbasis daya dukung lingkungan untuk penataan ruang dan wilayah dalam pemanfaatan sumberdaya alam yang optimal. Unpublished 2014.

[3] Ngoye E., and Machiwa, J.F. The influence of land-use patterns in the Ruvu river watershed on water quality in the river system. Physics and Chemistry of the Earth 2004; 29:1161–1166.

[4] Akasaka, M., Takamura, N., Mitsuhashi, H., Kadono, Y. Effects of land use on aquatic macrophyte diversity and water quality of ponds. Freshw. Biol. 2010; 55: 909–922.

[5] Lu, Y., Song, S., Wang, R., Liu, Z., Meng, J., Sweetman, A.J., Jenkins, A., Ferrier, R.C., Li, H., Luo, W., Wang, T. Impacts of soil and water pollution on food safety and health risks in China. Environ. Int. 2015; 77:5–15.

[6] Valle Junior, R.F., Varandas, S.G.P., Fernandes, L.S., Pacheco, F.A.L. Groundwater quality in rural watersheds with environmental land use conflicts. *Sci. Total Environ*. 2014; 493:812–82.

[7] Pacheco, F.A.L., Fernandes, L.S. Environmental land use conflicts in catchments: a major cause of amplified Nitrate in river water. Sci. Total Environ 2016; 548-549:173–188.

[8] Liu, H.,Wu, J.J. Water pollution index method applied in the evaluation of river water quality. J. Anhui Agric. Sci. 2014; 42:7164.

[9] Fulazzaky, M.A. Water quality evaluation system to assess the Brantas River water. Water Resource Manage 2009; 23;3019–3033.

[10] Rumhayati, B. Siswoyo, H., Nurochman, M.H.C. Assessment the role of sediment in the Sumber Brantas Rivers watershed affected by agroforestry activities*,* IPTEK Journal of Proceeding Series 2014;1:195-200.

[11] Lumb A, Halliwell D, Sharma T. Application of water quality index to monitor water quality: A case of the Mackenzie River Basin, Canada. Environmental Monitoring and Assessment 2006: 113:411–429.

[12] Akkaraboyina MK, Raju BSN. Assessment of water quality index of River Godavari at Rajahmundry. Universal Journal of Environmental Research and Technology 2012; 2:161-7.

[13] Lyulko I., T. Ambalova, T. Vasiljeva. To integrated water quality assessment in Latvia. MTM (Monitoring Tailor-Made) III. Proceedings of International Workshop on information for Sustainable Water Management 2001; 449-452.

[14] Filatov N., D. Pozdnyakov, O. Johannessen, L. Pettersson, L. Bodylev. White sea: Its marine environment and ecosystem dynamics influenced by global change. 2005.

[15] Poonam T, Tanushree B, Sukalyan C. Water quality indices-important tools for water quality assessment: a review. International Journal of Advances in Chemistry, 2013; 1:15-29.

[16] Alves MTR, Teresa FB, Nabout JC. A global scientific literature of research on water quality indices: trends, biases and future directions. Acta Limnologica Brasiliensia 2014; 26:245-253.

[17] APHA. Standard Methods for the examination of water and wastewater.19th ed. APHA, AWWA, WEF, Washington, DC, USA. 1992.

[18] APHA. Standard Methods for the examination of water and wastewater.19th ed. APHA, AWWA, WEF, Washington, DC, USA. 1995.

[19] Shafi, S. Kamili, A.N., Shah, M.A., and Bandh, S.A. Coliform bacterial estimation: A tool for assessing water quality of Manasbal Lake of Kashmir, Himalaya. African Journal of Microbiology Research, 2013; 7:3996-4000.

[20] Bai RV, Bouwmeester R, Mohan S.Water quality index and importance of water quality parameters. Air, Soil, and Water Research 2009; 2:51–9.

[21] Knapp, A. K. and M. D. Smith. Variation among biomes in temporal dynamics of aboveground primary production. Science 2001; 291:481-484.

[22] Samudro, G. and S. Mangkoedihardjo. Review on BOD, COD and BOD/COD Ratio: A Triangle Zone For Toxic, Biodegradable and Stable Levels.International Journal of Academic Research, 2(4): 235-239.

J. Appl. Environ. Biol. Sci., 8(2)152-159, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Evaluation of some *in vitro* Anti-Carcinogenic Activities of Polysaccharides Extracted from Ascomata of the Desert Truffle *Terfezia claveryi* Chatin

Attia, W.Y.[1, 2], El-Naggar R.E.[2]*, Bawadekji, A.[3], Al Ali M.[4]

[1]Northern Border University, Deanship of Preparatory Year, Arar, P.O. Box 1321, Saudi Arabia
[2]Tanta University, Faculty of Science, Zoology Department, Tanta, Egypt
[3]Northern Border University, Deanship of Scientific Research, Arar, P.O. Box 1321, Saudi Arabia
[4]Université d'Angers, Institut Supérieur de la Sante et des Bioproduits d'Angers, France

Received: November 19, 2017
Accepted: January 13, 2018

ABSTRACT

This research study carried to evaluate, *in vitro*, anticancer activities of polysaccharides extracted from desert truffle *Terfezia claveryi* Chatin. Ehrlich's ascites carcinoma (EAC) cell line was used to determine, *in vitro*, anticancer activities of this extract *in vitro*. MTT assay was used to quantify the half maximal inhibitory concentration (IC_{50}). Further, flow cytometry was used to determine apoptosis and cell cycle analysis. The obtained results indicated that the IC_{50} of *T. claveryi* polysaccharides extract was 77.6 µg/mL and 47.6 µg/mL after 24 and 48 hrs of treatment, respectively. Flow cytometric analysis demonstrated that the apoptotic effect of *T. claveryi* polysaccharides extract on EAC cells was dose and time dependent. The treatment of EAC cells either with cisplatin (20 µg/mL) or with *T. claveryi* polysaccharides extract (IC_{50}) for 24 or 48 hrs decreased their percentage of G0/G1phase while increased the arrest of G2 phase in cell cycle. In conclusion, these results showed a considerable *in vitro* anti-carcinogenic effect of *T. claveryi* polysaccharides extract, suggesting its potential application as anticancer agent.
KEY WORDS: *Terfezia claveryi*, Polysaccharides, Ehrlich's ascites carcinoma, IC_{50}, Apoptosis, Cell cycle.

INTRODUCTION

Although there are many therapeutic strategies including chemotherapy, radiation and surgery to treat cancer, treatment with chemotherapy cause severe side effects to different organs of the human body [1, 2]. Accordingly, new therapeutic strategies to treat cancer without harming the host organs is crucial to avoid the toxic effects of chemicotherapies [3, 4, 5]. Many studies have been reported that the natural products could be a new approach to ameliorate chemotherapy side effects or to treat cancer [6, 7, 8]. Furthermore, several studies have been reported that mushrooms have several biological activities such as anti-oncogenesis, anti-metastasis, provide a synergistic antitumor activity together with conventional chemotherapy, also have direct antitumor activity [9, 10, 11, 12]. *Terfezia claveryi* is known as edible desert truffles distributed all over world and especially in the Mediterranean Basin [13, 14, 15]. These hypogeous fungi have been documented as medicinal food in different civilization such as Chinese, Greek and Egyptian [16, 17]. It has a unique nutritional profile of unsaturated fatty acid, vitamins, minerals, and protein [18]. Different chemical constituents were found in *T. claveryi* species such as protein (17.6 2%), linoleic acid (62%), carbohydrates, ergosterins and sterol glycosides [19, 20].
Asian black truffle has been used in traditional folk medicine as adjuvant therapy of gastric cancer, while desert truffle (*Terfezia boudieri*) elicited antimicrobial and antioxidant activities [21, 22]. Black and white truffles also showed anti-inflammatory and cytotoxic activities [23]. In addition, polysaccharides isolated from Tuber truffles exhibited high antioxidant and antitumor activities [15, 24]. Although the desert truffle *T. claveryi* showed important medicinal activities as mentioned above, including antioxidant, antibacterial and antifungal activities [25, 26, 27, 28, 29]. On the other hand, there is a very little information available on its antitumor effects at the level of preclinical and clinical studies. Therefore, the present study is conducted to evaluate, *in vitro* the anti-carcinogenic activities of polysaccharides extract isolated from desert truffle *T. claveryi* by using EAC cells.

MATERIAL AND METHODS

Collection of *T. claveryi* ascomata and polysaccharides extraction.

Fresh ascomata of *T. claveryi* were collected during the maturing stage, at the end of winter, from the sub-soil near the roots of *Helianthemum sp.* at north-eastern region near Arar city in Saudi Arabia. They were identified by Prof.

***Corresponding Author:** El-Naggar Randa Ezz El-Din, Tanta University, Faculty of Science, Zoology Department, Tanta, Egypt, Phone: +201271043437, E-mail: randa.elnaggar@yahoo.com

Bawadekji from Northern Border University. These ascomata were chopped into small pieces, lyophilized, and then ground into fine powder, 100 g. of this powder was soaked in 2 L of 95% (vol/vol) ethanol at 70ºC for 2 hours in order to remove phenols. This step was repeated twice, ethanol was evaporated; and then the residue passed for ulterior extraction with 2 L of distilled water at 80°C (3 times/6 hours). The gathered filtrate solution was centrifuged at 8400 g for 10 minutes and then concentrated and dialyzed [30]. The protein liberated from the extract is removed by Sevag reagent, then, the extract was precipitated by washing four times with ethanol [31]. Precipitate was collected by centrifugation for 10 minutes at 8400 g and then lyophilized to obtain the crude polysaccharide extract.

Maintenance and expansion of the tumor cell line.
Ehrlich ascites carcinoma (EAC) cell line was obtained from the Centre of Excellence of Cancer Research, Tanta University, Tanta, Egypt. EAC cells were maintained in female Swiss albino mice by weekly intraperitoneal (i.p.) inoculation of viable $2x10^6$ cells/mouse at the Cancer Institute, Cairo, Egypt. Tumor cell suspensions were prepared in balanced salt solution at pH 7.4 to a final concentration of 5×10^6 viable cells/ mL [32].

Assessment the antitumor activity of *T. claveryi* polysaccharides extract.
EAC cell count using trypan blue assay:
EAC cells were seeded into 6-well culture plates (Falcon, Oxnard, CA) at a density of 1×10^6 cells/well in RPMI-1640 medium supplemented with 5% fetal calf serum (Gibco, Grand Island, N.Y.), 50 µM β-mercaptoethanol (Sigma Chemical Co.) and antibiotics. Sets of subconfluent cells in plates were treated with different concentrations of *T. claveryi* polysaccharides extract, and subsequently incubated in a humidified 5% CO_2 environment. After 24 and 48 hrs, cells were harvested by trypsinization using trypsin-EDTA. Cells were washed with sterile saline (0.9%) and 0.5-1 mL of 10% trypsin-EDTA solution was added to the cell monolayer. After incubation for 3-5 min, cells were collected, stained with trypan blue (Sigma Chemical Co. USA) according to [33], and counted using a hemocytometer under light microscope. Viable and dead cells were counted separately for each condition.

Determination of EAC cell proliferation using MTT assay:
The cytotoxic effect of *T. claveryi* polysaccharides on EAC cell proliferation was measured using MTT assay according to the method developed by [34]. EAC cells were seeded in 96-well culture plates at a density of 1×10^6 cells/well in RPMI-1640 medium supplemented with fetal calf serum, β-mercaptoethanol and antibiotics. Then, cells were treated with different concentrations of *T. claveryi* polysaccharides extract, and later incubated in a humidified 5% CO_2 environment. 150 µl of the medium were removed After 24 and 48 hrs, from each well. Tetrazolium salt MTT (3[4,5-dimethylthiozol-2-yl]-2,5-diphenyl tetrazolium bromide, Sigma Chemical Co.) has been used to determine the extent of EAC cell proliferation, which sticks to active mitochondria and turns into blue formazan product. MTT (5 µl of 20 mg/ mL) was added to each well and incubated for 4 hours at 37ºC. The dark blue crystals were dissolved by the addition of 150 µl of 0.04 M HCl/ isopropanol, the plates were inserted into a Dynatech MR580 micro-elisa spectrophotometer; after an incubation in the dark for overnight and a test wavelength of 570 nm and a reference wavelength of 630 nm were used to have the optical densities.

Determination of EAC cell apoptosis:
Measurement of apoptosis in EAC-untreated cells and EAC-treated cells with different concentrations of *T. claveryi* polysaccharides extract was performed using Annexin V, apoptosis Detection kit II (Cat. No 556570) as proposed by [35]. Briefly, EAC cells were washed twice with cold PBS and then re-suspended in 1X binding buffer at a concentration of 5×10^6 cells/mL. 100 µl of the solution (5×10^5 cells) were shifted to a 5 mL culture tube. 5 µl of Annexin-V and 5 µl propidium iodide (PI) were added. The cells were gently vortexed and incubated for 15 min at RT (25°C) in the dark. 400 µl of 1X binding buffer were added to each tube, and then analysed by BD FACSCanto™ II flow cytometer. In this case, changing of cell stain is an indicator; positive stain for both Annexin-V and PI are either in the end stage of apoptosis, exhibiting necrosis, or are dead cells. While negative stained cells for both Annexin-V and PI are alive and not exhibiting determinable apoptosis.

Cell cycle analysis of EAC cells after treatment for 24 and 48 hrs with extract:
In order to evaluate the effect of *T. claveryi* polysaccharides on the distribution of tumor cells in G1, S and G2/M phases of the cell cycle, Cell cycle analysis was achieved by using flow cytometry after DNA staining to detect the total amount of DNA as described by [36]. Approximately, 2×10^6 of EAC cells cultured in the presence of the IC_{50} (77.6 µg/ml) of *T. claveryi* polysaccharides extract. Cells were collected after 24 and 48 hrs of incubation, and then washed with PBS and proceeds to be fixed with cold 70% ethanol and kept at -20°C for twelve hours. After washing

cells twice by adding 2 mL cold PBS (1800 rpm, 5 min), the supernatant was eliminated, and cells were stained with a solution containing 300 µg/mL of PI/ triton X 100 staining solution (1000 µl of 0.1% triton + 40 µl PI + 20 µl RNAse). The analysis of samples was done using BD FACSCanto™ II flow cytometer and data were analyzed using BD FACS Diva software.

Statistical analyses

Data are expressed as means ± SD. Excel (Microsoft Corporation, USA) and Minitab (version 18.1, Minitab, Inc., USA) were utilized. One-way ANOVA and Tukey pairwise comparisons were used to test the differences of means among different groups, Equal variances were assumed for the analysis with significance level $\alpha = 0.05$. P values < 0.05 are considered significant. Grouping information using the Tukey method was used, means that do not share a letter are considered significantly different.

RESULTS

EAC cells viability decrease with an increase of *T. claveryi* polysaccharide concentrations

To test the impact of *T. claveryi* polysaccharides extract on the viability of EAC cells, different concentrations of the extract were used to determine the percentage of the viable cells after 24 and 48 hrs post treatment. The results showed that by increasing the concentration of the extract. The percentage of dead cells was significantly increased while percentage of the viable cells was significantly decreased. Except for the concentration of 25 µg/mL (Fig. 1). By increasing the time of the exposure to the *T. claveryi* polysaccharides extract, more increase in the percentage of the dead cells and more decrease in the percentage of the viable cells (Fig. 2).

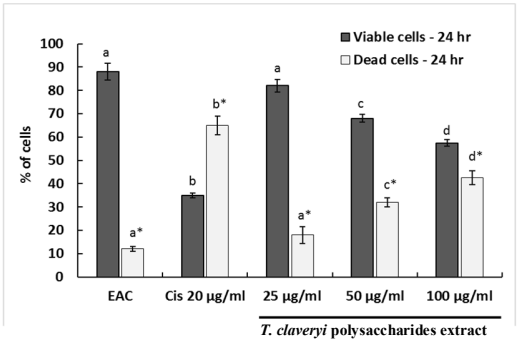


Figure 1. Treatment with different concentration of *T. claveryi* polysaccharide extract for 24 hrs decreased the viability of cells with the increase of the extract concentrations.

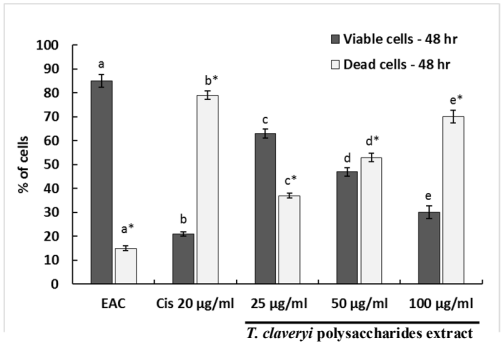


Figure 2. Treatment with *T. claveryi* polysaccharides for 48 hrs showed more decrease in the percentage of the viable cells.

All these increases and decreases were significantly different ($p < 0.05$) in comparison to EAC cells without *T. claveryi* polysaccharides extract.

***T. claveryi* polysaccharides extract showed a moderate anticancer activity**

To evaluate the anticancer activity of *T. claveryi* polysaccharides extract, MTT assay was performed, the half maximal inhibit concentration (IC_{50}) was determined. Briefly, EAC cells (1×10^6 /well) were seeded and let overnight to adhere in the plate. Different concentrations of *T. claveryi* polysaccharides extract range between 25 to 150 µg/mL were added in accordance with experimental design. Cells were incubated for 24 and 48 hrs in 5% CO_2 incubator. The result showed that the (IC_{50}) were 77.6 and 47.6 µg/mL after 24 and 48 hrs, respectively (Fig. 3).

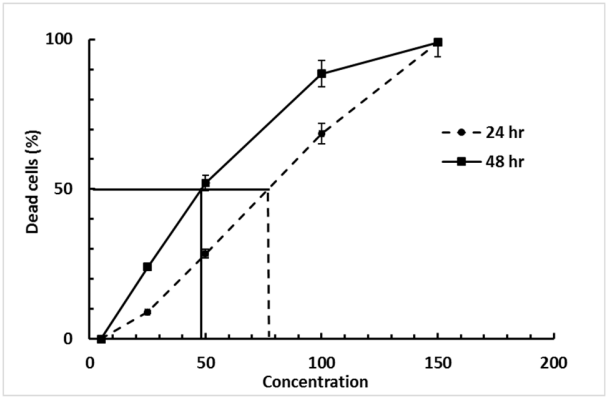


Figure 3. Half maximal inhibitory concentration (IC_{50}) of *T. claveryi* polysaccharides extract on EAC-cells after 24 and 48 hrs of post treatment.

Anticancer activity of *T. claveryi* polysaccharides extract was dose and time dependent

To detect the percentage of the apoptotic cells (early and late apoptotic) after the treatment with *T. claveryi* polysaccharides extract for 24 or 48 hrs. By using sterilized 6-well plate, 5×10^{6}/ EAC-cells/well were seeded and incubated for overnight to adhere to the plate surface as mentioned above. Different concentrations of *T. claveryi* polysaccharides extract were applied. Cells incubated again for 24 or 48 hrs. Cells harvested and stained with Annexin-V and propodimiodied (PI) based on a certain protocol for flow cytometry. Flow cytometry analysis showed after 24 hrs of treatments, that *T. claveryi* polysaccharides extract induced apoptosis of EAC cells in dose dependent pattern. Treatment with 25, 50 and 100 µg/mL of *T. claveryi* polysaccharides extract for 24 hrs, the apoptotic percentage were 14, 25 and 35%, respectively (Fig. 3). Treatment with the same concentrations of the extract for 48 hrs showed apoptotic percentage 25, 35 and 54%, respectively (Fig. 4). The results showed that the increase of the apoptotic percentages was dose and time dependent.

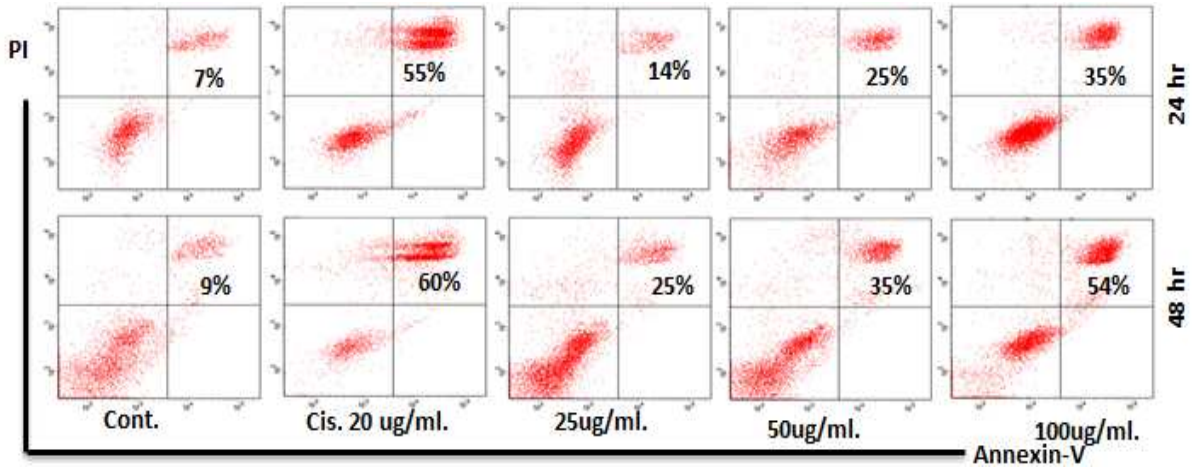


Figure 4. Treatment with *T. claveryi* polysaccharides extract showed an increase as concentration and time dependent pattern.

The percentage of viable cells, early apoptotic, and late apoptotic EAC cells after 24 hrs with no treatment (-ve control) was 89, 2.4 and 7%, respectively. EAC cells treated with 25, 50 and 100 µg/mL of *T. claveryi* extract for 24 hrs, the percentage of viable cells were 80.9, 67.8 and 55.6%, respectively (Fig. 5). EAC cells treated with the same concentrations of *T. claveryi* polysaccharides extract for the same time showed percentage of early apoptosis as 4.7, 6.8 and 9.4%, respectively, and for late apoptosis were 14, 25 and 35%, respectively (Fig. 5).

The percentages of viable cells, early apoptotic, and late apoptotic EAC cells after 48 hrs with no treatment (-ve control) were 87, 3.1 and 9.1%. After the treatments for 48 hrs by *T. claveryi* extract concentrations 25, 50 and 100

µg/mL the percentage of viable cells were 68, 56 and 33.5%, respectively (Fig. 6). EAC cells treated with the same concentrations of *T. claveryi* extract for the same time showed percentage of early apoptosis as 6.7, 8.4 and 11.1%, respectively. While, the percentages of late apoptosis were 25, 35 and 54%, respectively (Fig. 5). Of note, treatment with 20 µg/mL of cisplatin (reference drug) for 24 hrs, showed a percentage of viable cells (33.6%), early apoptotic (10.5%) and late apoptotic (55%). While the treatment with the same dose of cisplatin for 48 hrs showed a percentage of viable cells (23.4%), early apoptotic (16.4%) and late apoptotic (60%) (Figs. 5, 6).

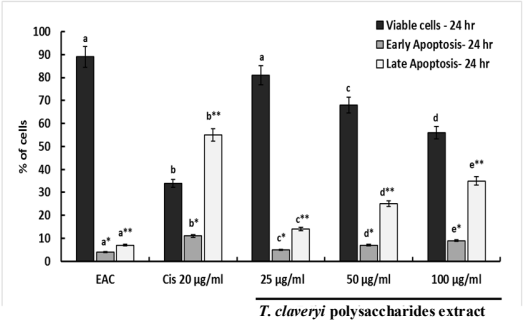


Figure 5. Treatment with *T. claveryi* polysaccharides extract for 24 hrs increased the apoptotic percentages of EAC-cells in dose dependent pattern.

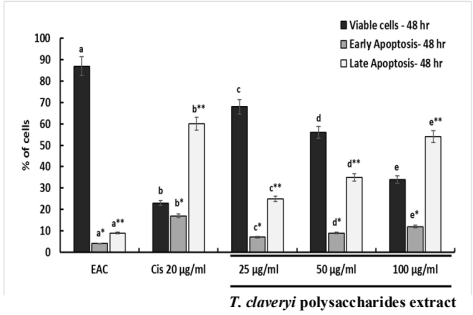


Figure 6. Treatment with *T. claveryi* polysaccharides extract for 48 hrs showed increase in early and late apoptostic EAC-cells.

Treatment with IC_{50} of *T. claveryi* polysaccharides extract for 24 and 48 hrs increased the percentage of G2 and decreased the percentage of G0/G1.

To evaluate the effect of *T. claveryi* polysaccharides extract on the distribution of tumor cells in G1, S and G2/M phases of the cell cycle. Approximately, 2×10^6 of EAC cells cultured in the presence of IC_{50} of *T. claveryi* polysaccharides extract for 24 and 48 hrs. The results showed that the selected IC_{50} of the extract increased the percentage of G2 phase and decreased the percentage of G0/G1 phase of the exposure to the extract for 24 or 48 hrs. as shown in Figure 7.

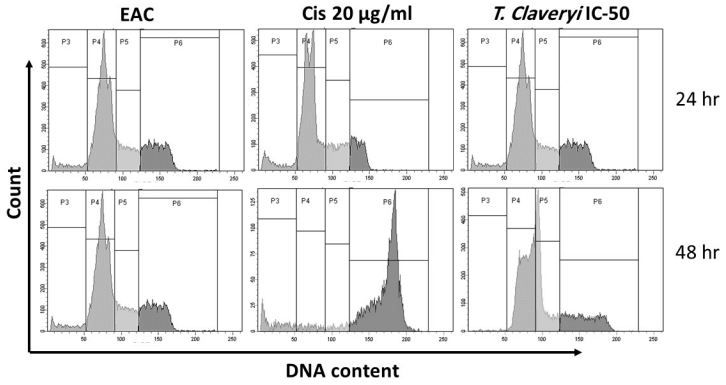


Figure 7. Treatment with IC_{50} of *T. claveryi* polysaccharides extract for 24 and 48 hrs increased the percentage of G2 and decreased the percentage of G0/G1.

DISCUSSION and CONCLUSION

Several medical applications of desert truffle *T. claveryi* were reported. It has reported that *T. claveryi* had a potent antibacterial and antifungal activities [25, 26, 27, 28, 37, 38]. Fungal polysaccharides extract especially *T. claveryi* exhibit anti-inflammatory activity that might contribute to the prevention of inflammatory diseases [39]. Further, it has been reported that the methanol extract of *Terfezia* sp. had antimicrobial activity against a wide range of both Gram-positive and Gram-negative bacteria [40]. Furthermore, it was reported that a higher oxidative inhibition on

lipid peroxidation after the treatment with *T. claveryi* [24, 41]. In addition, it was reported that the aqueous extract of *T. claveryi* has a potent hepatoprotective activity against $CC1_4$ [38]. Our results showed that the IC_{50} of *T. claveryi* polysaccharides extract on EAC cells were 77.6 and 47.6 µg/mL after 24 and 48 hrs of exposure, respectively, these findings showed that the polysaccharide extract of *T. claveryi* has a moderate anticancer activity *in vitro*. While other study showed that *T. claveryi* polysaccharides extract inhibited the human brain carcinoma cell line [42]. Similarly, to our findings, *T. claveryi* polysaccharides extract showed inhibition activity against PC3 and MCF7 cell lines [43]. The inhibition of cell growth by *T. claveryi* extracts might be due to its antioxidant properties [17]. After we obtained IC_{50} of *T. claveryi* polysaccharides extract, the percentage of the apoptotic cells was determined at different concentrations of the extract by incubation of the treated cells for 24 and 48 hrs. According to our findings, *T. claveryi* polysaccharides extract induced apoptosis in dose and time dependent pattern. Therefore, the treatment with the extract for 48 hrs induced significant increase in apoptotic percentages more than its effect for 24 hrs. Consistent with our finding, recent study showed that *T. claveryi* hexane extract significantly promoted cell apoptosis through the mitochondrial pathway and DNA fragmentation [42]. From the previous points of view, it can be speculated that anticancer effect, and apoptotic activity of *T. claveryi* extract is due to the presence of main chemical constituents and due to the antitumor activity of the polysaccharides. Regarding to the effect of the *T. claveryi* polysaccharide extract on cell cycle of EAC cells. Cells were cultured in 6-well plates at a confluence of 2×10^6 cells/well. Cells were treated with extracts for 24 and 48 hrs with respective IC_{50} values. Then, cell cycle phases and DNA content were analyzed by flow cytometry. We found that the half maximal concentrations (IC_{50}/24hrs and IC_{50}/48 hrs) of *T. claveryi* polysaccharide extract could inhibit cell proliferation and arrest cell cycle in G1 phase. These results were in agreement with other study which showed that polysaccharides from the fungus *Pleurotus abalonus* induced the cell-cycle arrest [44, 45]. In conclusion, these results showed a considerable effect of *T. claveryi* polysaccharides extract *in vitro* as anti-carcinogenic agent. Further studies are required to assess the antioxidant capacity of the *T. claveryi* polysaccharides extract and its anticancer effect using tumor bearing mouse model.

ACKNOWLEDGMENTS

The authors wish to acknowledge the approval and the support of this research study by the grant No. 5747-SCI-2016-1-6-F from the Deanship of the Scientific Research at Northern Border University, Arar, KSA.

REFERENCES

1. Kigawa, J., 2013. New strategy for overcoming resistance to chemotherapy of ovarian cancer. Yonago. Acta. Med., 56(2): 261-269.
2. Daga, A., A. Ansari, S. Patel, S. Mirza, R. Rawal and V. Umrania, 2015. Current drug and drug targets in non-small lung cancer: limitations and opportunities. Asian Pac. J. Cancer Prev., 16(10): 4147-4156.
3. Kim, H.S., J.Y. Kim, J.S. Kang, H.M. Kim, Y.O. Kim and I.P. Hong, 2010. Cordlan polysaccharide isolated from mushroom *Cordyceps militaris* induces dendritic cell maturation through Toll-like receptor 4 signaling. Food Chem. Toxicol., 48: 1926-1933.
4. Mostafa, H.A., E.H. Abd El-Zaher, E. Shalaby and W.Y. Attia, 2014. The role of endopolysaccharides extracted from the mushroom *Pleurotus ostreatus* in enhancing the immune response against tumor growth in mice. Egypt. J. Exp. Biol. (Zool.), 10(1): 71-84.
5. Abd El-Zaher, E.H., H.A. Mostafa, E.M. Shalapy and W.Y. Attia, 2015. Enhanced antioxidant and anti-tumor activities of endopolysaccharides extracted from *Pleurotus ostreatus* mushroom. Egypt. J. Exp. Biol., 11(1): 1-14.
6. Akanbi, M.H., E. Post, S.M. van Putten, L. de Vries, J. Smisterova, A.H. Meter-Arkema, H.A. Wösten, R. Rink and K. Scholtmeijer, 2013. The antitumor activity of hydrophobin SC3, a fungal protein. Appl. Microbiol. Biotechnol., 97(10): 4385-4392.
7. El-Naggar, S.A., A.A. Alm-Eldeen, M.O. Germoush, K.F. El-Boray and H.A. Elgebaly, 2015. Ameliorative effect of propolis against cyclophosphamide-induced toxicity in mice. Pharmaceutical Biology, 53 (2): 235-241.
8. Xiao, Z., S.L. Morris-Natschko and K.H. Lee, 2016. Strategies for the optimization of natural leads to anticancer drugs or drug candidates. Med. Res. Rev., 36(1): 32-91.
9. Cho, J.H., S.D. Cho, H. Hu, S.H. Kim, Y.S. Lee and K.S. Kang, 2002. The role of ERK1/2 and p38 MAP kinases in the preventive mechanisms of mushroom *Phellinus linteus* against the inhibition of gap junctional intercellular communication by hydrogen peroxide. Carcinogenesis, 23(7): 1163-1169.

10. Pyo, P., B. Louie, S. Rajamahanty, M. Choudhury and S. Konno, 2008. Possible immunotherapeutic potentiation with D-fraction in prostate cancer cells. J. Hematol. Oncol., 1: 25-33.
11. Weng, C.J. and G.C. Yen, 2010. The *in vitro* and *in vivo* experimental evidences disclose the chemopreventive effects of *Ganoderma lucidum* on cancer invasion and metastasis. Clin. Exp. Metastasis, 27(5): 361-369.
12. Liu, R.M., X.J. Zhang, G.Y. Liang, Y.F. Yang, J.J. Zhong and J.H. Xiao, 2015. Antitumor and antimetastatic activities of chloroform extract of medicinal mushroom *Cordyceps taii* in mouse models. BMC Complement Altern. Med., 15: 216-229.
13. Gutiérrez, A. M. and M. Honrubia, 2003. Morphological characterization of the mycorrhiza formed by *Helianthemum almeriense* Pau with *Terfezia claveryi* Chatin and *Picoa lefebvrei* (Pat.) Maire M. Mycorrhiza, 13: 299-307.
14. Al-Laith, A.A., 2010. Antioxidant components and antioxidant/ antiradical activities of desert truffle (Tirmania nivea) from various Middle Eastern origins. J. Food Compos. Anal., 23: 15-22.
15. Luo, K., J. Zhang, L. Yan, Y. Tang, X. Ding, Z. Yang and Q. Sun, 2011. Composition and antioxidant activity of water-soluble polysaccharides from *Tuber indicum*. J. Med. Food, 14(12): 1609-1616.
16. Wang, S. and M.F. Marcone, 2011. The biochemistry and biological properties of the world's most expensive underground edible mushroom: truffles. Food Res. Int., 44: 2567-2581.
17. Badalyan, S., (2012). Medicinal aspects of edible ectomycorrhizal mushrooms. In: Edible Ectomycorrhizal Mushrooms. Springer Berlin, Heidelberg, p: 317-334.
18. Patel, S., 2012. Food, health and agricultural importance of truffles: a review of current scientific literature. Curr. Trends Biotechnol. Pharmacy, 6: 15-27.
19. Al-Kaisey, M.T., H.A. Hadwan, H.A. Abeed, E.J. Taher and B.L. Dhar, 1996. Proximate analysis of Iraqi truffles. Mushroom Res., 5: 105-108.
20. Culleré, L., V. Ferreira, B. Chevret, M.E. Venturini, A.C. Sánchez-Gimeno and D. Blanco, 2010. Characterization of aroma active components in the black truffles (*Tuber melanosporum*) and summer truffles (*Tuber aestivum*) by gas chromatography-olfactometry. Food Chem., 122: 300-306.
21. Hu, H.J., P.Z. Li, B.Q. Hang and Y.W. Guo, 1994. Effects of polysaccharide of *Tuber sinica* on tumor and immune system of mice. J. China Pharm. University, 25: 289-292.
22. Doğan, H.H. and S. Aydın, 2013. Determination of antimicrobial effect, antioxidant activity and phenolic contents of desert truffle in Turkey. Afr. J. Tradit. Complement. Altern. Med., 10(4): 52-58.
23. Beara, I.N., M.M. Lesjak, D.D. Cetojević-Simin, Z.S. Marjanović, J.D. Ristić, Z.O. Mrkonjić and N.M. Mimica-Dukić, 2014. Phenolic profile, antioxidant, anti-inflammatory and cytotoxic activities of black (*Tuber aestivum* Vittad.) and white (*Tuber magnatum* Pico) truffles. Food Chem., 165: 460-466.
24. Zhao, W., X.H. Wang, H.M. Li, S.H. Wang, T. Chen, Z.P. Yuan and Y.J. Tang, 2014. Isolation and characterization of polysaccharides with antitumor activity from Tuber fruiting bodies and fermentation system. Appl. Microbiol. Biotechnol., 98(5): 1991-2002.
25. Murcia, M.A., M. Martinez-Tomé, A.M. Jiménez, A.M. Vera, M. Honrubia and P. Parras, 2002. Antioxidant activity of edible fungi (truffles and mushrooms): losses during industrial processing. J. Food Prot., 65(10): 1614-1622.
26. Gouzi, H., L. Belyagoubi, K.N. Abdelali and A. Khelifi, 2011. *In vitro* antibacterial activities of aqueous extracts from Algerian desert truffles (Terfezia and Tirmania, Ascomycetes) against *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Int. J. Med. Mushrooms, 13(6): 553-558.
27. Neggaz, S. and Z. Fortas, 2013. Tests of antibiotic properties of Algerian desert truffle against bacteria and fungi. J. Life Sci., 7(3): 259-266.
28. Schillaci, D., M.G. Cusimano, V. Di Stefano, V. Arizza, D. Russo, A. Bawadekji, S. Davino, M.L. Gargano and G. Venturella, 2015. Antimicrobial activity of the desert truffles *Tirmania pinoyi* and *Terfezia claveryi* against human pathogens. (Conference paper). The 8th International Medicinal Mushroom Conference, Manizales, Colombia, p: 24-27.
29. Bella, P., M.L. Gargano, S. Davino, M. Davino, V. Arizza, A. Bawadekji, V. Catara, R. Compagno and G. Venturella, 2015. *In vitro* antibacterial activity of extract from the desert truffles *Tirmania pinoyi* and *Terfezia claveryi* against plant pathogenic bacteria. (Conference paper). The 8th International Medicinal Mushroom Conference, August 24-27, 2015. Manizales, Colombia.
30. Wang, Y.F., X.L. Wei and Z.Y. Jin, 2009. Structural analysis of a natural polysaccharide isolated from green tea. Food Res. Int., 42: 739-745.

31. Navarini, L., R. Gilli, V. Gombac, A. Abatangelo, M. Basco, and R. Toffanin, 1999. Polysaccharides from hot water extracts of roasted coffee Arabica beans: isolation and characterization. Carbohydr. Polym., 40: 71-81.
32. Saha, S. and S. Mondal, 2000. Suppression of Ehrlich ascites tumour growth by immunization with ganglioside GT1b of its origin, its IgM antibody or anti-idiotype of the anti-GT1b IgM. Int. J. Exp. Biol., 38: 1207-1216.
33. Strober, W., 2001. Trypan blue exclusion test of cell viability. Curr. Protoc. Immunol., doi: 10.1002/0471142735.ima03bs21.
34. Mitry, R.R., R.D. Hughes, M.M. Aw, C. Terry, G. Mieli-Vergani, R. Girlanda, P. Muiesan, M. Rela, N.D. Heaton and A. Dhawan, 2003. Human hepatocyte isolation and relationship of cell viability to early graft function. Cell Transplant, 12(1): 69-74.
35. Vermes, I., C. Haanen, H. Steffens-Nakken, and C.P. Reutelingsperger, 1995. A novel assay for apoptosis. Flow cytometric detection of phosphatidylserine expression on early apoptotic cells using fluorescein labeled Annexin V. J. Immunol. Methods, 184: 39-51.
36. Crissman, H.A. and G.T. Hirons, 1994. Staining of DNA in live and fixed cells. Meth. Cell Biol., 41: 196-209.
37. Janakat, S., S. Al-Fakhiri and A.K. Sallal, 2005. Evaluation of antibacterial activity of aqueous and methanolic extracts of the truffle *Trefezia claveryi* against *Pseudomonas aeruginosa*. Saudi Med J., 26(6): 952-955.
38. Janakat, S. and M. Nassar, 2010. Hepatoprotective activity of desert truffle (*Terfezia claveryi*) in comparison with the effect of *Nigella sativa* in the rat. Pakistan Journal of Nutrition, 9(1): 52-56.
39. Du, B., H. Zeng, Y. Yang, Z. Bian and B. Xu, 2016. Anti-inflammatory activity of polysaccharide from Schizophyllum commune as affected by ultrasonication. Int. J. Biol. Macromol., 91:100-5.
40. Hussain, G. and I.M. Al-Ruqaie, (1999). Occurrence, chemical composition, and nutritional value of truffles: an overview. Pak. J. Biol. Sci., 2: 510-514.
41. Janakat, S., S. Al-Fakhiri and A.K. Sallal, 2004. Promising peptide antibiotic from *Terfezia claveryi* aqueous extract against Staphylococcus aureus *in vitro*. Phytother Res., 18: 810-813.
42. Scheck, A.C., K. Perry, N.C. Hank and W.S. Clark 2006. Anticancer activity of extracts derived from the mature roots of Scutellaria baicalensis on human malignant brain tumor cells. BMC Complement Altern Med., 6: 27.
43. Dahham, S.S., S.Sc. Al-Rawi, A.H. Ibrahim, A.S. Abdul Majid and A.M.S. Abdul Majid, 2016. Antioxidant, anticancer, apoptosis properties and chemical composition of black truffle *Terfezia claveryi*. Saudi Journal of Biological Sciences. In press.
44. Yu, J., R. Sun, Z. Zhao and Y. Wang, 2014. *Auricularia polytricha* polysaccharides induce cell cycle arrest and apoptosis in human lung cancer A549 cells. Int J Biol Macromol., 68:67-71.
45. Ren, D., Y. Jiao, X. Yang, L. Yuan, J. Guo and Y. Zhao, 2015. Antioxidant and antitumor effects of polysaccharides from the fungus Pleurotus abalonus. Chem Biol Interact., 25:237:166-74.

J. Appl. Environ. Biol. Sci., 8(2)160-169, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Sources of Acquisition of Moral Values: An Analysis of Personal Experiences of University Teachers

Rafiq, M.[1]; Dr. Syed Asad Abbas Rizvi[2]

[1]Ph.D Education Scholar Faculty of Social Sciences, Department of Education, International Islamic University, Islamabad
[2]Assistant Professor in Education, Faculty of Social Sciences, Department of Education, International Islamic University (IIUI), Islamabad

Received: November 8, 2017
Accepted: January 3, 2018

ABSTRACT

This study was designed to investigate that how moral values were acquired by the university teachers in their life. What were the sources and factors that have catalyzed instilling of personal moral values in their life? This study involved the qualitative grounding of a list of sources that have inspired the participants to caught certain values in their life, finding similarities in personal experiences and induction of generalizations were the objectives of the study. The design of the study was qualitative phenomenology. The population was the teachers of university level in Islamabad and Rawalpindi. Theoretical sample was snow balled. Semi-structured interview was the instrument of the study. Qualitative data was analyzed by content analysis technique using epistemological qualitative exploratory method. The results have shown a broad range of factors that have acted as source of acquiring moral values. There were found some common sources that have affected moral orientation of many participants. The study was completed under the umbrella of Islamic world view of moral development as a theoretical lens of the study.

KEYWORDS: Teachers of University Instilling of Moral Values, Qualitative Grounding, Phenomenology, Epistemological Method, Factors Affecting Moral Orientation, Islamic World View, Moral Development.

INTRODUCTION

In principle Muslim society is moral leader in the world (Gallani, 1995). [1] Its morality should set moral standards as a role model for other individuals and nations. The Muslims are raised for the people in the world with duty to order the people to do virtues and forbid the people to abstain from committing sin. It is the responsibility of Muslims to practice Islamic moral law in such a way so that their life becomes un-refutable witness of truthfulness of Islam. (Maududi, 2007). [2] Quran says about this duty of Muslims: "You are now the best people brought forth for (the guidance and reform of) mankind. You enjoin what is right and forbid what is wrong and believe in Allah" (Quran, 3:110). [3]

This role of Muslims as a moral leader is mentioned in Quran in these words: "Thus, have We made you a Community of the "Golden Mean" so that you may be witnesses regarding mankind and the Messenger (ﷺ) may be a witness regarding you" (Quran, 2:143). [3] "Believers Be upright bearers of witness for Allah" (Quran, 5:8). [3] "And who is more unjust than the one who hides the testimony which Allah has entrusted to him?" (Quran, 2:140). [3] But unfortunately, the present society of Muslims specially in Pakistan, is producing such individual moralities which are not better than that of non-believers. They can tell a lie, use dishonesty, exercise cruelty, deceive others, back off from their commitments, earn by theft and dacoity and indulge in all forms of immodesties and the average estimate of immoralities in Muslims is not less than that of any non-Muslim nations (Maududi, 2013). [4] Laurence Brown (1944, as cited in Maududi, 2006) twits the Muslims and Muslim states on their morality against the Islamic laws and says that the Muslims have modified the Islamic laws and have adopted legal standards of the west even in Muslim personal laws. He says that the Muslim's concept that the source of law is the Allah, is disproved by the actions of Muslims, and it was just a pious fiction.

Nancy, Efinger and lacey (2003) [5] describes that the American society is facing severe moral problems of materialism, individualism and lack of civility. Thomas (2012) [6] claims abortion, pornography, terrorism, violation of human rights and poverty are the global moral issues. Tappan (1998) [7] concludes that the world today is full of moral degeneration crisis, chaos and confusions. There are many studies which address the issue of moral development which can be classified as: The studies which discuss the factors of moral development using secular

Corresponding Author: Muhammad Rafiq, Ph.D. Scholar, Education Department of Education, Faculty of Social Sciences International Islamic University, Islamabad, Pakistan. Email: aua705@gmail.com

theoretical frame work e.g. Nancy, Efinger, and Lacey, 2003[5]; Greenleaf, 1977 [8]; Burn, 1978 [9]; Dalton and Petrie, 1997 [10]; King, 1997[11]; Roepke, 1995 [12]. These studies claim that the moral development of a person is positively influenced by moral leadership, peer culture, parents, spirituality and teachers. These studies are free from the effects of religious faith and the concept of hereafter.

A second set of studies examine the effect of religion on morality, Iqbal's philosophy of moral values and comparison of modern Islamic theory of education and Western theory of moral education (e.g. Afifa, 2003 [13]; Javed, 2007 [14]; Khurram, 2007) [15].

There are very little studies which aim at exploring personal experiences of educationists about transformative and influential factors for moral development. This gap leads the researcher to conduct this study to explore influential factors for moral development of a person. There is a lack of knowledge about the determinants of moral developments of a person. This study contributes to the knowledge base by investigating the determinants of moral development of a person. This study is important for the teachers to plan how to make strategy for the moral development of the students. The study provides knowledge base for the policy makers and educationists.

The Statement of the Purpose

The purpose of this phenomenology study was to explore the sources of acquisition of moral values in the life of teachers at university level in Islamabad and Rawalpindi. The exploration of the sources of acquisition of moral values was defined, for this study, as an investigation of the personal experiences of the teachers to find answer to question what were factors or thing that facilitate them to learn their moral values.

Objectives of the Study

1. To analyze the personal experiences of the university teachers about how they have acquired their moral values in their life.
2. To enlist the sources of acquisition of moral values of university teachers.

REVIEW OF THE RELATED LITERATURE

Theoretical Framework for Moral Development

The theoretical framework works as a guiding lens (Creswell, 2009) [16] for a research study. It guides researcher to make decisions about selection of participants, question asked from the participants, data collection and analysis procedures (Creswell, 2009) [16]. Human behaviors are complex, multi facet and multidimensional (Woolfolk, 2005 [17]; David, 2001) [18]. Among the human behaviors the study of morality is even more difficult because it varies individual to individual society to society and nation to nation.

The morality is a set of principles laid by religion revealed by Allah through His Apostles called it the straightway of morality (الصِرَاطَ الْمُسْتَقِيْمَ۝٠٠٦) (Gallani, 1995) [1]. This study is meant to explore causes of moral transformation of teachers of Universities. As a Muslim, the morality of the teachers must be viewed through theoretical Lens of Quran and Sunnah. Thus, this study will use Islamic philosophy of moral development revealed by Quran and Sunnah as the theoretical Lens of the study. The actual Islamic theory of moral development in the Quran and Sunnah can be narrated as:

1. Moral development of individuals is the highest and first and foremost aim of Islam. Quran was revealed on Apostle of Allah Muhammad (ﷺ) to show right way of passing life Quran says: اِهْدِنَا الصِرَاطَ الْمُسْتَقِيْمَ Direct us on to the Straight Way (Quran, 1:6) [3] and Quran says about its motto هُدًى لِّلْمُتَّقِيْنَ۝٠٠٢ It is guidance to God-fearing people (Quran, 2:2) [3]. Holy Prophet Muhammad (ﷺ) claimed that the purpose of His prophet hood is to make perfect the morality of human (Malik, 2001) [19]. The last Apostle of Allah said that the best among believers is one who is the best in moral development (Bukhari,) [20] The importance of good manners in Islam can be understood from following Hadiths of holy Prophet Muhammad (ﷺ) Narrated Abud Darda: The Prophet ﷺ said: There is nothing heavier than good character put in the scale of a believer on the Day of Resurrection (Abu Dawood, 42:4781).[21]

   Narrated Aisha, Ummul Mumineen: The Messenger of Allah ﷺ said: By his good character a believer will attain the degree of one who prays during the night and fasts during the day. (Abu Dawood, 42:4780).[22]Narrated Abu Umamah: The Prophet (ﷺ) said: I guaranteed a house in the surroundings of Paradise for a man who avoids quarrelling even if he was were in the right, a house in the middle of Paradise for a man who avoids lying even if he was were joking, and a house in the upper part of Paradise for a man who made his character good (Abu Dawood, 42:4782) [22].
2. Man has built-in ability or schema to distinguish between moral good and moral evil. Quran say about this schema: فَاَلْهَمَهَا فُجُوْرَهَا وَ تَقْوٰىهَا۝٠٠٨ and imbued it with (the consciousness of) its evil and its piety (Quran, 91:8).[3] وَ

هَدَيْنٰهُالنَّجْدَيْنِۚ٠٠١٠and did We not show him the two highroads (of good and evil)? (Quran, 90:10). [3] Surely, we showed him the Right Path, regardless of whether he chooses to be thankful or unthankful (to his Lord) (Quran, 76:3).[3]٠٠٣ اِنَّا هَدَيْنٰهُ السَّبِيْلَ اِمَّا شَاكِرًا وَّ اِمَّا كَفُوْرًا

According to Maududi (2013) [4], Qutab (1997) [23] and Ibne Kaseer (2006) [24] these verses of Quran preach following moral principles:

- Allah has placed conscience in man which act as a moral discriminator. It is highly sensitive in judging what is morally good and what is morally evil. It warns a person every time he is about to commit an evil. The conscience of man can be soothed to be silent and insensitive by continued suppression. In this condition, it becomes pro-evil i.e. it shows peaceful co-existence with evil deeds however it cannot be destroyed completely by any mean. It can become virulent for evil deeds by induction at any time in the life. This induction occurs by struggle of Allah's Messengers (ﷺ), teachings of righteous people and external factors.
- Presence of conscience in man is an irrefutable evidence of existence of hereafter's accountability.
- Human being is under a test whether he adopts thankful way of life or unthankful way of life to his Lord by his free will. He will neither be forced to do a virtue nor be forced to commit an evil and vice versa because لَآ اِكْرَاهَ فِي الدِّيْنِۙ١ قَدْ تَّبَيَّنَ الرُّشْدُ مِنَ الْغَيِّۚ١ "There is no compulsion and coercion regarding religion. The right thing has been made distinct from the wrong thing" (Quran, 2:256).[3] All efforts of Prophets were aimed at highlighting the difference between moral good and moral evil and let the individuals to apt moral good by his free will using his built-in discriminating sense. Human has been provided with faculties of sight, hearing and thinking as the means of acquiring knowledge.

3. According Islamic theory of moral development the morality develops gradually moral. The evidence in favor of this gradual change of morality is present in Holy Quran and the Sunnah of Allah's Apostle (ﷺ). According to Khizzri (1978) [25] Allah applied full of wisdom policy to reform the bad habits of Arabs like alcoholism step by step. First command was to highlight the harms of alcoholism for human health for example see this verse of Quran: يَسْـَٔلُوْنَكَ عَنِ الْخَمْرِ وَ الْمَيْسِرِؕ١ قُلْ فِيْهِمَآ اِثْمٌ كَبِيْرٌ وَّ مَنَافِعُ لِلنَّاسِ١ وَ اِثْمُهُمَآ اَكْبَرُ مِنْ نَّفْعِهِمَاؕ١ وَ يَسْـَٔلُوْنَكَ مَاذَا يُنْفِقُوْنَ١ قُلِ الْعَفْوَؕ١ كَذٰلِكَ يُبَيِّنُ اللّٰهُ لَكُمُ الْاٰيٰتِ لَعَلَّكُمْ تَتَفَكَّرُوْنَ٠٠٢١٩They ask you about drinking and gambling. Say, "There is great harm in both, though there is some benefit also for the people. But the harm of the sin thereof is far greater than their benefit. "(Quran, 2:219) [3]When the people has realized that the drinking of alcohol is injurious for health they were advised to stop saying prayer when they were drunk in these words of Quran: يٰۤاَيُّهَا الَّذِيْنَ اٰمَنُوْا لَا تَقْرَبُوا الصَّلٰوةَ وَ اَنْتُمْ سُكٰرٰى حَتّٰى تَعْلَمُوْا مَا تَقُوْلُوْنَ

"Believers: Do not draw near to the Prayer while you are intoxicated until you know what you are saying" (Quran, 4:43) [3].When the people were mentally prepared to accept the forbiddingness of alcohol Quran say: يٰۤاَيُّهَا الَّذِيْنَ اٰمَنُوْۤا اِنَّمَا الْخَمْرُ وَ الْمَيْسِرُ وَ الْاَنْصَابُ وَ الْاَزْلَامُ رِجْسٌ مِّنْ عَمَلِ الشَّيْطٰنِ فَاجْتَنِبُوْهُ لَعَلَّكُمْ تُفْلِحُوْنَ

"Believers: Intoxicants, games of chance, idolatrous sacrifices at altars, and divining arrows are all abominations, the handiwork of Satan. So, turn wholly away from it that you may attain to true success" (Quran, 5:90) [3].

This concept of gradual moral development can also be seen in the traditions of Holy Prophet Muhammad (ﷺ) when He sent Mu'adh bin Jabal to Yemen as an official and advised him in these words:

"Narrated Ibn `Abbas: Allah's Apostle (ﷺ)said to Mu`adh bin Jabal when he sent him to Yemen. You will come to the people of Scripture, and when you reach them, invite them to testify that none has the right to be worshipped except Allah and that Muhammad (ﷺ) is His Apostle. And if they obey you in that, then tell them that Allah has enjoined on them five prayers to be performed every day and night. And if they obey you in that, then tell them that Allah has enjoined on them Sadaqa (i.e. Zak`at) to be taken from the rich amongst them and given to the poor amongst them. And if they obey you in that, then be cautious! Don't take their best properties (as Zak'at) and be afraid of the curse of an oppressed person as there is no screen between his invocation and Allah" (Bukhari, 5.59:634).[21]

4. Quran and Sunnah guide us to word the learning principle of rehearsal to incorporate the concepts into long term memory. The concepts leant by a person are planted first into the short-term memory which is the volatile section of the memory. This learning can be moved to long term memory by rehearsal.

METHODOLOGY OF THE STUDY

This was a qualitative phenomenology type of study. It has applied content analysis to data obtained through semi-structured interviews of the teachers to answer the epistemological research question by qualitative exploration. The coding applied was thematic. The papulation was 3924 teachers of the universities in Islamabad and Rawalpindi. The size of theoretical sample was 15 university teachers and the sampling technique applied was snow balling. Data analysis procedure included the transcription of interview data into key points, initial coding, grouping codes

into categories with frequency counts and finally generations of themes. Table 1 shows a list of categories and codes.

Table 1 Coding Categories for Sources of Moral Values Acquisition

Educational	Religious	Family	Social	Political And Organizational	Media
Teachers	Religious Leaders	Parents	Workplace	Employer Organization	Social Media
Educational Institution	Quran And Sunnah	Mother	Society	Boss	TV
Language	Muslim Heroes	Father	Neighbors	Management	Cartoons
Curriculum	Islamic Literature	Kinship	Colleagues	State	Films
Co-Curricular Activities	Mosque	Home Environment	Events	Political Leaders	Print Media
	Islamic History		Trails	Political System	Fiction
	Incentives-Rewards		Reference Groups		
	Philosophy				

DATA ANALYSIS

The researcher has already transcribed data concerning moral development strategies for university teachers in the light of Islamic Philosophy of moral development in the Quran and Sunnah. The data was collected through limited number of semi-structured interviews and focus group interviews with the teachers -the participants of the study. These interviews have already been summarized into key points. All interviews have been written up onto a separate computer file. Now they are all being put together into a single data set for analysis. What is presented here is already interpreted, rather than verbatim, data according to the themes of the statements. Data with initial coding is presented in succeeding passages and the codes are written in capital letters in Square brackets

Face book consume a lot of time so human interaction decrease and computer interaction increase. [MEDIA]. Mother, father, Din, Friends Company and reading of Islam literature. [FAMILY]. A selected population has tendency to learn Quran and Sunnah to get understanding of Din[RELIGIOUS]. Education system is producing mere Dr. Engineers, professions no Islamic Dr. Islamic engineer e.g. In Russia, a person is awarded degree of my skill unless he became a socialist [EDUCATIONAL]. Basic training responsibility rest with parents. Mostly parents are doing well with their children. Parent and school should collaborate with educational institutions to develop the morality of students[FAMILY]. Environment is also responsible [SOCIAL]. People missed role model to follows it means reference groups [SOCIAL]. Company of good friends, friendly Home environment and religious atmosphere, Parents, [FAMILY/SOCIAL]. Events, Trail (Azmaish), [SOCIAL]. Understanding of Islam (Din ka Fahim, Pilgrimage (Haj) RELIGIOUS. Teacher does justice show parallel speech and action[EDUCATIONAL]. Home atmosphere is mostly reflected in behaviors of students[FAMILY]. Quid-e-Azam said I have forged coins in my pocket. Later, these forged coins become rules of Pakistan[POLITICAL]. Teachers facing financial problems [EDUCATIONAL]. Role models of parents, leaders, teachers motivate to morality [FAMILY/EDUCATIONAL].

Morality of boss guides the subordinates [POLITICAL]. Hands influence is some direct e.g. for family members, relations, neighbors, friends, colleagues[FAMILY]. Reading of Islamic literature has great effect in moral development cartoons have degenerative function to morality [RELIGIOUS]. Islamic books generative function to morality of mothers [RELIGIOUS]. Lorain and tales of prophets affects +why [FAMILY]. Mother + Father main force of moral development [FAMILY]. Father has developed my morality FAMILY. Novels – Promote reading habits [MEDIA]. Pakistan history [RELIGIOUS]. Grandmother help and teach values [FAMILY]. Organization POLITICAL AND ORGANIZATIONAL]. Influential persons, [SOCIETY]. teachers and head of the departments, chairman, deans, VCS should demonstrate as role model for students (wrong role of model)[EDUCATIONAL]. Islamic history, Quran, Hadith, Psychology It was mind changing they provide ethical environment [RELIGIOUS].

Teacher should sacrifice and do effort to set good examples for students [EDUCATION]. Parents should also co-operate with institution [FAMILY]. Peer pressure can also help keep students on right way [SOCIAL]. Teachers should realize the responsibility as moral developer[EDUCATIONAL]. Environment of religious provided by parents [SOCIAL]. Books reading such as Poems of Iqbal and Zafar Ali Khan, “Muhammad “by Martin Lings “Quran and Science” by Morris Baccei [RELIGIOUS]. Teachers are source inspiration for my personal moral development [EDUCATIONAL]. First and foremost, responsibility rest with parents Father is responsible for moral development of child Mother is key factor in moral development [FAMILY]. Family system is essential for moral

development [FAMILY]. Parents, Educational system govt. of political system. [FAMILY]. Education institution Teacher + student, curriculum, EDUCATIONAL. Governing bodies, classroom, administrator [ORGANIZATIONAL]. Fortunately, I was raised in family, parents from day one inculcated ethical change or it was because of my mother and father. This personal influence that I could understand (Al-Hamdulillah) what is right and what is wrong. I was fortunate that I get such moral environment. It was further strengthening by my involvement in educational arena. As lecture and my college light minded, due to all these a keep on this approach. [FAMILY]. Religious leadership is responsible they are also participant of the moral declining factors[RELIGIOUS]. Parents are illiterate so they are unable to train their child morally[FAMILY]. Only environment of educational institution is not efficient in moral development because in society parent's illiterate [EDUCATIONAL]. Parents have major a role [FAMILY].

Masjid has a role [RELIGIOUS]. School has a role (education system) [EDUCATIONAL]. State has a responsibility the role of state is twofold [PLOLITICAL]. First state will promote moral values by its policies and programs and utilization of media to encourage moral developments [POLITICAL]. State should set moral aims and plan and provide budget to achieve the set goals aims. [POLITICAL]. Moral behaviors are better learned by demonstration of moral character of elders, parents, teachers etc. [FAMILY]. The overall atmosphere of working of person affect the moral development process because when atmosphere is encouraging immoral practices then one cannot rectify immoralities such as deceit and lying [ORGANIZATION]. The way of life of Influential persons like teachers, administrators, executives motivate student for moral development[ORGANIZATION].

Western society supports moral development because people there never ignore and never compromise with immoral actions. They condemned immoral actions on the spot. This type of moral training is due to morality supporting atmosphere of the society [SOCIETY]. If head of the department or institution become correct and start never compromising with immoral practices like Quad-Azam, it will correct the whole institution. Similarly, whole country can be derived to righteousness if ruling class become moral figures like Quad- Azam [ORGANIZATION]. Parents have a major role to play for moral development of their children. [FAMILY]. TV, cell phone and Social media are very influential in this era [MEDIA]. Media has a substantial role in moral development and moral degeneration TV and Social media [MEDIA]. Learning of Arabic language is essential for moral development because it helps understand Quran, the ultimate source of morals [EDUCATIONAL]. Religious leaders misguide the people by advising them to recite and memorize the Quran for reward in hereafter. They discourage understanding and comprehension of Quran for personal interests [RELIGIOUS].

Understanding and comprehension of whole Quran is key factor for moral development [RELIGIOUS]. Teacher should deliver such moral training lectures to mold the hearts [EDUCATIONAL]. Government is more responsible than any other factor for moral decline. Because it duty of Govt. to train citizens and implement moral policies in the country [POLITICAL]. Teachers should depict their behavior as a preacher's behavior [EDUCATIONAL]. A teacher should be role model of morality [EDUCATIONAL]. Co- curricular activities promote social values [EDUCATIONAL]. Personal moral behavior of the teacher impresses many students and they show moral conversions [EDUCATIONAL]. Family is responsible for moral development but there are many problems due to which family's contribution to moral development is weak and insufficient [FAMILY]. Education system is not doing its function of moral development [EDUCATIONAL]. Religious literature helps moral orientation. [RELIGIOUS]. Peers affect morality. SOCIAL. Educational institution plays major role in moral development[EDUCATIONAL]. Teachers are the key factor for moral development [EDUCATIONAL]. Organizations in which the individual works have their own moral system and the workers are vulnerable to adaptation [ORGANIZATION].

Personal characters decorated with moral values influence others to change their moral thoughts. RELIGIOUS. According to educational point of view the environment is a major factor for moral development of moral decline [EDUCATIONAL]. Curriculum and the teachers are also related with moral development[EDUCATIONAL]. Moral development is phenomenon which is accomplished by combine effort of education system, teachers, assessment system, electronic media and print media [EDUCATIONAL]. Teacher is very important component of education system because he must implement the curriculum. If the teacher is not skilled for and motivated to develop the morality of students the curriculum will fail to achieve the goals [EDUCATIONAL]. Teacher should be a role model of Islamic morality [EDUCATION]. Preaching moral values to others refine personal morality[EDUCATIONAL]. Parents have vast effect on moral orientation [FAMILY].

Reading of Islamic literature affects moral development positively [RELIGIOUS]. There are teachers also part of Universities. I thank the teachers have responsibility to ensure that not only providing some information but at the same time provide a role model of honesty fairness, punctuality, not getting benefits of students not favoring others, if teachers are providing this role model then students are bound to absorb those qualities and to improve their morality [ORGANIZATIONAL]. But teachers are trucking themselves mercenaries of Education, if they are

there just for a job. They are in university for attendance and they are teaching somewhere else [EDUCATIONAL]. Then we cannot expect student behave with responsibility and show have good morality standard so besides institutions. I thank teachers are responsible moral crises in Pakistan is facing essentially a moral crisis, that originate from education [EDUCATIONAL].

Data presented have been coded coarsely using six main categories. More specific coding was possible but it was deliberately avoided and the researcher have gone through for meanings rather to go for words.

Sortation of Data into Main Categories

The concepts coded in the initial coding process fall into following areas:

- Educational
- Religious
- Family
- Political and Organizational
- Media
- Social

Listing and Frequency Counting of Sub-Categories

Relevant Themes and meaningful units within each category were grouped together and a tally (/) was placed against the number of times that the issue was mentioned by the participants. The data were presented in tabular form to facilitate referencing it in the results and discussion sections of the article.

Table 2 Category Family

Name of the variable	Frequency
Parents /////, /////	10
Mother ///	3
Father////	4
Kinship /	1
Grandmother/	1

Table 3 Educational Factors

Name of the variable	Frequency
Teachers /////, /////, /////, /	16
Educational System /////	5
Educational Institution ///	3

Table 4 Category Religious Factors

Name of the variable	Frequency
Reading of Text of Quran And Sunnah ////	4
Comprehension of Quran /	1
Reading of Islamic Literature /////, /	6
Religious Leaders ///	3
Muslim heroes ///	3
Reading Poems of National hero Allam Muhammad Iqbal /	1
Reading Islamic History/Reading Pakistan History ///	3
Mosque and it activities /	1
Performance of Islamic rituals /	1
Rewards and incentives /	1
Nature of personality /	1

Table 5 Category Social Factors

Name of the variable	Frequency
Home environment //	2
Refence groups /	1
Peers and company of friends //	2
Specific events of trails and difficulties /	1
Role of influential persons /	1
Reaction of society not to compromise with wrongs social pressure////	4

Table 6 Category Media

Name of the variable	Frequency
Social media ////	4
TV and cell phone /////	5
Fiction (reading of novels) /	1

Table 7 Political and Organizational Factors

Name of the variable	Frequency
Organization /////, //	7
Morality of Boss/Management /////	5
State policies ///	3
Workplace environment //	2
Ideals //	2

RESULTS

Table 2 showed that most of the time source of moral values acquisition is related to the parents and it is the most frequent source of moral values in this family related variables. Its frequency was 10. Second most frequent factor was personality of the father who promote instilling of moral values and its frequency was 4. Third factor was mother who act as an agent of moral orientation in the participants and its frequency was 3. Grandmother and kinship relatives were also found to affect moral values acquisition of the participants but this issue was raised only once each.

Table 3 showed the role of teachers, educational institutions and educational system in moral development of the subjects. Teachers were the most frequently mentioned factor which become cause of moral value acquisition of individuals. Its frequency was 16. Five participants have claimed that their moral orientation was affected by the characteristics of the education system. The Characteristics of educational institution might affect moral orientation of a person. This issue was raised by three times in the data.

Table 4 showed the results of about religious factors that have influenced the subjects to acquire specific moral values in them. Reading of Quran text, comprehension of Quran text and reading of Islamic Literature promote instillation of moral values and the frequency of these issues being highlighted was 4, 1 and 6 respectively. The results also showed that autobiography of Muslim Heroes and interaction with present religious leaders was effective in acquisition of moral values and it was mentioned thrice in the data. Specifically, poems of Allama Muhammad Iqbal were stated as source of learning moral values once in the data. Reading events of Islamic history and Pakistan history also affect moral values of the persons. It was raised 3 times in data. Mosques, as a social institution, and performance of ritual activities were mentioned as source of moral values with frequency equal to 1. Incentives and rewards given by teachers, family members, educational institutions, governments and finally promised rewards of hereafter announced by Almighty Allah in Quran and Sunnah were mentioned as sources moral values acquisition. There is an unusual variable the nature of the personality of an individual that was raised in the data as an influencing factors for moral orientations.

Table 5 showed that there were many factors in society that were mentioned as source of moral values. It included home environment if it was supporting for moral development, facilitated moral value inculcation. It was raised twice in the data. Reference group, specific events of trail in the life of individuals and influential persons in the

society were also stated as the source of their moral values but these were raised only once in the data. Most frequently raised factor was the social pressure among the social factors with frequency 4.

Table 6 showed the attitude of participants towards the influences of media reconstruction of moral reasoning. It was claimed four times in the data that the sources moral value acquisition was the social media interactions with friends and groups. Television and cell phone were mentioned as influencing factor for moral reforms of the participants. Its frequency was 5. Reading of fiction (novels) was also a cause of moral reform and it was raised one time in the data.

Table 7 showed the frequency of the issues raised by participants which grouped into political and organizational category for analysis. It showed that the nature and environment of the employer organization (firm) has influenced the induction of moral values in the life of the participants and it was mentioned 7 times in the data. The characteristic features of the morality of the immediate boss was reforming principle for the morality of the subordinate. The frequency of this issue was 5. Policies of the states was mentioned as sources of moral values three times in the data. The environment of workplace and ideals were mentioned as source of shunting moral values into the existing moral values.

DISCUSSION

The purpose of the study was to analyze the personal experiences of the University teachers about how have they acquired their moral value systems and to investigate what were the sources and factors that promote their moral development. The findings of the study showed that there were six broad categories of the factors that have affected morals of the teachers. First factor was the family of a person and within family father, mother, brothers, sisters and grandmother were the sources moral values for the participants. These findings are in line with those of Jabaruddin, 2016[26]; Nancy, 2003. [5] These findings of this study are also in line with teachings of Quran and Sunnah where responsibility of moral development of young ones, is fixed on family members. For instance, see this verse of Quran "Believers, guard yourselves and your kindred against a Fire whose fuel is human beings and stones, a Fire held in the charge of fierce and stern angels who never disobey what He has commanded them, and always do what they are bidden" (Quran, 66:6) [3] and Sahih (verified) Hadith of the Messenger of Allah (ﷺ) found in Sahihain:

> Every one of you is a shepherd and is responsible for his flock. The leader of people is a guardian and is responsible for his subjects. A man is the guardian of his family and he is responsible for them. A woman is the guardian of her husband's home and his children and she is responsible for them. The servant of a man is a guardian of the property of his master and he is responsible for it. No doubt, every one of you is a shepherd and is responsible for his flock. (Bukhari, 6719[20]; Muslim, 1829). [21]

In study of Nancy role of brother and sister is not discussed but our study shows their role in moral modifications. This could be explained by the difference of the context of studies. Findings of our study are in Pakistani context and the nature of family system suggest that kinship can affect moral modifications.

Second was the educational factor having components teachers, education system and nature of the educational institute. This finding is in line with the findings of Rianawati (2015) [27] and Dasari (2016) [28] where they have established the role of teachers in value education of the students. These finding are also in line with the Islamic concept of education where the Holy Prophet Muhammad (ﷺ) introduce himself as a teacher with the ultimate objective of His Prophet Hood duty of perfection of good manners (Malik, 2001) [19]

Third finding showed the factors related to religion. This factor was composed of eleven related issues that have ever influenced the participant to acquire certain moral value from that sources. These findings are in line with those of Kacaric (2015) [29]in general concept of religion. These findings are also in line with those of Afifa (2003) [14] and Javed (2007) [15]. This can be explained that all divine religions urge to promote some universal values that are named in Quran as Al- Maroof. In Fourth finding, social factors such as home environment of a person, social pressure, peers, influential persons and Kocabiyik (2014) [30] but the role events of trail are not discussed in this study. However, we believe that learning of moral values from trial and sufferings is quite an Islamic principle as we argue from 7 minor punishments on Bani Israel during the era of Moses was a warning to alert them. Fifth and sixth finding emerged with media, political and employer organization as source of moral values for individuals. This result was supported by Nkechi (2016) [31]

CONCLUSIONS

The results of the study have directed the researcher to conclude that moral values acquisition is complex phenomenon composed of diverse array of moral values. Some of these values comes from family sources and the parents are the major source of values for their children. The source of some values is rooted in the educational set ups. The origin of some other values lies in interactions of a person with his or her society of living and working.

Some basic values and motives to acquire them comes from religion. This category is the most diverse one in this study. Despite of the difference in the frequency count of the sub-categories of this variable all sub-categories are important to act as source of moral values. This study has also concluded the positive role of media in imparting moral education to the community. It is also concluded that organization in which a person works may act as source of moral values for its employees. Some people get inspirations from their political leaders to be moral.

Recommendations and Limitations

Based on conclusions stated above it is recommended that the educational institutions should plan to inculcate moral values into the young generations. This study has concluded the role of religious thoughts, religious leaders, Muslim heroes and religious institutions so it is also recommended that these factors should be the part of the moral development strategies of the educational institutions. It is also recommended to generate live interaction between educational settings and the communities. As this is a qualitative study so personal biases of the researcher may have influenced the results, findings and conclusions. Thus, it is also recommended that this issue of the sources of acquisition of moral values should be further researcher by quantitative methods by taking larger samples in a different context.

REFERENCES

1. Gallani, S. A (2008). Rooh e Din Ka Shanasa Iqbal Maktaba Tameer-e-Millat
2. Maududi, Abu ul Ala, Syed (2007). Hadayat Islamic Publications. Lahore.
3. Quran (n.d). Complete English Translation of Noble Quran 38:72. Dar- us- Salam Publications, Lahore Retrieved from http://www.dar-us-salam.com/TheNobleQuran/ on 15-05-2013
4. Maududi, Syed (2013). The Meaning of the Quran 9th ed. Islamic Publications (PVT) LTD Lahore Vol-1
5. Nancy, M.; Efinger, J.; Lacey, C.H (2003). Personal Moral Development: Perceptions of 14 Moral Leaders. ED 476 828 retrieved from https://eric.ed.gov/?q=personal+moral+development&ft=on&id=ED476828 on 13-11-2017
6. Thomas Gumbleton2012 Love, not power or violence, is the way to the Reign of God NCR https://www.ncronline.org/blogs/peace-pulpit/love-not-power-or-violence-way-reign-god
7. Tappan, M.B. (1998). Moral education in the zone of proximal development. Journal of Moral Education, 27(2), 141-160. Retrieved October 11, 2001, from the ProQuest database.
8. Greenleaf, R. K. (1977). Servant leadership: A journey into legitimate power and greatness. New York: Paulist Press.
9. Burns, J. M. (1978). Leadership. New York: Harper & Row
10. Dalton, J. C. & Petrie, A. M. (1997). The power of peer culture. Educational Record, 78 (3-4), 19-24.
11. King, P. M. (1997). Character and civic education: What does it take? Educational Record, 78(3-4), 87-93.
12. Roepke, W. J. (1995). Morality as a yardstick of educational leadership. Journalism and Mass Communication Educator, 50(2), 71-76.
13. Afifa, Khanam (2003). Effect of Religious Education on the Moral Development of Children. Unpublished thesis Lahore: The University of the Punjab.
14. Javid, Iqbal, Nadeem (2007). Iqbal's Concept of Morality (A Philosophical Appraisal). Unpublished thesis Lahore: The University of the Punjab. Retrieved from www.hec.gov.com
15. Hussain, Khuram (2009). An Islamic consideration of western Moral Education: An exploration of Individual. Journal of Moral Education, V (36), p297-0308. http://dictionary.kids.net.au/word/morality) 0n 17-01-2013.
16. Creswell, J. W. (2009). Research Design Qualitative, Quantitative and Mixed Methods Approaches.
17. Woolfolk, A. (2005). Educational Psychology9th (Ed). Singapore: Pearson Education.
18. David G. Myers (2001). Psychology Worth Publishers ISBN 1572597917
19. Imam, Malik Ibne Ans (2001). Mowatta Imam Malik Darussalam Publications Lahore
20. Bukhari Muhammad Ibn Ismail (2006) Sahih Al-Bukhari Darussalam Publications Lahore
21. Muslim, Imam Ibn Hjjaj Neshapuri Sahih Muslim Darussalam Publications Lahore
22. Dawood, Sulaiman Bin Ash'ath. Sunnan Abu Dawood Darussalam Publications Lahore

23. Qutab, Syed Shaheed (2012). In the Shade of the Quran
24. IbneKaseer, Emadudin (2006). TafseerIbneKaseer Urdu Translation by Maulana Muhammad JunaGhari. MaktabaAL-Qauddusia Lahore retrieved from ttp://www.quranurdu.com/Tafseer%20Ibn-e-Kaseer/ on 30-05-2014
25. Khizzri, Bick (1978). Tareekh FiqhIslami Urdu. DarulIshaat Karachi
26. Jabaruddin, Alimuddin & Darman Manda (2016). Educational Values in Different Social-Economic Status—A Study Case of Six Families in Maros Regency International Education Studies; Vol. 9, No. 6; 2016 ISSN 1913-9020 E-ISSN 1913-9039 retrieved from https://eric.ed.gov. on 10-11.2017
27. Rianawati (2017) The Implementation of Education Character on Moral in Islamic Junior High State School 1 Pontianak in the Academic Year 2015/2016 Journal of Education and Practice ISSN 2222-1735 (Paper) ISSN 2222-288X (Online) Vol.8, No.9, 2017 retrieved from www.iiste.org on 12-11-2017
28. Dasari, R.P (2016) Value Orientation among Tribal Future Teachers of B.Ed. Program: Need for Curricular Interventions Universal Journal of Educational Research 4(6): 1432-1436, 2016 DOI: 10.13189/ujer.2016.040621 retrieved from http://www.hrpub.org on 12-11-2017
29. Kacaric, N. (2015). Effect of Serbian Orthodox Religious Teaching on the Morality of Youth - Eschatological Aspect DOI: 10.17810/2015.15
30. Kocabiyik, O. Onat; A. Kulaksizoğlu (2014). A Qualitative Survey Examining the Moral Identities of Young Adults. Educational Sciences: Theory & Practice • 14(3) • 851-858 ©2014 Educational Consultancy and Research Center DOI: 10.12738/estp.2014.3.1961retrieved from www.edam.com.tr/estp on 13-11-2017
31. Dr. (Mrs.) Nkechi C. Njoku (2016) Impact of Nigerian Home Video/Movie Industry on the Moral Behaviours of Secondary School Students in Ebonyi State of Nigeria. Journal of Education and Practice ISSN 2222-1735 (Paper) ISSN 2222-288X (Online) Vol.7, No.26, 2016 retrieved from www.iiste.org on 13-11-2017

J. Appl. Environ. Biol. Sci., 8(2)178-183, 2018

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

National Internal Security Policy: An Analysis of Prospects and Challenges for Pakistan

Irfan Ullah[1*], Ashfaq U. Rehman[2], Sajjad Ali[3], Azra Yasmin[4]

[1]PhD Candidate at the Department of Political Science, University of Peshawar, Pakistan.
[2]Assistant Professor at the Department of Political Science, Women University Swabi, Pakistan.
[3]PhD Candidate at the Department of Political Science, Qurtuba University of Science and Information Technology Peshawar, Pakistan.
[4]Principal Girls Degree College Sarai Salih. Haripur

Received: August 13, 2017
Accepted: November 1, 2017

ABSTRACT

This paper specifically focuses on the text and objectives of the National Internal Security Policy (NISP) 2014 to 2018. It has been the first ever policy document formulated under the civilian setup which investigated the detailed causes of terrorism and extremism thus proposing comprehensive policy recommendations for tackling these threats. As a soft component of NISP, the policy makers also envisaged a Comprehensive Response Plan (CRP)to gain the trust and confidence of the general populace in combating extremism and terrorism. National Counter Terrorism Authority (NACTA) has been given the lead role in materializing the proposals of NISP on the ground. In this study, a critical analysis of NISP and the role of NACTA has been made to find out how effective this policy had proved so far in terms of mitigating the spate of militancy, extremism, terrorism and turning around the volatile security atmosphere in Pakistan. Various aspects of NISP have been analysed and effort have been made to find out any drawbacks either in the text itself or the way and scale it has been implemented so far.

KEYWORDS: Terrorism, Extremism, Militancy, Security, NISP, CRP and NACTA

INTRODUCTION

Pakistan had announced its first ever National Internal Security Policy (NISP) on 26th February 2014 with a clear objective of containing the menace of terrorism and militancy that has wrought havoc with the nation. It was the first ever policy document formulated under the civilian setup which investigated the detailed causes of terrorism and proposed comprehensive recommendations to tackle the threats. The text of NISP, which is spread over 94 pages had thoroughly discussed the various dynamics of terrorism and chalked out an all-encompassing scheme or roadmap to banish the menace from the country.

Broadly speaking, the NISP adopted a two-pronged strategy to take on the issue of extremism. The first strategy is the reflection of the realization that militancy could not be eradicated only by the employment of military means. Hence, the policy makers envisaged a Comprehensive Response Plan (CRP) which was nothing but the soft component of NISP. The main objective of this component was to gain the trust and confidence of the general populace in combating extremism and terrorism. It was to make it clear that government did not believe only in smashing the heads of terrorists but was also mindful of the problems and miseries that the terrorist activities and military operations might create. In short, it aimed to adopt a more holistic approach rather than an occasional one.

The issues that were proposed to be tackled through CRP was reconstruction of various infrastructure facilities that had been demolished and destroyed owing to terrorism. These included educational institutions like schools, colleges, health care facilities, roads, communication networks and supply of energy. All relevant agencies were to assess the damage done. National Counter Terrorism Authority (NACTA) as coordinating agency was established to supervise the entire process.

Besides reconstruction, another objective was the rehabilitation of all the residents of the terror hit areas with special focus on the vulnerable portion of the society like women, children, and elders. The rehabilitation process would be executed through the fund available from both, the government and non-governmental organization (NGOs). NACTA would oversee the rehabilitation process and provided the necessary coordination among all those agencies involved in the rehabilitation process.

Reintegration was another important component that was incorporated into the soft part of NISP. This was to include bringing Madrassahs into the educational mainstream and to regulate them under the law of the land. One of the foremost objective was the development of a uniform national narrative against terrorism and religious militancy with the support of the religious scholars, intelligentsia, media and educational institutions.

***Corresponding Author:** Irfan Ullah, PhD Candidate at the Department of Political Science, University of Peshawar, Pakistan.

The basic aim of this component was to remove the confusion about militancy and to root out the ideological foundation of the militants.

Overhauling the prevailing legal system was also proposed to be tackled through CRP. This factor was designed to do away with the shortcoming existing in the criminal justice system and to tighten the loopholes that are usually exploited by the militants. It is pertinent to mention that all the above recommendations were to put into action under the supervision of the NACTA.

The hard component of NISP was termed as Composite Deterrence Plan (CDP). It ranged from the restructuring of National Internal Security apparatus, NISA and to make it proactive from reactive in its approach. Fostering the much-needed harmony and cooperation among the different intelligence agencies was also one of its features. Likewise tackling the targeted assassination, extortion, kidnapping for ransom, ensuring the safety of the key installation and institutions, de-weaponization, along with preventing the misuse of social, electronic, print media for the dissemination of radical views was proposed to be covered under this component of NISP. Moreover, to integrate the national data base and registration system to identify people residing in various parts of the country, their assets, and border control mechanism to regulate the lawful movement of Afghan refugees and putting a check on any unauthorized movement of people, drugs, weapons were also tasks that were put under the Composite Deterrence Plan (CDP).

CDP also included the formation of the Directorate of Internal Security (DIS) under NACTA to synchronize the functions and activities of some 33 military and civilian intelligence and operational agencies. The formation of Rapid Response Force (RRF), Counter Terrorism Departments (CTD) in federal capitals, all the four provinces, Azad Jammu and Kashmir (AJK) and Gilgit-Baltistan would be setup under the plan. There was also a proposal of setting up of civilian armed forces that would operate under the Ministry of Interior (MOI).

To isolate the militants, a proper scheme for disruption of their transnational network was to be launched which strived to cut off their financial connection. To this end, the cooperation of the international community would be sought along with the tightening of the anti-money laundering regimes.

LITERATURE REVIEW

National Internal Security Policy (NISP) is one of the major contributions of democratic government and All Parties Conference. It has been designed well, by involving major security agencies, civilians and military leadership. The major work ahead is the implementation of NISP in a true sense. Its implementation will test the seriousness on the part of the civilian government. Presently, the government is faced with serious problems like bad law and order as well as governance issues, especially in Baluchistan and FATA. Implementing NISP in these situations will be a tough job for the present government. The will and writ of the state institutions will be tested in this regard. In implementing NISP, the political will of the civilian government will be tested (Khosa, 2014). However, the attitude of one of the major ministry of the government i.e. Ministry of Interior (MOI) in this regard brings to fore a big question mark. Various steps specified in the NISP like registration of madrassahs, building national narrative against militancy and terrorism, and producing environment of cooperation among different intelligence and other security agencies have not been properly worked over by the civilian government till date.

From the literature, it has been assessed that one of the biggest problem faced by civilian government is that it has failed to effectively control the financing of terrorism. This financing is of two types. Firstly, financial support given to different madrassas based on religious support. Secondly, the monetary support given to extremist organizations which are working against the writ of the state. The former support is mainly given based on sectarian issues. Those madrassas which are run by Sunni sect are usually funded by Saudi Arabia and its Sunni allied states. On the other hand, the Shiasect madrassas are mainly supported by Iran. Taking concrete measures for controlling such funding is a big challenge for the government. The government tried through NISP to register madrassas in Pakistan. Moreover, it was aimed to check the funding of these madrassas. But such steps of government were opposed by religious political parties. “Special emphasis should be given to control money laundering and terrorist financing’’. Similarly, the later support is mainly for the basic purpose of strengthening those extremist organizations which are working against the interests of the state. These organizations are continuously working against the writ of the state. Through their militant activities, the law and order situation of the country was deteriorating, especially in Baluchistan. NISP had been needed to be implemented properly in Baluchistan too. Otherwise, the results will not be fruitful as designed in NISP. Role of media in this regard is also very important. Media must not portray the activities of terrorists like heroes. There is need of consensus-based counter narrative against terrorism. In this regard, the role of media is also very important. Media is a powerful tool in modern days. Instead of spreading sensational news, it must play a positive role in curbing terrorism. Similarly, the government must introduce judges’ protection programs and effective security protocols. Military courts are not the permanent solution for eradicating terrorists. The actual

need is to strengthen the judicial organ of the government. There is also need of providing security and protection to those witnesses who are giving their verdicts against terrorists.

Rana (2010) is of the view that there is need to build a national narrative against extremism. In the present situation extremism is defined differently by different people in Pakistan. Some people define it based on their political differences with other groups. Others define it based on religion and even some groups based on social differences. In such situation, it is very difficult to eliminate extremism. There must be consensus on the definition of extremism. It will only be possible in such situation for eradication of this evil from the Pakistani society. The major problem for NISP is the lack of consensus-based definition of extremism and terrorism.

The toughest test for NISP is the militancy in the land of Baluchistan. That part of Pakistan is currently faced with two kinds of problems. The first problem is the presence of ethnic based movement in that region. The history of this kind of movement is long but it took its ugliest form in the days of dictatorial rule of President General Parvez Musharraf. The second problem is more inspired groups of Deobandi interpretation of religion. Some extremist Deobandi groups are involved in terrorist activities against the Hazara Shias. Malik (2014) described that Deobandi Sunni sectarian groups claim responsibility for most of the attacks against the Hazara Shias. These groups carry out their activities time and again and role of the state is questioned because of turning blind eye to their activities. NISP is very difficult to be given the credit of working effectively on the eventful land of Baluchistan.

Farooq (2014) discussed another important challenge to national security policy. He believes that the political parties did not take the required interest in formulating security policy. The policy was prepared in six months. All the political parties were asked to contribute in the formation of this policy. However, these political parties did not take active interest and no significant suggestions were given for this security policy. The only exception in this regard was the Muttahida Qaumi Movement (MQM). This lack of interest shows that the security policy was not the brain child of all the political parties. The actual reason behind this lake of interest is that two provinces i.e. Sindh and Khyber Pakhtunkhwa have not been ruled by the ruling party at federal level i.e., Pakistan Muslim League-Nawaz (PML-N). The lack of interest by these provincial governments and other opposition parties in the formation of national security policy shows that its implementation in these two important provinces is difficult.

According to Hussain (2016), one of the serious problems for NIPS is "the working of banned militant and sectarian outfits which are operating under new banners". The banned outfits are not properly monitored by the government which allows them an opportunity to regroup under different names. Though the NISP declares that the banned militant and sectarian outfits will not be allowed to function under new names, however, the government has not yet taken any serious step for the implementation of this section of NISP.

In the same way there is need of special government funding for NACTA to hire qualified staff. This staff will enable NACTA to work out of its own office premises. If NACTA is made limited to its premises, then it is of no use in countering terrorism. Therefore, there is a dire need of proper and adequate funding for NACTA by the federal government.

Zaidi (2014) holds that the primary purpose of this body, is to improve the level of coordination between all the intelligence agencies. Without proper and coordinated intelligence, it is difficult to control terrorist activities in the country. Pakistan presently has more than enough intelligence agencies and the required personnel. What is lacking is an effective coordination among all the civil and military intelligence agencies. NISP addresses this issue properly and emphasises that the "main responsibilities are improving coordinating intelligence". In the same way there is need of madrassah reforms as well as de-radicalizing of the youth. It will help the state to minimize the extremism and terrorist threats. The de-radicalized youth will contribute positively in the development of the state. In such cases, the NISP will be working properly and effectively. Moreover, there is need to de-radicalize the militant prisoner. They must be processed through a brain washing and rehabilitation program so that they could become more responsible citizens of Pakistan.

From the cited opinion it is concluded that Pakistani society is "deeply divided by emotive discourses." There are many people who are sympathizers of the terrorists. These terrorists are carrying out their activities based on the extreme interpretation of religion. The need is to develop a strong but inclusive discourse towards interpretation of religion. It will enable the people to distinguish between good and bad religious groups and may develop harmony among all the sects as well.

Similarly, the existing institutions are enough for tackling the threat of extremism. Their lack of capacity is the major area to be properly addressed by plans like NISP. These institutions like Frontier Constabulary (FC) and Islamabad Capital Territory Police (ICT) must be given proper attention for capacity building instead of replacing their work by new forces like Rapid Response Force (RRF). Creation of new forces results in redundancy of forces. The problems which arise from these steps are of two types. Firstly, the work of these forces overlaps with each other. Their areas of influence are not clearly divided. They overlap the functions and powers of each other. Secondly, such steps on the part of the government results in the financial burden over the machinery of the government. A huge chunk of money is diverted towards establishing new

forces instead of making the present forces efficient. Similarly, common people are ignored, and their grievances are not properly addressed.

After appreciating the positive aspects of NISP, Safi (2014) focuses on the loopholes of this security policy. He believes that "the approach of the National Internal Security Apparatus (NISA) needs to be changed from a reactive to a proactive approach with a positive stance towards the internal security issues. It is common tragic attitude of every government that it reacts to the steps taken by the terrorists. The actual need is to take certain steps before the activities of the terrorists. Through these measures the loss of life, property and liberty of the people of the state will be safeguarded. Reactive steps taken by government are of short term benefit for the people. They cannot address the long-term grievances of the people and cannot guarantee security.

In the same way, another point which is lacking during the initiation of NISP was that it was not presented in Senate of Pakistan by the government. It was because the government does not have the required majority in the Senate to pass it. The ugly part of this issue was that government was not serious to include certain positive responses and suggestions from the Senate which was dominated by the members of other opposition parties.

Hameed (2014) discussed that instead of all these shortcomings, the positive side of the NISP was that for the first time the fact was recognized that there was a lack of coordination among the security and intelligence agencies in Pakistan. Before NISP, this fact was usually brushed under the carpet. This resulted in the fact that no government addressed that true aspect of security which was lacking. It is NISP alone which has properly addressed this problem. Every problem can be resolved but the prior need is to identify the problem. Now that it is identified, its implementation needs seriousness on the part of the government.

The need is to "conduct research and propose measures for a national counter terrorism action plan". This is mainly the job of NACTA. In this regard the NACTA must play its role as a think tank. Though many such plans were chalked out earlier, but none was given due attention, financial help and space to work properly. As a result, such plans never saw the light of the day. NACTA can identify various causes of spreading terrorism if and only when it is enabled to conduct is free research. A dictated policy of research will be of no use. If the government or state agencies do dictate the researchers, they will not be able to properly identify the factors which leads to the activities of terrorism. An independent NACTA without any pressure from government or military will be able to work properly which is the major purpose of establishing this entity (Butt, 2011).

Moreover, there is also a greater challenge for the implementation of NISP because there are groups in Pakistan which are working against the state interests. "Groups like Lashkar-e-Tayyeba (LeT) and Jaesh-e-Muhammad (JeM) do not target the Pakistani state institutions or civilians, however, their breakaway factions have joined the anti-state insurgents over the years". These groups are mainly believed to be supported by the certain elements within the military establishment in Pakistan. Raza Rumi believes that the role of military is not to define the society, but to defend it. Due to this reason, the state and nation building purpose is ignored by successive military dictators. Their perception about defence of the state is based on viewing India as a perpetual enemy. Due to this perspective certain elements within the military establishment are blamed to be supportive of some militant groups. Similarly, the intelligence agencies are reluctant to share their information with other departments including NACTA (Rumi, 2015).

Such kinds of policies on the part of the military are dangerous for the peace of the state in future. These days, the militants have got affiliations with much dangerous groups like Al-Qaeda and ISIS. Farhan Zahid believes that the future of Pakistan will be secure only if all kinds of terrorist groups are rooted out the soil of Pakistan. These groups are out of control of the state agencies and institutions which may in turn make them more dangerous for the future and security of our state.

Apart from that, the problem of Baluchistan is taking the ugly turn. More and more actors are getting involved in these insurgencies. This problem must be managed by the state. "The grievances of Baloch people need to be properly addressed by the state". It is important to acknowledge our wrong policies which have further worsened the situation. Ejaz Haider says, "acknowledging our contribution to today's problems is an important start for course correction". The future can be secured only by not repeating our previous mistakes.

Critical Analysis

NIPS is the first comprehensive document devised under the civilian leadership to eradicate the menace of violent extremism and terrorism. It has nearly addressed all the factors that have a direct bearing on the internal stability of the country. The text was an answer to the so called holistic approach that the experts are advocating for governing in the scourge of militancy. The text has provided a long array of proposals that needs to be put into practice under the supervisions of NACTA.

NIPS is an unprecedented move in the sense that it came from the civilian leadership which was till now interpreted as the sole domain of the security establishment. The text provides for the coordination among various operational and intelligence agencies and to employ all the relevant entities along with the mobilization of the entire society to control this monster. This policy has rightly diagnosed the problems and prescribed quite

effective antidote. However, the policy is merely a paper work unless it is implemented in the letter and spirit. This is where the otherwise diligently drafted documents of internal security can go astray. The lead institution that was given the significant role in materializing this text was NACTA but unfortunately it was not made an effective and properly functioning institution. The meeting of its board of governor rarely takes place and Prime Minister usually prefers to stay away from its meetings. Similar is the status of the proposed Directorate of Intelligence which was to create the harmony and coordinate the activities of the different intelligence and operational activities. The reason is the existence of trust deficit between the civil and military institutions on the one hand and federal and provincial governments on the other.

The national security policy has failed to consider the low number of police personnel as is manifested by the study of Ahmad (2014). It said that "the total strength of Peshawar city police stands at 6000 while the experts suggest that 11000 is appropriate for the population of 6.7 million. Same problem is afflicting the Karachi city which has 26,667 personnel while the estimated requirement is 100,000.

Madrassah regulation and checking their role in fanning certain mindset conducive to the militants and their role in providing financial support to them in terms of fund raising on their behalf have not been heeded by the authorities. Azeem (2014) study has laid bare "the funding that terrorist organizations are getting from the madrasah of the twin cities." It is claimed that religious seminaries are serving the role of couriers for militant outfits. "Religious parties are also creating hurdles in bringing the madrassas in the mainstream education and are against the regularization".

"Pakistan still has covert relationship with some elements of the Taliban and has not shed its policy of employing them for achieving foreign policy objectives." According to Hussain (2015),certain elements in Pakistani military establishment still have the links with the Taliban. This policy thinking of the state institutions has come in the way of formulating a coherent and transparent policy vis-a-vis the militants. It has also given the anti-state militants the space to manoeuvre and hide among the favourite militants which are normally considered good Taliban. Though the NIPS was the initiative of the civilian government which was aimed to assert the civilian supremacy over the issue mainly taken as the military's domain but the policies that ensued the tragedy of Army Public School at Peshawar ended up bolstering the grip of the military establishment over security matters. The government's decision to set up the military court instead of strengthening the legal system and particularly the criminal justice system was a clear deviation from the recommendations proposed by the National Internal Security Policy. Ironically, NISP had correctly identified the redundancies existing in the security and intelligence agencies but suggested the creation of more institutions. Its perfect example is the creation of Rapid Response Force (RRF) on federal level while the existing Federal Investigation Agency (FIA) could be modified to perform all the tasks that had been assigned to RRF. This is a negative outgrowth of security apparatus and is an unnecessary financial burden on the national exchequer.

Another aspect that has been overlooked in the draft of NISP is the fact that every province has different nature of militancy that needs to be tackled respectively. For example, in Sindh, the law and order is bad mainly because of the urban terrorism due to the political patronage of the criminal bands by the major political parties on ethnic lines. Though the religious inspired terrorism does have its contributions in worsening the law and order situation, but the main contributory is the turf war between the major political forces of the province. Punjab has its own dynamics of terrorism which is mainly sectarian in nature. On the other hand, Baluchistan is witnessing the insurgency that is totally different from the one that is prevailed in Khyber Pakhtunkhwa or FATA. In such situation, it is not sensible to have a uniform NISP for the entire country. The inputs of provincial governments while devising the NISP was not solicited. That's why a sweeping generalization has been resorted to while designing this policy.

Curriculum reforms is one of the major problems which must be addressed properly by the government. There is no agreement over developing curriculum especially at school level which should be inclusive in nature. The curriculum must not categorize people based on their interpretation of religion or sectarian lines. A general message of shared humanity must outshine in the textbooks of the country. Unfortunately, such an attempt by the previous governments has been reversed by the present religious parties especially in Khyber Pakhtunkhwa. Such a categorization makes our children extremists especially in their religious outlook. NISP did not address this problem effectively.

Terrorism is not only the outcome of anti-American resentment and Indian paranoia. It is more an indigenous problem having the local roots. It was not entirely the backlash of American invasion of Afghanistan as is portrayed by some people. Terrorism was present on Pakistani soil way before the event of 9/11. It was present because of the Jihadist policies of President General Zia-ul-Haq. However, it grew at alarming rate after the invasion of Afghanistan by the US and NATO forces.

The loophole in NISP could only be resolved through properly addressing the issues which are not discussed presently in the security policy. The think tanks must revise the security policy with proper feedback from different scholars and academics who are working on the problem of terrorism. In this regard, the provincial feedback and political consensus is of utmost importance. It also requires seriousness on the part of

federal government to implement NISP in its true sense. In such a way the desired fruits of NISP could be achieved and our land could be made further safe for its citizens.

REFERENCES

Ahmad, R. (2014, December 15). *The Express Tribune*. Retrieved from https://tribune.com.pk: https://tribune.com.pk/story/806856/short-supply-peshawar-with-one-police-official-per-1116-citizens/

Azeem, M. (2014, April 07). *Dawn*. Retrieved from https://www.dawn.com: https://www.dawn.com/news/1098291

Butt, Q. (2011, June 01). *The express Tribune*. Retrieved from https://tribune.com.p: https://tribune.com.pk/author/965/qaiser-butt/42/

Farooq, K. K. (2014, April 20). *TNS*. Retrieved from http://tns.thenews.com.pk: http://tns.thenews.com.pk/search-security/#.WLWQvlWGPIU

Farooq, K. K. (n.d.). *The national internal security policy of Pakistan- An Assessment by Khawaja Khalid Farooq*.

Hameed, M. (2014). *National Internal Security Policy 204-18.*

Hussain, Z. (2015, Jan 21). *Dawn*. Retrieved from https://www.dawn.com: https://www.dawn.com/news/1158315

Hussain, Z. (2016, August 17). *Dawn*. Retrieved from https://www.dawn.com: https://www.dawn.com/news/1277950

Khosa, T. (2014, March 08). *Dawn*. Retrieved from https://www.dawn.com: https://www.dawn.com/news/1091721

Malik, S. Y. (2014). Mapping Conflict Trends in Pakistan. *United State Institute of Peace*.

Rana, M. A. (2010). Literature response to extremism in Pakistan. *Pak Institute for Peace studies*, 1-10.

Rumi, R. (2015). *Charting Pakistan Internal Security Policy.* United States Institute of Peace Special report.

Safi, S. (2014). *National Internal Security Policy: An Analysis.* Islamabad: Pakistan Institute of Legislative Development and Transparency.

Zaidi, K. K. (2014). *The National Internal Security Policy of Pakistan: An Assessment.* Oslo: Centre for International and Strategic Analysis.

Siddiqa. A, (2013) *"Militancy and Radicalism in Punjab"* The New Frontiers: SISA Report No. 2, Centre for International and Strategic Analysis, Oslo.

Abbas. H, (2005) "*Pakistan's Drift into Extremism: Allah, the Army, and America's War on Terror"* Armonk, NY: M.E. Sharpe, pp.209.

Rafiq. A, (2014) *"Pakistan's Resurgent Sectarian War"* United State Institute of Peace, Peace Brief.p. 180

Kashif. H, (2010) *"Administrators' Appointment on Non-Political Basis: Sanaullah,"*Daily Times, February 24, 2010, available at archives.dailytimes.com.pk/lahore/24-Feb-2010/administrators-appointment-on-non-political-basis-sanaullah

Abbasi. S, (2013) *"Sleeping with the Enemy,"* The News, May 8, 2013, available at www.thenews.com. pk/Todays-News-16-176147-Sleeping-with-the-enemy

Nasr. V, (2002) *"Islam, the State, and the Rise of Sectarian Militancy in Pakistan: In Pakistan: Nationalism without a Nation"*, Christopher Jaffrelot, Zed Books, New York

Khan. I, (2013), *"Formidable Power of Pakistan's Anti-Shia Militants,"* BBC News, January 12, 2013, available at www.bbc.co.uk/news/world-asia-20983153

BBC News, March 2, 2010 *"Missile 'Kills Lashkar-e-Jhangvi Leader' in Pakistan"* available at news.bbc.co.uk/1/hi/world/south_asia/8544744.stm

Yusuf, H. (2012). *"Sectarian Violence: Pakistan's Greatest Security Threat"* Norwegian Peace Building Resource Centre.

Montero, D. (2007). *"Shiite-Sunni Conflict Rises in Pakistan"* Christian Science Monitor.

Rana, M. A. (2011). *"Pakistan Security Report 2010",*Pakistan Institute of Peace study (PIPS), Islamabad.

Qadeem, M. (2015). *"Countering Ethno-Sectarian Conflicts by Reaching out to Extremist Youth through Engaging Mothers in Pakistan"*, Thammasat Review, 18(1), 62-80.

World Socialist, (2012).*"Pakistan's Hazaras Targeted by Campaign of Ethnic-communal Killings.* http://www.wsws.org/articles/ 2012/may2012/paki-m22.shtml

Bari Baloch, (2012).*"Four Hazaras among 6 Dead"*, The Nation, June 4th 2012, available at http://www.nation.com.pk/pakistan-news-newspaper-dailyenglish-online/national/04-Jun 2012/fourhazaras-among-6-dead.

INSTRUCTION TO AUTHORS

Manuscript Submission:

Send your manuscript with attachment by mailing it to **info@textroad.com**, **textroadjournals@gmail.com** along with **covering letter**.

Manuscript Preparation:

* Title
* Author names and addresses
* Abstracts (Not more than 300 words)
* Key words
* Introduction
* Materials and Methods
* Results and Discussions
* References (Use numbering in the text instead of full references).
  Give full references at the end of the file
* Photographs should be of high quality (Minimum 300-600 dpi)
* Graphs should be in clearly visible form so that it may become easy to redraw
* The manuscript must be submitted in MS-WORD file format.

INSTRUCTIONS TO AUTHORS

Submission

Submit manuscripts as e-mail attachment to the Editorial Office at:

textroadjournals@gmail.com **or** **info@textroad.com** along with covering letter. A manuscript number will be mailed to the corresponding author same day or within 48 hours. The authors may also suggest two to four reviewers for the manuscript (JBASR may designate other reviewers). There is no page limit. The submitting author takes responsibility for the paper during submission and peer review.

Terms of Submission

Papers must be submitted on the understanding that they have not been published elsewhere (except in the form of an abstract or as part of a published lecture, review, or thesis) and are not currently under consideration by another journal. The submitting author is responsible for ensuring that the article's publication has been approved by all the other coauthors. All enquiries concerning the publication of accepted papers should be addressed to editor@textroad.com.

Review Process

All manuscripts are reviewed by an editor and members of the Editorial Board or qualified outside reviewers. Decisions will be made as rapidly as possible, and the journal strives to return reviewers' comments to authors within one or two weeks. The editorial board will re-review manuscripts that are accepted pending revision. It is the goal of the JBASR to publish manuscripts within 4 weeks after submission.

Style of Manuscripts

Manuscripts should be written in clear, concise and grammatically correct English (with 10 font size and Times New Roman font style) so that they are intelligible to the professional reader who is not a specialist in any particular field. Manuscripts that do not conform to these requirements and the following manuscript format may be returned to the author prior to review for correction. The entire manuscript, including references, should be typed single spaced on one side of the paper. All pages should be numbered consecutively in the bottom centre starting from the title page. The manuscript should be presented in the following order.

Title and Authorship Information

The title should be a brief phrase (capitalize first letter of each word in the title) describing the contents of the paper. The Title Page should include the authors' full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

Abstract

All manuscripts should not exceed 250-300 words and should describe the scope, hypothesis or rationale for the work and the main findings. Complete sentences, active verbs, and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Keywords

Key words (5-7 words) should be provided below the Abstract to assist with indexing of the article. These should not duplicate key words from the title.

Introduction

This section should include sufficient background information, provide a clear statement of the problem, the relevant literature on the subject, and the proposed approach or solution. The aims of the manuscript should be clearly stated. The introduction should not contain either findings or conclusions. It should be understandable to colleagues from a broad range of scientific disciplines.

Materials and Methods

This should be complete enough to provide sufficient detail to allow the work to be repeated by others. However, only truly new procedures should be described in detail; previously published procedures should be cited, and important modifications of published procedures should be mentioned briefly. Capitalize trade names and include the manufacturer's name and address. Subheadings should be used. Methods in general use need not be described in detail.

Results

Results should be presented in a logical sequence in the text, tables and figures; repetitive presentation of the same data in different forms should be avoided. The results should not contain material appropriate to the Discussion. It should be written in the past tense when describing findings in the authors' experiments. Results should be explained, but largely without referring to the literature.

Discussion

The discussion should consider the results in relation to any hypotheses advanced in the Introduction and place the study in the context of other work. Results and Discussion sections can be combined.

Conclusions

If an optional conclusion section is used, its content should not substantially duplicate the abstract.

Acknowledgment

The acknowledgments of people, grants, funds, etc should be brief.

References

Bibliographic references in the text appear like [1, 2, 5, 6], using square brace in superscript. References should be numbered consecutively, with style:

Journal paper:

1. Hadjibabaie, M., N. Rastkari, A.Rezaie and M. Abdollahi, 2005. The Adverse Drug Reaction in the Gastrointestinal Tract: An Overview. Intl. J. Pharmacol., 1 (1): 1-8.

Books:

1. Daniel A. Potter, 2002. Destructive turfgrass insects: Biology, diagnosis and control. Wiley Canada Publishers, pp: 24-67.

Chapters in Book:

1. Bray R.A., 1994. The leucaena psyllid. In: Forage Tree Legumes in Tropical Agriculture (eds R.C. Gutteridge and H.M. Shelton) pp. 283–291. CAB International, Oxford.

Titles of journals should be given in full. 'In press' can only be used to cite manuscripts actually accepted for publication in a journal. Citations such as 'manuscript in preparation' or 'manuscript submitted' are not permitted. Data from such manuscripts can only be mentioned in the text as 'unpublished data'.

A Report:

1. Makarewicz, J.C., T. Lewis and P. Bertram, 1995. Epilimnetic phytoplankton and zooplankton biomass and species composition in Lake Michigan, 1983-1992. U.S. EPA Great Lakes National Program, Chicago, IL. EPA 905-R-95-009.

Conference Proceedings:

1. Stock, A., 2004. Signal Transduction in Bacteria. In the Proceedings of the 2004 Markey Scholars Conference, pp: 80-89.

A Thesis:

1. Strunk, J.L., 1991. The extraction of mercury from sediment and the geochemical partitioning of mercury in sediments from Lake Superior, M. S. thesis, Michigan State Univ., East Lansing, MI.

Tables and Equations

Tables and equations should not be submitted in a format exceeding the A4 page size (in portrait form). **All tables should be embedded within the manuscript, and must be captioned and numbered sequentially.** Each table should be on a separate page, numbered consecutively in Arabic numerals and supplied with a heading and a legend. Tables should be self-explanatory without reference to the text.

Figures / Illustrations / Photographs

Graphics should be supplied as high resolution (at least 300-600 dp.i.) electronic files. Digital images supplied only as low-resolution print-outs cannot be used. Graphs, diagrams, chromatograms, photos, etc. should be prepared as clear, original positives, suitable for reproduction. **All figures should be embedded within the manuscript, and must be captioned and numbered sequentially.**

Proofs

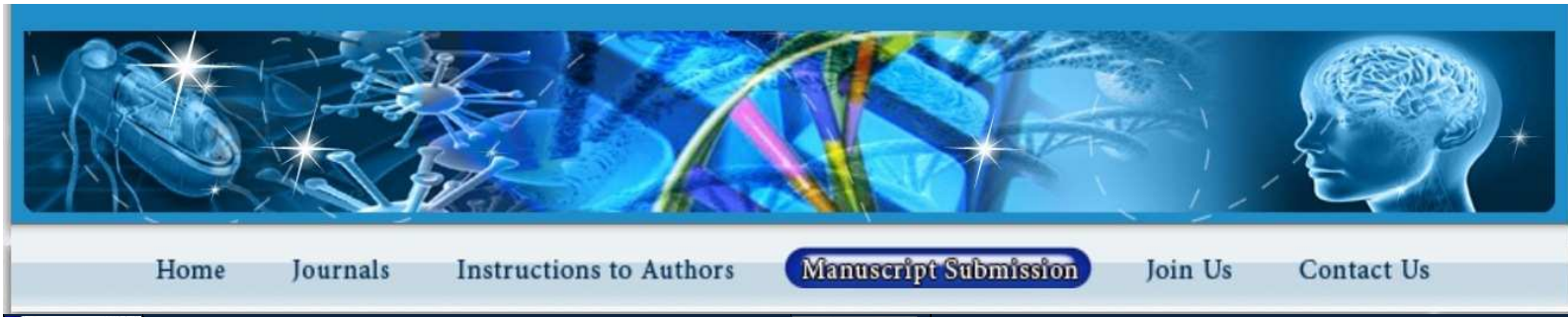
Proofs will be sent via e-mail as an Acrobat PDF file (e-mail attachment) and should be returned within 3 days of receipt. Page proofs are considered to be the final version of the manuscript. With the exception of typographical or minor clerical errors, no changes will be made in the manuscript at the proof stage.

Check List

We recommend that you ask a colleague to read over your paper prior to submission to ensure it is of a high standard and conforms to a high level of scientific writing.

Before submission of your manuscript, please check that:

- All references cited in the text are included in the reference section.
- All figures and tables are cited in the text.
- Figures are at least 300 d.p.i.
- The pages are numbered.




Journal of Basic and Applied Scientific Research


Journal of Social Sciences and Humanity Studies


Journal of Basic and Applied Chemistry


Journal of Basic Sciences and Applied Research


Journal of Applied Environmental and Biological Sciences


Journal of Computer Sciences and Communication


Journal of Pharmaceutical and Biomedical Sciences


Journal of Engineering and Higher Technology


Journal of Agriculture and Food Technology


Current Economics and Management Research